British Medical Journal

The Journal of the British Medical Association

INCLUDING AN EPITOME OF CURRENT MEDICAL LITERATURE

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JENNER CENTENARY NUMBER.

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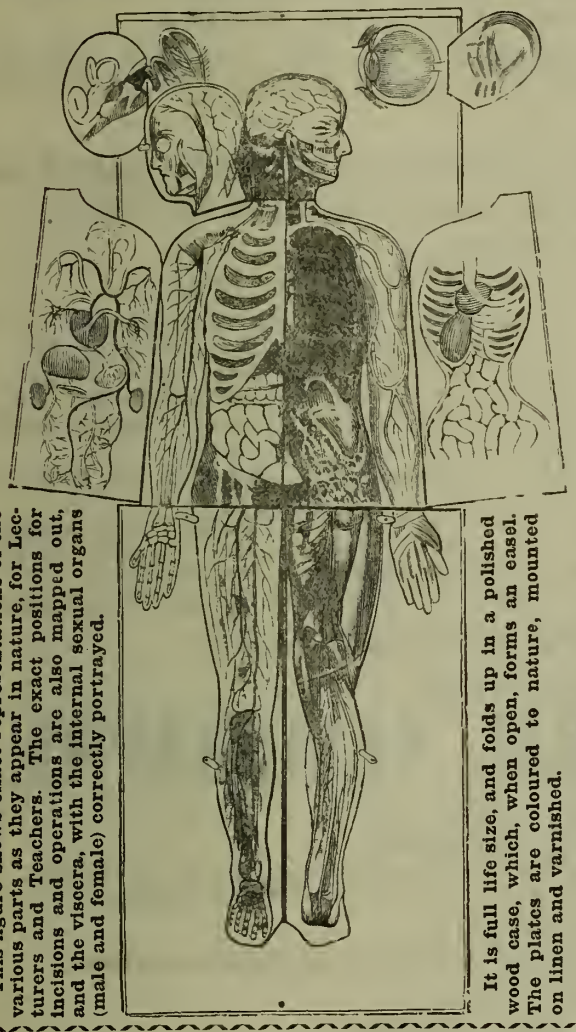

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Renewed attention has been directed to the therapeutic action of the serum by the recent researches of Chantemesse at the Pasteur Institute, and the publication of Prof. Pfeiffer and Dr. Kolle's joint communication "Ueber die specifische Immunitätsreaction der Typhus-bacillen" in the last issue of the *Zeitschrift für Hygiene und Infections-krankheiten*. In No. 9 of the *Deut. Med. Wochenschr.* appears a report by Börger of his experiments with serum prepared by Beumer and Peiper from the blood of an immunised sheep. In those cases in which beneficial results followed, the injections were made on the sixth, seventh, eighth and ninth days of the attack respectively. The feverish symptoms disappeared on the eleventh, seventeenth, eighteenth, and nineteenth days respectively. His serum seems to have had no beneficial influence on the progress of the disease when the first injection did not take place before the ninth day. The *British Medical Journal* thus summarises his conclusions "Börger thinks that it may be said with confidence that the injections, if they do not have a favourable, at least have no injurious effect. He points out that the favourable influence was noticed only in cases in which the injections were made early."

Liquid Anti-Typhoid Serum (B. W. & Co.) is supplied in bottles of 10 c.c., and the dried antitoxin in phials containing an equivalent to that quantity, at 5s. each. Each bottle is guaranteed as in good condition by the signature of the medical expert, under whose personal direction the contents are prepared and tested.

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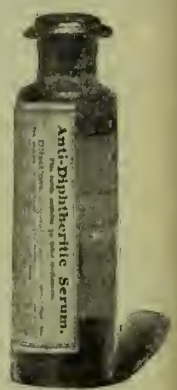
In the *British Medical Journal*, of February 8th, 1896, a very interesting case, treated by means of the B. W. & Co. antitoxin, was reported by the late senior House Surgeon to the Leeds Infirmary. In spite of the usual treatment the disease progressed in the most alarming way. On December 31st, 1895, sloughs had extended half way round, and two-thirds through the penis, and, as the patient was in imminent danger of losing his glans, Anti-Syphilitic Serum (B. W. & Co.) was injected as a last resource. The effect was almost magical; the advance of the disease was checked, and on January 25th the patient had been out for nearly a fortnight and had gained almost a stone in weight. The wound was practically healed.

Liquid Anti-Syphilitic Serum (B. W. &. Co.) is supplied to the medical profession in 10 c.c. bottles at 5s. each. In the form of lustrous golden scales it is supplied in tubes containing the equivalent to 3 c.c. of the liquid serum at 1s. 9d. per tube. The latter quantity forms one average adult dose. Each bottle of the serum is accompanied by an expert guarantee that it is in good condition and free from microbes.

ANTI-DIPHTHERITIC SERUM.

The report on the use, during 1895, of Anti-Diphtheritic Serum in the hospitals of the Metropolitan Asylums Board contains some important statistics which will well repay careful and detailed perusal. In this place it is possible to draw general conclusions only. One of the most striking facts seems to be that, in the six hospitals in question, about 250 lives that would have been lost under other methods of treatment, have been saved by antitoxin during the year under consideration. Perhaps it would be as well to reprint the epitomised General Results as shown in the *British Medical Journal* of April 4th:—



"The results obtained in 1895 were distinctly better than in 1894. The superintendents state that the improved results, as shown by the statistics and by clinical observations, were manifested in the following respects:

"1. A great reduction in the mortality of cases brought under treatment on the first and second day of illness.

"2. The lowering of the combined general mortality to a point below that of any former year.

"3. The still more remarkable reduction in the mortality of the laryngeal cases.

"4. The uniform improvement in the results of tracheotomy at each separate hospital.

"5. The beneficial effect produced on the clinical course of the disease.

"The cases treated in 1894 before the use of antitoxin numbered 3,042, and the deaths 902, or 29.6 per cent. The cases treated with antitoxin in 1895 numbered 2,182, and the deaths 615, or 28·1 per cent. But from these figures were excluded a large proportion of the less severe cases, so that to obtain a fair comparison, all the cases for 1895 must be taken, both those treated by antitoxin (including nearly all the severe cases) and those not treated by antitoxin, including most of the less severe. We then find that the number of cases was 3,529, with 796 deaths, or 22.5 per cent. as compared with a mortality of 29.6 per cent. in 1894."

Dried Anti-Diphtheritic Serum of perfect activity was first issued by us to the profession. This dry Serum is little liable to undergo decomposition, or changes of any nature, and is quite as effective as the liquid form. As it is readily soluble in a small quantity of water, it may be injected by means of an ordinary hypodermic syringe. Anti-Diphtheritic Serum (B. W. & Co.) supplied in either liquid or lamellar form, at the price of 1s. per tube or phial, containing one therapeutic dose of 600 Behring-units. Each bottle is accompanied by our usual guarantee.

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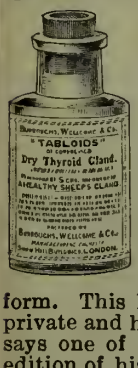

Thyroid "Tabloids," containing the whole substance of sheep's thyroid gland, and therefore all the active principles, are made in two sizes, 1½ and 5 grs. in each, and supplied to the medical profession in bottles containing 100 at 10d. and 2/- each.

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"These 'Tabloids,' being intended for internal administration, are made so that they disintegrate immediately when moistened with water."—*Brit. Med. Journal*, April 11th.

"Disintegrate immediately on coming in contact with water or the juices of the stomach."—*Sanitary Record*, April 11th.

"Rapidly disintegrate when placed in water."—*Chemist and Druggist*, March 28th.

"As regards the physical characters of this 'Tabloid' the best reports can be given. Although retaining its form in spite of repeated contusion against the side of the bottle, it disintegrates within a few seconds when placed in water, even though it is allowed to remain at rest."—*British and Colonial Druggist*, March 27th, 1896.

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Week by week we are receiving reports from the medical and nursing press, and from practising physicians and surgeons, regarding the value of "Emol-Keleet" in the treatment of a great variety of skin diseases, and for ordinary dusting purposes in the nursery and sick room. When the delicate skin of babies is roughened by contact with ordinary hard water, a teaspoonful of "Emol-Keleet" in the bath, night and morning, softens the water and gives a delightfully soft skin. As a nursery dusting powder, and for application before and after the appearance of bed-sores, it is invaluable. For chafing and undue perspiration, and in the treatment of eczema, infantile eczema, intractable urticaria, and nearly every inflammatory or weeping skin disease, it is now largely prescribed.

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"The eruption, though scattered over various parts of the body was most violent about the perineum, between the nates and the region of the pubes. There was the usual weeping discharge, especially in the last-named regions. The constitutional effect was very marked and the nervous symptoms were intense, so much so that the patient almost contemplated bodily destruction." After trying the usual standard remedies without effect "Emol-Keleet" was applied. The result was excellent. "The intense itching abated, his life became bearable, his spirits rose, and he was able to take suitable nourishment. After a few slight relapses the patient rapidly regained his usual health."

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Though "Hazeline" is very properly regarded as an outcome of modern pharmaceutical methods, yet it is undoubtedly the fact that the Witch Hazel was well known by the American Indians to possess the remedial qualities characteristic of

this preparation. It is possible that the reason the medicine-men of the Indian tribes were so successful in their use of it in the treatment of wounds, sprains, &c., was simply because they always used the fresh material in making their preparations. Following up this idea, experiments showed that the whole of the active principles of the Witch Hazel could be obtained from the plant in its fresh conditions only, and this best by process of distillation. "Hazeline," the result of such distillation, is water-like in appearance, with an aromatic, pleasantly-fragrant odour, and a slightly astringent taste. It possesses well-marked anodyne, hæmostatic, and antiseptic properties. "Hazeline" possesses all the advantages of arnica without any of its drawbacks. It is many times more useful, since it may be used freely both internally and externally.

The pain-subduing influence of "Hazeline" makes it of considerable service in painful burns, contusions, sprains, abrasions, &c. It is a styptic of considerable power, and is used largely in hæmorrhage of all kinds. Indeed, it may be said that for internal bleeding few agents are so effective, not only because it is generally successful in promptly arresting the flux of blood, but also because it may be given in large quantities without risk of the production of untoward or toxic consequences. In cases of bleeding from external wounds or cuts, "Hazeline" has replaced the tinctures of iron and myrrh, because it has none of the objectionable characteristics of either of the old remedies, while it possesses the good and beneficent qualities of both, and is no less prompt in its astringent and styptic action.

The antiseptic properties of "Hazeline" are such as to enable it to be used, either diluted or undiluted, to both healthy and unhealthy wounds, and diluted with a little warm water, upon even so delicate an organ as the eye.

"Hazeline" is supplied to the medical profession in ½-lb. and 1-lb. bottles at 1s. 2d. and 3s. 6d. per bottle.

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Ever since the successful issue of the important researches that justified the addition of the word "Perfected" to the title of the Wyeth Beef Juice, we have constantly received reports from medical practitioners expressing pleasure at the increasingly beneficial results they have obtained with this preparation. By certain improvements in the process of manipulation, it has been made possible to prepare the beef juice of greater density and increased concentration. The *nutritious value due to pure serum albumen* has been *increased nearly one-third* with out sacrificing *any* of the highly palatable properties for which this beef juice has become so famous.

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"This is a preparation upon which we reported in warm terms several years ago, and our re-examination of the juice enables us to corroborate what was then said. The juice is quite limpid, is free from alcoholic and phenolic preservatives, and where a highly concentrated and quickly assimilable form of nutrition is desired this juice may be commended."—*The Chemist and Druggist.*

"We have been extremely satisfied with the results of our investigation. The Perfected Wyeth Beef Juice is pleasant to take, is liked by patients, and its nutritive qualities are of the highest. In short, it is a really valuable preparation, as a trial of it in cases where such nutriment is needed will quickly prove."—*Medical Press and Circular.*

Supplied to the medical profession at 2s. 10d. per bottle.

BURROUGHS, WELLCOME & Co.

THE ACTION AND USES OF THE KEPLER MALT PRODUCTS.

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The Kepler Extract of Malt is made from winter-malted barley only, the malt infusion being concentrated by specially-designed machinery in such a way as not to destroy any portion of the diastasic ferment contained in the malt. It is valuable both as a food and as a digester of foods. It is a tonic, alterative, digestive, and nutrient of the highest value.

It contains the largest possible proportion of Diastase, the fermentive principle which hydrates the Amylose and Dextrin. Maltose represents the carbohydrate principles, and aids digestion by stimulating the gastric glands. The phosphates and the albuminoids in the Kepler Malt Extract replace nitrogenous waste of the body without making great demands on the physical powers of the economy. It is therefore a powerful aid to nutrition and digestion. The diastasic ferment of malt is more powerful and less readily destroyed by heat than even the natural ptyalin, and is active in a temperature ten degrees higher than that which destroys the power of the salivary ferment.

Although Kepler Extract of Malt is palatable and even highly agreeable when taken alone, there are many other acceptable and useful ways in which it may be given; for example, as a sweetener and digestive of gruels and as a nutritious adjunct to other foods. In an iced aërated water, such as Seltzer, it forms a richly diastasic "sweet wort," a most agreeable beverage. Children like it spread on their bread like honey. Punch prepared with milk predigested with the Fairchild Peptonising Tubes, and sweetened with the Kepler Extract of Malt instead of sugar, forms a delicious stimulant food.

Supplied in bottles at 1s. 8d. and 3s. each.

THE KEPLER SOLUTION.

THE comparative results obtained by the various processes employed to promote the assimilability of cod-liver oil cannot fail to prove of the greatest interest in view of the many important therapeutical uses to which this excellent nutrient has been applied. A very crude oil has been used in northern latitudes for many centuries, probably since prehistoric ages, but serious scientific attempts to produce a fine, tasteless, odourless, and readily assimilable oil belong entirely to the later decades of this century. Many of the much-praised commercial oils of the present day, however, contain traces of the decomposition products of albuminoid bodies in the livers, or oxidation products of some of the delicate chemical substances found in the oil. The former give rise to the objectionable taste and odour of the oil, the latter are the cause of its disagreeable eructations. By the most careful scientific preparation we secure cod-liver oil free from decomposing liver tissues, and by means of the Kepler process for dissolving the oil in Extract of Malt we prevent its deterioration by oxidation, and present it in a highly palatable and readily assimilable form.

It is almost unnecessary to say that it is not the amount of cod-liver oil that is *ingested* that does good, but the amount that is *assimilated*. It is relatively an easy matter to prepare an emulsion of cod-liver oil in which the oil is merely in a state of suspension, and the oily, fishy taste is temporarily and partially covered by pungent essential oils. When such an emulsion reaches the stomach the whole digestive process is thrown completely out of gear, the oil globules coalesce in the presence of the warm acid gastric juice, and the usual systemic disturbances follow. The Kepler process of treating cod-liver oil, however, carries things a step further. By an ingenious method the oil is actually dissolved in Malt Extract, no aromatic adjuvants are necessary, and a palatable preparation, in flavour like sweet cream, is produced.

"The Kepler Solution is a great advance on anything hitherto attempted in this direction.... The production of a solution of cod-liver oil is a great advance, and marks an epoch in the history of rational therapeutics.... It is an ideal form for the administration of fat."—*The British Medical Journal.*

Supplied in bottles at 1s. 8d. and 3s. each.

BRITISH MEDICAL JOURNAL:

JENNER CENTENARY NUMBER.

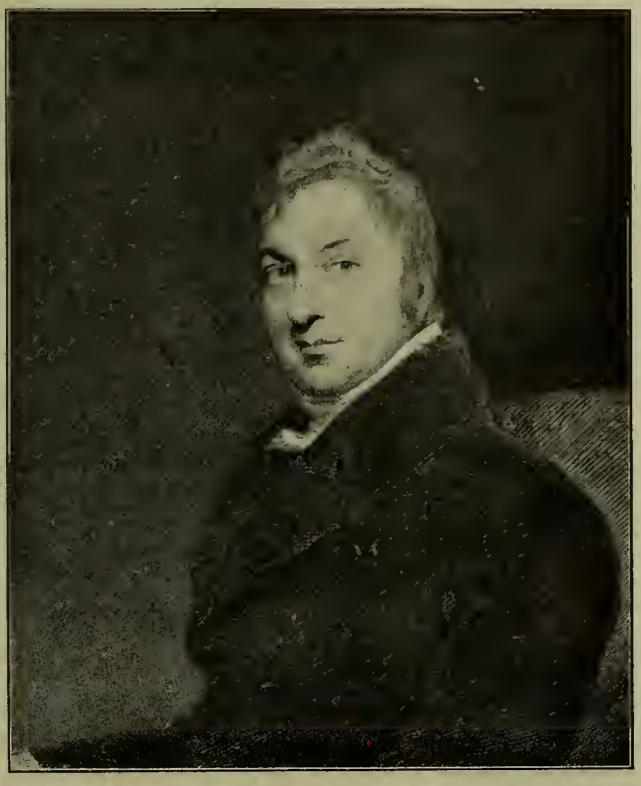
LONDON: SATURDAY, MAY 23, 1896.

EDWARD JENNER:

HIS LIFE, HIS WORK, AND HIS WRITINGS.

Early History.

Edward Jenner, the son of the Rev. Stephen Jenner, Rector of Rockhampton and Vicar of Berkeley, was born at the latter place May 17th, 1749. His mother was daughter of the Rev. H. Head, a former vicar of Berkeley. His first school was at Wotton-under-Edge, where he was under the care of the Rev. Mr. Clissold; from there he was removed to the Rev. Dr. Washbourn, at Cirencester. Jenner's school career was of short duration. At about the age of 13 he began his professional education under Mr. Daniel Ludlow, of Sodbury; from there he entered as a student at St. George's Hospital, where his name appears in the list of students for 1770, and when he was 21 he went as house pupil to John Hunter. Jenner had an innate love of natural history, and nothing could have been more fortunate than his falling under influence such as Hunter's. The young pupil came with a fair knowledge of both zoology and geology; the fossiliferous rocks of his native county had given him ample opportunity for studying geology, and the collecting of fossils was a hobby which he retained throughout his life. To a young man with these tastes Hunter's house with its menagerie and collection of specimens must have been a paradise.



From the painting by Sir Thomas Lawrence in the possession of the Royal College of Physicians.

His Correspondence with John Hunter.

Between master and pupil an affection sprang up which was only terminated by Hunter's death. Unfortunately the letters from Jenner to Hunter have disappeared, but those of Hunter show that Jenner's opportunities in the country of getting specimens and carrying out experiments were always taken advantage of by Hunter and lovingly responded to by his pupil. These attentions of Jenner to Hunter were reciprocated by the latter making purchases for Jenner in town. "I have sent you the candlesticks as you desired," writes Hunter; "I hope you will like them. They coast five pounds and a shilling, so I owe you four shillings." Again, when Hewson's preparations were for sale, Hunter writes and offers to purchase any that Jenner may require. A subsequent letter shows that prices were too high for him to make any bargains. Hunter writes: "I could not buy a single preparation for you, they all went so dear—injections of the lymphatics of a turtle sold for guineas, an eye not injected fifteen shillings, and so of all the rest." In 1786 we read in one of Hunter's letter: "I have bought the print of Wright, viz., The Smiths, which is his best. There is one more I would have you have—I mean Sir Jos. Reynolds's of Count Hugolino (*sic*); it is most admirable, and fit only for a man of taste."

Jenner frequently asked Hunter's advice in professional matters, and also sent patients up to London to him. Hunter's replies to Jenner's queries were generally mixed up with requests for specimens or for experiments. In 1776 he writes: "I have but one order to send you, which is send every thing you can get, either animal, vegetable, or mineral, and the compound of the two, viz., either animal or vegetable mineralised. I would have you do nothing with the Boy but dress him superficially; these Fungus's will die, and be damnd to them, and drop off. Have you large trees of different kinds that you can make free with?" Hunter offered him a share in the school of natural history which he purposed starting. Jenner refused this offer; Hunter's reply to the refusal is given in facsimile on pages 1255-56.

His love for natural history nearly robbed medical science of Jenner's discovery. He arranged and prepared the specimens brought home by Captain Cook in 1771, and was offered the post of naturalist to the next expedition, which sailed in the following year. This, however, he declined, and settled down into country practice at his native town of Berkeley. Here for some years he led the quiet life of a country doctor, with ample leisure for his natural history pursuits. Baron, in his *Life*, gives us a picture of Jenner from the pen of his great friend, Edward Gardner, of Frampton:

The old Vicarage at Berkeley where Jenner was born.

"His height was rather under the middle size, his person was robust but active and well formed. In his dress he was peculiarly neat and everything about him showed the man intent and serious and well prepared to meet the duties of his calling.

"When I first saw him it was on Frampton Green. I was somewhat his junior in years, and had heard so much of Mr. Jenner, of Berkeley, that I had no small curiosity to see him. He was dressed in a blue coat, and yellow buttons, buckskins, well-polished jockey boots with handsome silver spurs, and he carried a smart whip with a silver handle. His hair, after the fashion of the times, was done up in a club, and he wore a broad-brimmed hat."

Baron's own description of his first interview with Jenner is as follows:

"The simple dignity of his aspect, the kind and familiar tone of his language, and the perfect sincerity and good faith manifested in all he said and did could not fail to win the heart of anyone not insensible to such qualities.....He was dressed in a blue coat, white waistcoat, nankeen breeches, and white stockings. We are grateful to him who told us that Milton wore large buckles and that Washington broke in his own horses, and in some future day the curious reader may be thankful for such particulars descriptive of the habits of Jenner."

It is from such contemporary descriptions only that pictures of the great men of the past can be completed; for this reason it is worth quoting a paragraph from the obituary notice of Jenner in the *Gentleman's Magazine*, xciii, 104, evidently written by someone acquainted with him:

"In his housekeeping nothing was gaudy but all was good. The cookery was tastefully and fashionably set out, the wines, commonly five or six kinds, old and of fine flavour. At a striking innocent trait of character the philosopher, as a keen observer, would smile cheerfully, but the writer of this never saw him indulge in what is called a horse laugh."

In 1778 Jenner was crossed in love; this he took very much to heart, and probably his correspondence with Hunter did not improve matters. Although not such a misogynist as his brother William, yet John had not very tender feelings towards the fair sex. He had evidently heard a false report as regards Jenner, for, with his usual disregard of grammar and spelling, he writes: "I was told the other day that you was married, and to a young lady with a considerable fortune. I hope it is true, for I do not know anybody more deserving of one." On hearing the truth, Hunter writes again: "I own I was at a loss to account for your silence, and I am sorry at the cause. I can easily conceive how you must feel, for you have two passions to cope with, viz., that of being dissappointed in love, and that of being defeted; but both will wear out, perhaps the first soonest. I own I was glad when I heard you was married to a woman of fortune; but 'let her go, never mind her.' I shall imploy you with Hedge Hogs, for I do not know how far I may trust mine." There seems a continuous line of thought here, Jenner's future mistrust of the fair sex and Hunter's present mistrust of his hedgehogs.

Family Life at Berkeley.

In 1788 Jenner was married to Miss Catharine Kingscote; although Mrs. Jenner was in delicate health she was able to do much for the poor and suffering in her neighbourhood. In this she was efficiently helped by her husband. Jenner

took an active part in all local work; he was a Justice of the Peace for the County of Gloucester, and performed the duties attaching to this office with great assiduity; in fact, Jenner's brother justices seem to have left a large part of the work to him; he also filled the office of mayor of Berkeley. In Rudder's *History of Gloucestershire* it is stated that Berkeley "is called a borough, though it sends no members to Parliament, and has a mayor annually chosen at the court-leet, who has the tolls of the town and wheelage of all goods landed from the vessels in the river at 2d. a load; but the authority and privilege of his office seem to extend no further."

Jenner vaccinated all the poor in his neighbourhood gratuitously; for this purpose he had a special place erected in his garden, which he called the Temple of Vaccina. From one parish, however, he had for a long time but very few patients; all at once, from this same parish, people came in great numbers. On his making inquiry as to this sudden wish for vaccination, he was told that the churchwardens had been urging the people to be vaccinated on account of the great cost to the parish of the increased number of coffins due to deaths from smallpox!

There were three children born to Jenner—Edward, Catherine, and Robert. John Hunter stood godfather to the eldest boy. The following is his reply to Jenner's request that he would undertake this office:

January, 1789.

DEAR JENNER,—I wish you joy; it never rains but it pours. Rather than the brat should not be a Christian, I will stand godfather, for I should be unhappy if the poor little thing should go to the devil because I would not stand godfather. I hope Mrs. Jenner is well, and that you begin to look grave now that you are a father.—Yours sincerely,

JOHN HUNTER.

From a painting by James Northcote now in the National Portrait Gallery.

Edward was very delicate, and for his tuition at home Jenner engaged the services of a remarkable youth, John Dawes Worgan; he was a lad of great promise, and was preparing to go to Oxford with the view of being ordained. This he was unable to do on account of weak health, and he died in 1809 at the age of 19. A volume of his poems was published in 1810, with a preface by William Hayley. The book was dedicated to Jenner, and in the preface he is thus referred to: "To you, who animated the exertions of Worgan's life by your approbation, and who watched over the couch of his affliction with the skill and sympathy of an affectionate physician, these his remains must be particularly interesting." Though Worgan died so young he wrote some essays in the *Gentleman's Magazine* in defence of vaccination over the signature "Cosmopolitus."

RETIREMENT FROM GENERAL PRACTICE.

In 1792 Jenner obtained the degree of M.D. from St. Andrews, and gave up general practice. This degree was obtained upon the recommendation of his friends Dr. Hickes of Gloucester and Dr. Parry of Bath. The entry in the minute book of the Senatus Academicus is dated July 8th, 1792; Jenner's name is wrongly written in the minute book, as the entry reads: "The University agree to confer the Degree of Doctor in Medicine on Mr. Edward Jennings, Surgeon of Berkeley, in the county of Glocester, upon recommendation from J. H. Hickes, M.D., of Gloster, and C. H. Parry, M.D., of Bath." In the Roll of Graduates the name was originally entered as Jennings, but has been subsequently altered to Jenner.

ACCIDENTS AND ILLNESSES.

Three times Jenner had a very narrow escape of losing his

life. The first was during the severe frost of 1786. He had to ride from Berkeley to Kingscote on an intensely cold day in a blinding snowstorm. The experience is worth recording in Jenner's own words: "As the sense of external cold increased, the heat about the stomach seemed to increase. I had the same sensation as if I had drank a considerable quantity of wine or brandy; and my spirits rose in proportion to this sensation. I felt, as it were, like one intoxicated, and could not forbear singing, etc. My hands at last grew extremely painful, and this distressed my spirits in some degree. When I came to the house I was unable to dismount without assistance. I was almost senseless, but I had just recollection and power enough left to prevent the servants from bringing me to a fire. I was carried to the stable first, and from thence was gradually introduced to a warmer atmosphere. I could bear no greater heat than that of the stable for some time. Rubbing my hands in snow took off the pain very quickly. The parts which had been most benumbed felt for some time afterwards as if they had been slightly burnt. My horse lost part of the cuticle and hair at the upper part of the neck, and also from his ears. I had not the least inclination to take wine or any kind of refreshment. One man perished a few miles from Kingscote at the same time and from the same cause."

Statue in Kensington Gardens by Mr. W. Calder Marshall, R.A.

In 1794 he had a severe attack of typhus, contracted whilst attending his nephew Henry's wife, and again in 1811 he was striken down with the same disease.

Jenner's home life at Berkeley for many years was one of great happiness. This was afterwards much clouded by the illness of his son, Edward, which terminated fatally in 1810. Mrs. Jenner, too, was very delicate: the state of her health caused Jenner great anxiety for some considerable time before her death, which took place at Cheltenham, September 13th, 1815. Jenner had taken up his abode at the last-named place about five years previous to his wife's death. Immediately after this sad event he again went back to Berkeley, and, except for a day or two, never left his native place again. The marriage of his daughter Catherine in 1822 left Jenner still more desolate. This lady died August 5th, 1833, having given birth to a daughter four days previously. His other son, Capt. Robert Fitzharding Jenner, also survived his father.

In 1820 Jenner had a fainting fit in his garden. He was picked up insensible and carried to his house. Baron was at once summoned, and on his arrival found that his patient had rallied, and that there was no reason for apprehending immediate danger. From this attack he never thoroughly recovered. The state of his feelings is best described in his own words, which are quoted from a letter written to Baron, May 31st, 1821. The original is in the Library of the Royal College of Surgeons. "My nerves still vibrate too readily when touched by unnatural sounds. Nature built the brain and nerves, but glasses, plates, knives, forks, and spoons are not of her manufactory. The sharp sounds elicited by the sudden contact of these bodies when forcibly brought together produce an effect like the splash from a stone forcibly thrown into a pool of smooth water. The propensity to feel this and the violence of the shock is in proportion to the length of the interval between one shock and another. Hollow sounds, such as church bells at a due distance, I do not regard, nor the rumbling of a waggon, however near, nor thunder. The clatter of a dinner table is the worst of all, from the clickings of knives, forks, and spoons on earthen

plates; and it is more annoying when there are only two or three at table than when there is a party—perhaps from my attention being more abstracted from myself."

DEATH AND BURIAL.

On January 24th, 1823, Jenner saw a patient whom he describes as being in "a state of paralytic debility." On the following day he himself was found insensible on a couch, in a like condition to the last patient he ever visited. Again his old friend Baron was sent for, but this time without avail, and Jenner breathed his last on the following day. On February 3rd he was laid to rest in the chancel of Berkeley Church by the side of his beloved wife.

The vicarage at Berkeley where Jenner was born is no longer in existence. The illustration of his birthplace is taken from a painting in the possession of Mr. F. Mockler. The room in which he died is that with glass door and Venetian shutters next to the conservatory in the picture of the present vicarage, (p. 1250) which was partly erected on the site of "The Chantry." The "Temple of Vaccina" is still standing, and is figured on p. 1254. The hide of the cow from which Jenner took the matter to inoculate Sarah Nelmes is now in the curator's room at St. George's Hospital; an inscription states that it was presented to the hospital on October 14th, 1857, by Jenner's son.

From a painting said to be by Sir Thomas Lawrence in the possession of Mr. T. Malcolm Watson.

DISCOVERY OF VACCINATION.

The year 1796 is a memorable one in Jenner's history, as on May 14th in that year he performed his first inoculation with cow-pox. The subject was a boy, about 8 years old, named James Phipps, and the matter was taken from the hand of Sarah Nelmes, a dairymaid who had become infected by her master's cows. This was an anxious time for Jenner. On July 1st variolous matter taken directly from a pustule was inserted, but no disease followed. At once he writes off to his friend Gardner to tell him of his success. After describing the inoculation he proceeds:

"Having never seen the disease but in its casual way before—that is, when communicated from the cow to the hand of the milker—I was astonished at the close resemblance of the pustules in some of their stages to the variolous pustules. But now listen to the most delightful part of my story: The boy has since been inoculated for the smallpox, which, as I ventured to predict, produced no effect. I shall now pursue my experiments with redoubled ardour."

This subject seems to have first attracted Jenner's attention when he was a pupil at Sodbury. A young girl came there for advice, and on smallpox being mentioned she exclaimed: "I cannot take that disease for I have had cow-pox." During Jenner's pupilage he mentioned this matter to Hunter, who does not seem to have been much struck with the idea, but he gave to his pupil one good bit of advice, "Do not think, but try; be patient, be accurate." On his return to Berkeley the idea was ever constant in his mind. He found that the opinion of the young girl at Sodbury was a general one amongst the milkers in and around Berkeley. To get at the truth of this opinion was his great object, but it was not until 1780 that he felt sufficient confidence in his conclusions to warrant his imparting them to others. It was to Gardner that he first made known his ideas on the subject of propagating the protective cow-pox from one individual to another, and so ultimately staying the plague of

Vicarage at Berkeley showing window of room in which Jenner died.

small-pox. "Gardner," said Jenner, "I have entrusted a most important matter to you, which I firmly believe will prove of essential benefit to the human race. I know you, and should not wish what I have stated to be brought into conversation, for should anything untoward turn up in my experiments I should be made, particularly by my medical brethren, the subject of ridicule, for I am the mark they all shoot at." In 1788 he brought the question under the notice of the profession in London, but he does not seem to have made much impression on anyone but Henry Cline. The period between this and 1796 was spent in experimental inquiries, and on May 14th in that year, as before stated, he carried out his first inoculation with the cow-pox. Then for two years there was no material for further experiments, as cow-pox disappeared from the dairies in his neighbourhood. The publication of the *Inquiry* in 1798 is referred to in the article on Jenner's works (p. 1257).

Just before the issue of the *Inquiry* Jenner went again to London, where he stayed for nearly three months; but, to his great mortification, he was unable to find one person on whom he could show the benefit of vaccine inoculation. Cline, however, in August of the same year inoculated a child, and he writes to Jenner: "The cow-pox experiment has succeeded admirably. The child sickened on the seventh day; and the fever, which was moderate, subsided on the eleventh day.....I have since inoculated him with small-pox matter in three places, which were slightly inflamed on the third day, and then subsided." Cline, satisfied with the truth of Jenner's discovery, tried to persuade him to leave Berkeley and settle down in London, and assured him of a large and lucrative practice if he would do so. Jenner was proof against this tempting offer, and decided to remain in the country. Later he did give in to the advice of his friends, and took No. 14, Hertford Street, Mayfair, on a lease for ten years; he found, however, that the expenses of a London house were not compensated for by the practice he obtained, and so gave it up before the expiration of his lease and returned to Berkeley, going up to London occasionally as business required his presence there.

The spread of vaccination at home and in foreign countries is dealt with in another article. Here it may be noticed that though honours fell thickly upon him at home his reputation was still greater abroad. On more than one occasion he was the means of obtaining the release of Englishmen detained in captivity abroad. With Napoleon he was a great favourite; on one occasion Jenner petitioned him to allow two friends to return to England; Napoleon was about to refuse the petition when Josephine reminded him that it was from Jenner. "Ah," said the Emperor, "Jenner, we can refuse nothing to that man." So great was his influence that a document signed by him was a good passport; Baron has preserved one of these for us. It runs as follows: "I hereby certify that Mr. A., the young gentleman who is the bearer of this, and who is about to sail from the port of Bristol on board the *Adventure*, Captain Vesey, for the island of Madeira, has no other object in view than the recovery of his health.—EDWARD JENNER, Member of the N. I. of France, etc., Berkeley, Gloucestershire, July 1st, 1810."

The principal honours awarded to Jenner at home and abroad will be found in a tabulated form at the end of this paper.

ATTACKS ON THE DISCOVERY AND THE DISCOVERER.

It was hardly to be expected that so great an advance in protective medicine could be made without opposition. Misstatement and misrepresentation Jenner had to put up with and combat. The caricaturists of the period were not slow to take the matter up; in many of these persons are drawn with horns and cows' heads growing from their bodies as the result of vaccination. Nor was such grotesque falsehood limited to the caricaturists. Dr. Rowley published a tract called "Cow-pox Inoculation no Security against Small-pox Infection;" in this he figured an ox-faced boy, the fact being

gravely stated that this appearance was due to the young man having been vaccinated. Dr. Benjamin Moseley, too, was a most determined opponent of vaccination, and lost no opportunity of attacking it. Cases were published where small-pox had undoubtedly followed vaccination. These Jenner had anticipated. "I expect," he said, "that cases of this sort will flow in upon me in no inconsiderable numbers; and for this plain reason—a great number, perhaps the majority, of those who inoculate are not sufficiently acquainted with the nature of the disease to enable them to discriminate with due accuracy between the perfect and imperfect pustule. This is a lesson not very difficult to learn, but unless it is learnt, to inoculate the cow-pox is folly and presumption." Another cause of the so-called failures was the want of care in those who performed the vaccinations. Jenner investigated many of the cases, and found that small-pox matter had been inserted into the arm on the third and fifth days after vaccination. Some of the cases, too, had been vaccinated in the variolous atmosphere of the Small-pox Hospital. This institution was founded in 1746 for the purposes of isolation and for inoculating the poor; long after the benefits of vaccination had been clearly shown, small-pox inoculation was practised at this hospital.

It was hardly to be expected that Jenner's discovery would escape the *odium theologicum;* many sermons were preached to show the wickedness of vaccination, and one preacher went so far as to try to demonstrate that the cow-pox inoculation was Anti-christ.

From an engraving by J. R. Smith.

Grants to Jenner by the House of Commons.

On March 17th, 1802, Jenner presented a petition to the House of Commons. In this he drew attention to what he had done almost single-handed for vaccination, and asked the House to grant him such remuneration as in their wisdom should seem meet. Stress was laid upon the fact that the new discovery was made known to all, and that the author of it, instead of reaping any pecuniary benefit, had been put to considerable expense. The petition was referred to a Committee of the House under the chairmanship of Admiral Berkeley. The three heads of inquiry were: (1) The utility of the discovery itself, which is the foundation of the petition; (2) the right of the petitioner to claim the discovery; (3) the advantage, in point of medical practice and pecuniary emolument, which he has derived from it. The Committee sat from March 22nd until April 26th and examined forty-five witnesses, including all the chief practitioners of the day. The Report of the Committee on the three points submitted to them was: (1) The result is that the discovery of vaccine inoculation is of the most general utility; (2) the whole of the oral depositions, as well as all the written documents from abroad, are uniform and decisive in favour of Dr. Jenner's claim to originality in the discovery; (3) he has not only reaped no advantage from his discovery, but he has been a considerable loser by the persevering attention which he has bestowed upon this one subject to the neglect of his other business ..... What his gain might probably have been if he had been solicitous to keep the secret within his own practice and that of his immediate pupils is, as far as medical men in great practice themselves can form a conjectural opinion, may be collected from the testimonies expressed in Nos. 7 (Dr. Bradley) and 30 (Dr. Baillie), in which no more than justice is done to the liberality and public spirit of the petitioner in pursuing the propagation and extension of this important discovery, and in rendering it rather of universal utility to the human race than of emolument to himself.

Dr. Bradley stated that Jenner might have expected, if he had settled in town and kept this secret to himself, £10,000 a-year at the present time [1802] and £20,000 within five years. Dr. Baillie told the Committee that Jenner "might have acquired a considerable fortune." It was pointed out that not only had he suffered loss in the way mentioned by Dr. Bradley, but that he had been put to great out-of-pocket expenses. His postages, home and foreign, came frequently to over £1 a-day. So great was the call on Jenner's time and pocket by those who, in all parts of the world, were anxious to obtain information about the discovery, that he dubbed himself "Vaccine Clerk to the World."

In June, 1802, a debate arose in the House of Commons on the report of the Committee. Admiral Berkeley, the Chairman of the Committee, explained portions of the report, and proposed that a grant of £10,000 should be made to Jenner. He stated that personally he thought the amount too small, and he should leave himself quite open to vote for a larger amount if an amendment to that effect were submitted to the House. The gallant Admiral put the matter in a plain, business-like form, to show the moderation of his proposal. There was plain evidence, he said, that Jenner had been the means of saving 40,000 lives per annum in the United Kingdom only; taking each life as worth only 10s., there was due to Jenner £20,000 per annum. Sir Henry Mildmay thought the sum proposed quite inadequate, and moved that £20,000 be inserted in place of £10,000. Mr. Bankes opposed the grant on economical grounds; he acknowledged the utility and general benefit of the discovery, but thought that Jenner had it in his power to remunerate himself by practising vaccination. In his opinion, Jenner had made a mistake in imparting the secret to the public. Mr. Windham answered the objections of Mr. Bankes; and Sir James Sinclair Erskine pointed out that Jenner had come to London at great cost to render his discovery more useful, and that he had sacrificed his practice at Berkeley for this purpose. The Chancellor of the Exchequer said that whatever sum was voted to Jenner, one thing was clear, namely, that he had already received the greatest reward that any individual could receive—the unanimous approval of the House of Commons. The right hon. gentleman pointed out that no money value could be put upon the discovery, as it was beyond all calculation. The difference between £10,000 and £20,000 was not the standard by which the Committee of the House judged of

the merit of Dr. Jenner, but the question of the amount had a reference to the duty which they owed to the public. The Chancellor thought that the vote would largely increase Jenner's practice, and that he would be thus indirectly benefited. To this Mr. Grey replied that there was no reason to expect such a consequence when everything attending the vaccine inoculation had been rendered so easy by Dr. Jenner's generous conduct. After Mr. Wilberforce and Mr. Courtenay had spoken both in praise of Jenner, a vote was taken by which it was decided that the grant should be £10,000. The numbers were: For the retention of the words ten thousand pounds, 59; against, 56; majority, 3.

On July 29th, 1807, the question of giving recompense to Jenner was again brought before the House of Commons by the Right Hon. Spencer Perceval (Chancellor of the Exchequer), who proposed that a second grant of £10,000 be paid to the discoverer of vaccination. In doing this Mr. Perceval referred to the previous grant, and pointed out that the intervening time had strengthened the general opinion as to the efficacy of vaccination and as to its great benefit to the nation at large. Mr. Shaw Lefevre stated the case of the antivaccinists; his main argument was that cases had been reported which were not successful. He, however, added: "I certainly shall oppose this vote; at the same time I ought to add that I do not know that I shall always persist in opposing it, for that my great object is to gain time and further opportunity to examine the report of the Royal College of Physicians." A long debate ensued, in the course of which Mr. Edward Morris, M.P. for Newport (Cornwall), moved that £20,000 be substituted for £10,000. The reason given by Mr. Morris for his amendment was that "during the progress, thus judiciously withheld for a great number of years, it is almost impossible that he (Jenner) could have followed the ordinary duties of his profession; he must have sacrificed a great portion of his practice as a physician, so that the time which he devoted to the discovery of this inestimable remedy may be said to be time devoted to the interest of the public, and entirely at his own risk." Mr. Wilberforce stated that on the previous occasion he had voted for the smaller sum, but "that was at a much earlier period of the discovery than the present." Instead of giving Jenner either £10,000 or £20,000, he was in favour of granting £1,000 per annum, "because it looks more like a memorial of the affection and gratitude of his country, and more likely to point him out as a person possessing and enjoying the affection and gratitude of his countrymen, who entertain a proper sense of the benefits they have received from him." It was pointed out that as the House was in Committee of Supply it could do no more than vote the supplies for the year, so that Mr. Wilberforce's proposal could not be adopted. The Chancellor of the Exchequer spoke in favour of the smaller amount, but the grant of £20,000 was carried by a majority of 13.

In looking at the small majorities by which these votes were carried, it must be borne in mind that the question on each occasion was not whether a grant should be made to Jenner or not, but whether the amount should be £10,000 or £20,000. Had the former question been the one before the House, it would have been carried with scarcely a dissentient voice. No truer estimate of the high opinion which educated men held of Jenner's character can be obtained than that which is evident in reading the reports of both of these debates. Even where a speaker disagrees with the vote, or has doubts as to the efficacy of vaccination, there is not a word to be found derogatory to Jenner's good name. No better evidence of this unanimity can be given than that of Dr. Moseley, who was Jenner's most bitter opponent. In his anger he writes, "It will not be credited by future generations that both these large sums were granted by Parliament without even a symptom of controversial discussion. Party tongues were dumb, and the spirits of contention, which on subjects of much less importance to the human race have so often shaken the empire, were here absorbed in sympathetic composure and unity."

Official red tape was well illustrated in the payment of the first grant; there was considerable delay in handing over the money to Jenner, and when this was done nearly £1,000 was deducted for fees and costs. To some extent this was remedied in the second grant, as the resolution of the Committee distinctly stated that the amount was to be paid "without any fee or other reward whatever."

From a portrait by Vigneron.

Jenner's Personal Character.

In forming an estimate of any public man's character there is generally a *via media* lying between the too enthusiastic praise of well-meaning but perhaps not always strictly unprejudiced personal friends and the bitter malice of opponents. In very few instances is this more a fact than it is in Jenner's case. Baron was so great a worshipper of Jenner that his statements are sometimes warped by his affection for his friend. On the other hand, those who are opposed to vaccination, and cannot or will not see the benefits which the human race has derived from it, can hardly find words hard enough to express their contempt for Jenner.

That he was a great man of the stamp of John and William Hunter probably no one would assert. But he was a patient observer, with a great love of Nature; probably dilatory and unmethodical: Baron's picture of him with his fossils scattered about rather points to this.

Of Jenner's manual dexterity Hunter evidently had not a very high opinion. To carry out some experiments for Hunter, Jenner had asked for a thermometer; the former sent the instrument, but in his letter says: "You very modestly ask for a thermometer; I will send you one, but take care that those damnd clumsy fingers do not break it also."

His perseverance with his investigations as regards the cow-pox is plainly shown; in season and out of season he talks of it to his friends. So much so was this the case at the local societies to which Jenner belonged that he was, by his fellow members, looked upon as having a bee in his bonnet, and it was intimated to him that a little less about his theory would be very acceptable. But in Baron and Gardner he had friends who did not tire and who urged him on in his work by their sympathy.

As a friend and companion he was evidently much appreciated by his neighbours at Berkeley; in all local affairs he took great interest, and his time for this purpose was, so far as his professional duties would permit, always freely at the disposal of his fellow townsmen.

Jenner was a man with a deeply religious mind; in this he was undoubtedly greatly influenced by the example of his wife. Some of his last words were: "I do not marvel that men are not grateful to me, but I am surprised that they do not feel gratitude to God for making me a medium of good." His very last public act was to attend a meeting at Berkeley for forming a Bible Society; at this meeting he moved the chief resolution.

Jenner's ideal of professional honour was certainly greater than that of some of his contemporaries. When he had written out the account of his improved mode of preparing tartar emetic, Hunter writes off at once and suggests that Jenner should give the preparation a new name, and he adds: "I would have you to burn your book, for you will have all the world making it." Jenner was proof against this temptation to reap reward from the use of a secret remedy, and published his paper in the *Transactions of the Society for the Improvement of Medical and Chirurgical Knowledge*. It was also pointed out by persons very competent to express an opinion on the subject that Jenner might have reaped a rich harvest had he kept secret his method of vaccination. Benjamin Travers, writing in 1804, says: "You should not have acted in the manner you have; your liberality and disinterestedness everyone must admire and extol, but you are sadly deficient in worldly wisdom." Again he writes: "If you had never for a moment hesitated as to whether he might not be a richer man by keeping his information to himself.

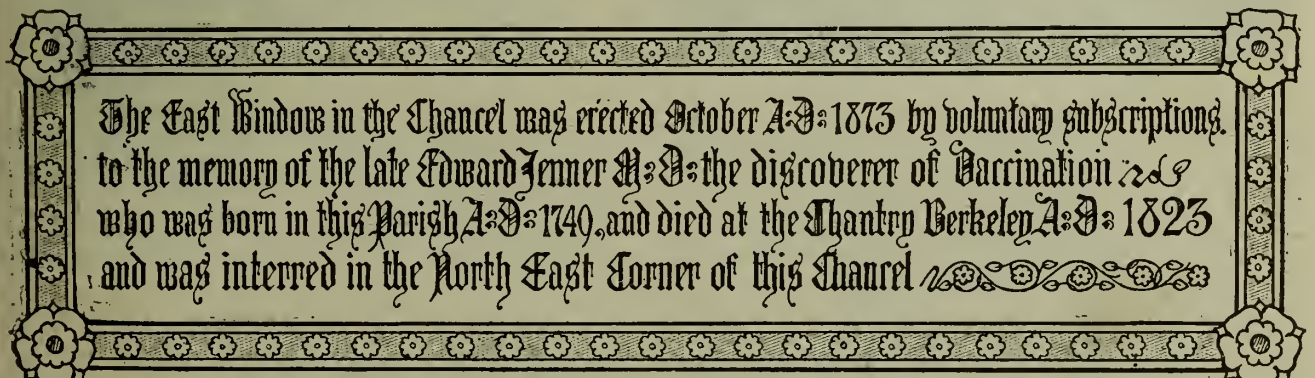
Jenner was exceedingly fond of music and poetry; some of his verses still live in printed collections. His two best known poems are perhaps "To a Robin" and "Signs of Rain." The latter was written as an excuse for not accepting the invitation of a friend to make a country excursion, and consists of the popular signs of coming rain ingeniously strung together in rhyme. As four specimen lines we may take the following:

The walls are damp, the ditches smell,
Clos'd is the pink ey'd pimpernel.
Hark! how the chairs and tables crack;
Old Betty's joints are on the rack.

Although Jenner met with much opposition in the introduction of vaccination, and had to put up with misrepresentation and abuse in his own time, it has been reserved for certain persons in the present generation to speak of him as a charlatan, a shuffler, a fool, and a liar. Surely those who lived with him and knew all the circumstances of the case were better able to judge fairly of the character of the man than those who, living a century later, try to draw a picture of him by distorting facts, and by assigning some bad motive for all his actions. The debates in the House of Commons show clearly in what esteem Jenner was held by men of education in his own time. The bare fact that a man who was a simple country doctor, without any outside influence to assist him, should have risen to the position Jenner held in his profession is a sure sign of the personality and character of the man.

Memorial window in Berkeley Church.

The Medical and Chirurgical Society was founded by the *élite* of the medical profession, and amongst the names of the first Fellows we find that of Edward Jenner. Oxford University must have had a high opinion of his qualifications or the authorities would not have departed from their usual custom and granted him the Honorary Degree of Doctor of Medicine.



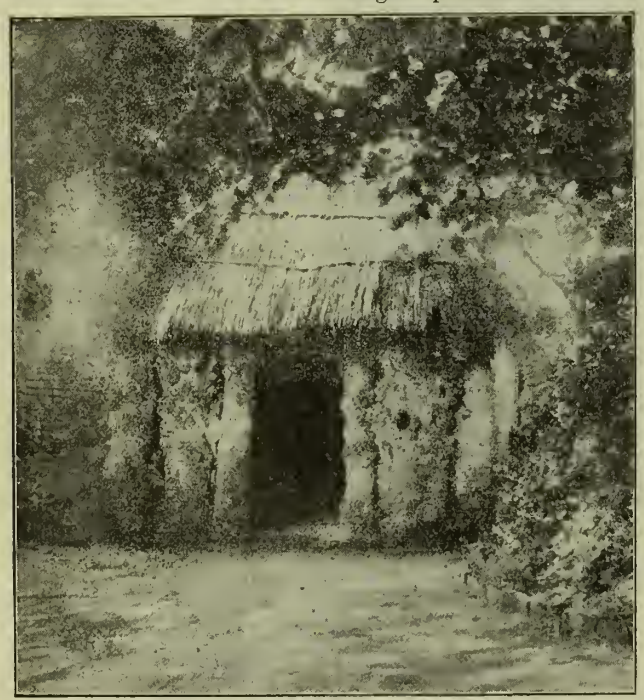
Memorial tablet in Berkeley Church.

undertaken the extinction of the small-pox yourself, with coadjutors of your own appointment, I am confident you might have put £100,000 in your pocket, and the glory be as great and the benefit to the community the same." As is well known, Jenner made public his discovery at once, and

JENNER'S WRITINGS.

To the Medico-Convivial Society at Rodborough Jenner contributed several papers; one of these was on Angina Pectoris and another on Ophthalmia. Writing in the *Asclepiad*, vol. vi, p. 268, Sir B. W. Richardson states that "there is no written record bearing on these subjects left behind on which we can found any correct conclusions as to his originality." This is not quite correct, as Dr. Parry, in his "Inquiry into the Symptoms and Causes of the Syncope Anginosa," has given us a communication from Jenner on the subject. Dr. Parry writes as follows: The substance of the following essay was originally read to a medical society in Gloucestershire. In that society the influence of the heart on the animal economy had often been the subject of discussion. It was generally admitted that many of the cases which are vulgarly called asthma originated, through different media, from diseases of that organ; and it was suggested by Dr. Jenner that the angina pectoris arose from some morbid change in the structure of the heart, which change was probably ossification, or some similar disease of the coronary arteries. To some questions which I have lately put to that excellent pathologist as to the series of observations which produced that opinion, I have received the following answer:

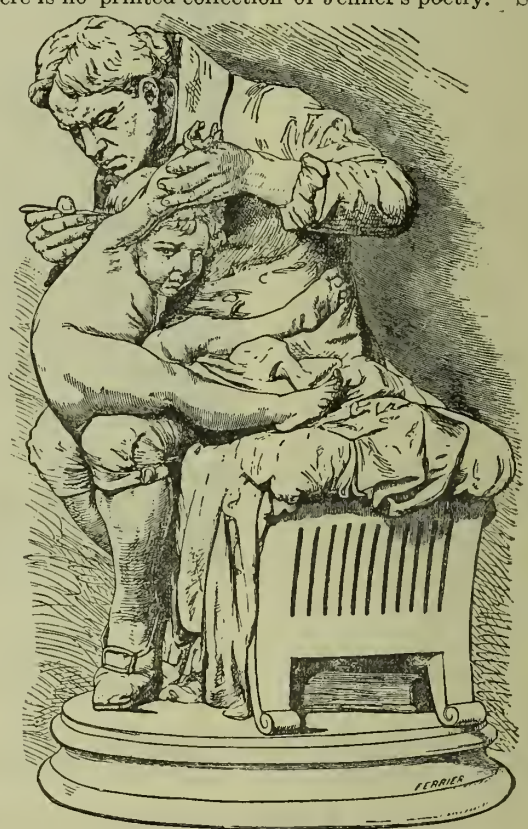
"The first case I ever saw of angina pectoris was that in



"Temple of Vaccina" in Jenner's Garden.

the year 1772, published by Dr. Heberden, with Mr. Hunter's dissection. There, I can almost positively say, the coronary arteries of the heart were not examined. Another case of a Mr. Carter, at Dursley, fell under my care. In that, after having examined the more important parts of the heart without finding anything by means of which I could account either for his sudden death or the symptoms preceding it, I was making a transverse section of the heart pretty near its base when my knife struck against something so hard and gritty as to notch it. I well remember looking up to the ceiling, which was old and crumbling, conceiving that some plaster had fallen down. But, on a further scrutiny, the real cause appeared; the coronaries were become bony canals. Then I began a little to suspect. Soon afterwards Mr. Paytherus met with a case. Previously to our examination of the body I offered him a wager that we should find the coronary arteries ossified. This, however, proved not to be exactly true; but the coats of the arteries were hard, and a sort of cartilaginous canal was formed within the cavity of each artery, and there attached, so, however, as to be separable as easily as the finger from a tight glove. We then concluded that malorganisation of these vessels was the cause of the disease. At this very time my valued friend Mr. John Hunter began to have the symptoms of angina pectoris too strongly marked upon him; and this circumstance prevented any publication of my ideas on the subject, as it must have brought on an unpleasant conference between Mr. Hunter and me. I mentioned both to Mr. Cline and Mr. Home my notions of the matter at one of Mr. Hunter's Sunday night meetings, but they did not seem to think much of them. When, however, Mr. Hunter died Mr. Home very candidly wrote to me immediately after the dissection to tell me I was right. The appearances in Mr. Bellamy's case gave me the idea that the disease arose from a determination to the vasa vasorum, and that the concretions were deposits from the coagulable lymph, or other fluids, which had oozed out on the internal surface of the artery." Dr. Parry then proceeds: With these observations of Dr. Jenner we were well acquainted in the society. Many of them were, indeed, communicated to us as they arose.

There is no printed collection of Jenner's poetry. Several



"Jenner vaccinating his own child." (From the Statue by Monteverde.)

pieces are printed in Baron's "Life"; there are others in the collection of Jenner papers in the Library of the Royal College of Surgeons of England.

Observations on the Natural History of the Cuckoo, in a letter to John Hunter, Esq., F.R.S., *Phil. Trans.*, vol. lxxviii, p. 219.

A Process for Preparing Pure Emetic Tartar by Recrystallisation, by Mr. Jenner, surgeon at Berkeley, in a letter to John Hunter, Esq., read June 4th, 1784, *Trans. of a Soc. for the Improvement of Med. and Chir. Knowledge*, vol. i, 1793, p. 30.

In the Library of the British Museum there is a pamphlet entitled Cursory Observations on Emetic Tartar, wherein is pointed out an improved method of preparing Essence of Antimony by a solution of Emetic Tartar in Wine. Wotton-under-Edge, printed by J. Bence, bookseller and stationer. There is no date, but at the end the pamphlet is signed "E. Jenner, Surgeon, Berkeley, Gloucestershire," in Jenner's

Dear Jenner

I send you in answer to
mine, which I should have answered
I own I suspected it would not
be; yet as I did intend such a
solution, I was unwilling to give
upon the offer. I thank you for
your Expt on the Hedge Hog; but
why do you ask me a question, by
the way of solving it. I think
your solution is just; but why
think why not try the Expt. Repeat
all the Expt upon a Hedge Hog as
soon as you receive this, and they
will give you the solution. Try the
Hart

cut off a Dog at the same place
cut off the Head, and expose
the Heart and let me know
the result of the whole

I am Dear Jenner
ever yours
John Hunter

Aug. 2d

Mr Jenner
Surgeon at Barkley
Gloucestershire
Rfm Mayne

own writing. This work seems to have escaped the notice of previous writers on Jenner. The copy in question shows pretty conclusively that it ought to be included in the list of his books. The volume of tracts in which it is bound up at the Museum contains one pamphlet which originally belonged to Dr. Lettsom. It is probable that all the tracts were once his property, and that this one is a presentation copy; this would account for Jenner's signing it.

An Inquiry into the Causes and Effects of the Variolæ Vaccinæ, a Disease discovered in some of the Western Counties of England, particularly Gloucestershire, and known by the name of the Cow-pox, pp. iv, 75, 4 plates, 4to. London: 1798. Dedicated to C. H. Parry, M.D., at Bath. Preface is dated Berkeley, Gloucestershire, June 21st, 1798.

Again—2nd edition, pp. vii, 182, plates, 4to. London: 1800. Dedicated to "The King." Preface is dated Berkeley, Gloucestershire, December 20th, 1799.

Again—3rd edition, pp. vii, 182, 4 plates. 4to. London. 1801. The third edition consists of "The Inquiry," "Further Observations on the Variolæ Vaccinæ," "A Continuation of Facts and Observations, etc."

The "Inquiry" was also published in America, and translated into Latin and into nearly every European language.

There are two known manuscripts of the "Inquiry" in existence, one in the Library of the Royal College of Surgeons of England, and the other in the collection of Jenner relics belonging to Mr. Mockler. The former MS. is entirely in Jenner's handwriting, the latter in that of his brother-in-law, with notes and corrections made by Jenner himself. The College MS. has been examined by Professor Crookshank, who has come to the conclusion that it is the paper rejected by the Royal Society. This opinion is given mainly on the fact that Jenner had originally written in the MS.: "I shall produce many instances (I could produce a great number more), but the following, I presume, will be fully sufficient to establish the fact to the satisfaction of this learned body." In the MS. these last words are scratched out, and it is made to read "establish the fact very satisfactorily."

Before proving that this paper was rejected by the Royal Society it will be necessary for the objectors to prove that it was ever received by that learned body. Undoubtedly Jenner originally intended sending the paper to the Royal Society, although Worthington advised him that it would be better to publish it as a pamphlet. What seems to have happened was that Everard Home took it to the Society and showed it informally at a Council meeting. It must not be forgotten that the theory was rather a startling one, and that at that time it was founded on one experiment only. There is not much to be wondered at in the Council referring the paper back to Jenner for further experiments to corroborate his views. Had the paper been formally presented by Home, and had it gone through the regular routine at the Society, there would be evidence of this in the Archives, but no one has ever been able to find any trace of it.

Professor Crookshank was evidently anxious to make the most of the Society which had "rejected" Jenner's paper. In the MS. at the College of Surgeons Jenner calls it "this learned body." This Professor Crookshank, whilst professing to quote verbatim, has altered to "this very learned body."[1] This word "very" is again inserted in vol. ii, p. 9, where the differences between the MS. and the printed pamphlet are pointed out. Professor Crookshank states that this alteration is made "in a different handwriting." This is not so; the writing is undoubtedly by Jenner himself. It may here be noticed that the quotations from the MS. in Professor Crookshank's book are very incorrect. Jenner writes "malady," Professor Crookshank prints "distemper;" the MS. has "for the same purpose," this appears in print as "in the same manner." Many other instances might be pointed out.

Professor Crookshank writes (vol. i, p. 264): "I was struck by the substitution, in a different handwriting, of the word *investigation* for *discovery*. Some friendly critic had evidently read the manuscript and made this correction, among others. Had Jenner made a discovery, and if so, what was it?..... The correction of his critic was, therefore, fully justified." The page of the manuscript in which this alteration is made is reproduced in *facsimile* (p. 1259), and it will be quite obvious to anyone examining it that the word "investigation" is in the same handwriting as the rest of the manuscript, namely, in that of Jenner. The capital *I*, the peculiar *t* and the *g* in the middle of a word, are identical with similar letters in other parts of the manuscript. The "justification" of the critic thus falls to the ground. It may be mentioned that the alteration about "the learned body" is also made in Mr. Mockler's copy, which is somewhat earlier than the College one. This can be seen by comparing the dates mentioned in the two manuscripts. It is not necessary to labour the point as to whether this was the manuscript taken by Home to the Royal Society or not. Even if it could be shown conclusively that the Society did receive and reject the paper, the subsequent history of the work would prove, not that Jenner was wrong, but that the Council of the Society made a mistake in rejecting the paper.

[1] *History of Vaccination*, vol i, p. 253.

Further Observations on the Variolæ Vaccinæ or Cow-pox, pp. 64, 4to. London: 1799. Dedicated to C. H. Parry, M.D., Bath. Dated Berkeley, Gloucestershire, April 5th, 1799.

A Continuation of Facts and Observations relative to the Variolæ Vaccinæ or Cow-pox, pp. 42, 4to. London: 1800.

Instructions for the Vaccine Inoculation: a sheet. 1801. Printed by D. N. Shury, Berwick Street, Soho.

On the Origin of the Vaccine Inoculation, pp. 8, 4to. London: 1801. The preface reads: "I am induced to give the following concise History of the Origin of Vaccine Inoculation from my frequently observing that those who only consider the subject cursorily confound the casual cow-pox with the disease when excited by inoculation.—Edward Jenner, Bond Street, May 6th, 1801." This pamphlet is very scarce, and was reprinted in 1863 by Mr. J. Brendon Curgenven.

On the Varieties and Modifications of the Vaccine Pustule, occasioned by an Herpetic State of the Skin, pp. 13, 4to. Cheltenham: 1806. The preface is dated Berkeley, March 18th, 1806. Reprinted Gloucester, 1819. This was originally published in *Med. and Phys. Jnl.*; xii, 1804, p. 97, as a letter without any printed title; the head line of page 98 is "Dr. Jenner, On the Effects of Cutaneous Eruptions;" on pp. 99 to 101, "Dr. Jenner, On Modifications of the Vaccine Vesicle."

Facts for the most part unobserved or not duly noticed respecting Variolous Contagion, pp. 15, 4to. London: 1808. Dated November 18th, 1808.

Observations on the Distemper in Dogs (read March 21st, 1809.) (*Med.-Chir. Trans.*, i, 263.)

Two Cases of Small-pox Infection communicated to the Fœtus *in Utero* under Peculiar Circumstances, with Additional Remarks (read April 4th, 1809.) (*Ibid.*, i, 269.)

Letter to William Dillwyn, Esq., on the Effects of Vaccination in Preserving from the Small-pox. To which are added sundry documents relating to vaccination referred to and accompanying the letter, Pp. 20, 8vo. Philadelphia: Published by the Philadelphia Vaccine Society. 1818.

A Letter to Charles Henry Parry, M.D., F.R.S., etc., on the Influence of Artificial Eruptions in Certain Diseases incidental to the Human Body, with an Inquiry respecting the Probable Advantages to be derived from Further Experiments, pp. 67, 4to. London. 1822. This is dated Berkeley, 1821.

Some Observations on the Migration of Birds, by the late Edward Jenner, M.D., F.R.S., with an introductory letter to Sir Humphry Davy, Bart., Pres. R.S., by the Rev. G. C. Jenner. Read November 27th, 1823. *Phil. Trans.*, 1824, p. 11.

Portraits of Jenner.

Painting by Sir Thomas Lawrence, now in the possession of the Royal College of Physicians; half length, seated in chair. An engraving of this picture by W. H. Mote forms the frontispiece to the first vol. of Baron's "Life," and is also the illustration to the Memoir of Jenner in Pettigrew (see p. 1245).

Painting said to be by Sir Thomas Lawrence in the possession of Mr. T. Malcolm Watson. On the back of the picture is the following written statement: "This original portrait of Dr. Jenner executed by Sir Thomas Lawrence was presented by him to his former pupil and intimate friend, Mr. Henry Wyatt, at whose death it became the property of his brother Mr. Thomas Wyatt. The widow of the latter presented it to her sister Mrs. Edward Wünsch, of Glasgow, from whom I received it as a New Year's gift on 1st January, 1862.—Thos. Watson." The present owner is the son of Dr. Thomas Watson, who wrote the above note (see p. 1249).

Painting by James Northcote, painted for the Medical Society of Plymouth and Plymouth Dock; it is now in the National Portrait Gallery; seated, fur collar, etc., right hand on paper bearing legend "Pustules of the Cow Pox in its successive stages." Engraving of the above by W. Say. Engraving by Edward Finden: as illustration to the *Lives of British Physicians (Family Library)*, 1830. Engraving by Ridley in *European Magazine*, vol. xlvi, 1804, p. 163. (See p. 1247.)

Portrait in Medley's group of the Founders of the Medical Society of London. Jenner was not in the original picture, but was subsequently introduced. The engraving by Branwhite was partly finished before this was done, and a piece of copper had to be let in the plate so that Jenner's head and shoulders might be engraved on a spot previously occupied by background details.

Painting by William Hobday represents Jenner seated; cloak with fur collar round him; left arm rests on volume lettered "John Hunter"; paper relating to vaccination lying on table. Engraving of the above "begun by the late William Sharp," finished by William Skelton. Whilst sitting for this portrait Jenner wrote the following verse:

> Ere you finish your job, Mr. Hobday, you'd better
> On each of his legs clap a bit of a fetter,
> Or the doctor will presently show you some fun—
> Yes, start from the canvas and certainly run.

J. R. Smith. Engraving in mezzotint. Jenner is represented leaning against a tree; milkmaid and cows in the distance. Engraving of the above by R. Page. 1823. (See p. 1251.)

J. Hazlitt, jun. C. Turner, sculptor. London: Published October 20th, 1808, by J. Hazlitt, No. 109, Great Russell Street, Bloomsbury.

Oil painting. Artist unknown. In Royal College of Surgeons of England.

In the collection of portraits at the Royal Medical and Chirurgical Society there is a small photograph said to be "from an original portrait in the possession of Mr. William Smith of Chesterfield."

Portrait by Vigneron, lithographed by C. de Lasteyrie, 1824. This was reproduced in the *Asclepiad*, vol. vi, p. 250. Also lithographed by Engelmann. (See p. 1252.)

Portrait of Jenner in a cocked hat. *Hicks sc.* Published by Henry Fisher. Caxton. London: March 1st, 1823.

Miniature by J. Robinson. Jenner with pen, ink, and paper in front of him; cow lying down in back. This is in Mr. Mockler's collection. There is an engraving of this by R. M. Meadows.

Head on large scale, drawn and etched by H. E. Shrapnell.

Oil painting. Artist unknown. In Mr. Mockler's collection.

Medallion. J. B. Drayton, ad viv. del. Anker Smith, A.R.A., sculp. Published February 1st, 1823, by J. B. Drayton, Cheltenham, Gloucestershire.

Silhouette from the title page of Lettsom's "Hints Designed to Promote Beneficence, Temperance, and Medical Science," vol. iii, 1801.

Statues.

Bronze statue by Calder Marshall, R.A., now in Kensington Gardens. This statue was originally in Trafalgar Square, but was removed to Kensington Gardens in 1862. The cost was defrayed by public subscription raised by a committee, of which Dr. Conolly was Chairman and Mr. G. V. Irving Secretary. The statue was unveiled by the Prince Consort in May, 1858. An interesting feature of this ceremony was that amongst those who spoke was the Marquis of Lansdowne, who, as Sir W. Petty, had proposed the resolution in the House of Commons for the grant to Jenner. There is an engraving of the statue by J. Brown. (See p. 1248.)

Statue by Sievier at the west end of the nave of Gloucester Cathedral, erected by subscription.

Statue at Brünn, in Moravia.

Bust by H. Corbould. A lithograph of this bust by R. J. Lane forms the frontispiece to vol. ii of Baron's "Life of Jenner."

Bust by S. Manning. Lithograph by M. Gauci, published by N. Chater and Co., 33, Fleet Street, and Washbourn and Son, Gloucester, August 10th, 1823.

Marble statue by Monteverde. Exhibited at the Paris Exhibition of 1878. Now at Boulogne. Jenner is represented vaccinating a child. (See p. 1254.)

There is also a memorial window in Berkeley Church with the following inscription: "The east window in the chancel was erected October, A.D. 1873, by voluntary subscriptions to the memory of the late Edward Jenner, M.D., the discoverer of vaccination, who was born in this parish A.D. 1749, and died at the Chantry, Berkeley, A.D. 1823, and was interred in the north-east corner of the chancel."

Medals.

The description of the medals in the following list is taken from an interesting paper by Dr. Storer in the *American Journal of Numismatics*, 1894 and 1895.

Obverse: Apollo presents a sailor who has been preserved by vaccination to Britannia, who holds a civic crown bearing Jenner. Legend, ALBA NAUTIS STELLA REFULSIT, 1801. *Reverse*: An anchor, Above, GEORGIO TERTIO REGE. Below, SPENCER DUCE (Viscount Althorp, First Lord of the Admiralty, and subsequently Earl Spencer). Presented to Jenner by the surgeons of the British Navy. Its locality is now unknown.

Obverse: DON. SOC. MED. LONDON. ANNO SALUT. 1773. INSTITUT. E. JENNER, M.D. SOCIO SUO EXIMIO OB VACCINATIONEM EXPLORATAM. *Reverse*: Apparently blank (the medal cannot be traced). Gold. Presented by the Medical Society of London, March 4th, 1804. Baron calls this medal "Gold Medal of the London Medical Society." The minutes of the Society show that it was a Fothergillian medal. On October 10th, 1803, a resolution was moved by Dr. Lettsom and seconded by Sir J. Hayes: "That it be recommended to a future meeting of the Council to consider the propriety of voting the Fothergillian medal to Dr. Jenner as a testimony of respect to the discoverer of vaccine inoculation." On November 7th, 1803, it was resolved on the motion of Dr. Lettsom, seconded by Dr. Bradley, to present to Jenner "a gold medal, value 10 guineas, struck from the Fothergillian die, and accompanied with a suitable inscription." November 21st, 1803: "Dr. Sims, Dr. Pinckard, Dr. Yellowly, and Mr. Aikin were nominated a committee to consider of an address to Dr. Jenner, and of an inscription for the medal voted by the Society to be laid before the Society at the ensuing meeting." November 28th: The report of the Committee was brought up and various inscriptions were proposed, all of which were referred to a future meeting. February 13th, 1804: It was resolved that the motto to the gold medal to be delivered to Dr. Jenner be the following: "E. Jenner, socio suo eximio ob vaccinationem exploratam." Dr. Lettsom was requested to present the medal at the ensuing meeting, and "to add any remarks that may appear to him worthy of the attention of the Society." Jenner was unable to attend the meeting on March 8th, 1804, and receive the medal personally. Dr. Sims was therefore appointed to receive it on Jenner's behalf. The address delivered by Dr. Lettsom is printed in the *European Magazine*, vol. xlvi, p. 163.

Obverse: An allegorical group. *Reverse*: EDUARD JENNER, DOCTOR IN DE GENEESKUNDE, GEBOREN DEN 17 MEY, 1749, TE BERKLEY IN HET GRAAFSCHAP GLOCESTER IN ENGELAND EN ALDAAR OVERLEDEN, DEN 26 JANUARII, 1823, UITVINDER DER KOEPOKINENTING IN HET JAAR, 1775, DOCH EERST IN 1798 DOOR HEM BEKEND GEMAAKT. Copper. By A. Bemme, at expense of H. Westhoff, jun.

Obverse: Between a rose bush and a cornucopia an infant with rose in hand points to its arm. At right of bush: L(90S). Inscription: EDUARD JENNER'S WOHLTHÆTIGE ENTDECKUNG. Exergue: VOM 14 MAI 1796. *Reverse:* ZUM ANDENKEN AN ERHALTENEN UND MITGETHEILTEN SCHUTZ (a scroll) GEREICHT VOM DOCTOR BREMER IN BERLIN. 1803. Silver.

As preceding, save upon reverse there follows after SCHUTZ ——. ——, and after BERLIN: ——

Obverse: Bust, to left. Beneath shoulder: F. LOOS. Inscription: EDUARD JENNER ENTDECKER DER SCHUTZ IMPFUNG. D. 14 MAI 1796. *Reverse:* An angel from clouds garlanding a cow around which seven children are dancing. Legend: EHRE SEY GOTT IN DER HÖHE. Exergue: UND FREUDE AUF ERDEN. Silver, bronze.

Obverse: As preceding, save that engraver's name is in exergue. *Reverse:* Hygieia, with serpent upon her right arm, protects by a shield bearing a cow an infant against a

42

Inoculation

Should it be ask'd whether this discovery is a matter of mere curiosity or whether it tends to any beneficial purpose? I should answer, that, notwithstanding the happy effects of inoculation, with all the improvements, which the practice has received since its introduction into this country, we sometimes observe that it proves fatal; & from this circumstance we feel, at all times, somewhat alarm'd for its consequences. But as fatal effects have been never known to arise from the Cowpox, even when inoculated in the most unfavorable manner, that is, when it has accidentally produced extensive inflammation, and suppuration on the hands; and as it clearly appears

flying demon. Legend: TRIUMPH! GETILGET IST DES SCHEUSALS LANGE WUTH. Silver, bronze, Berlin iron.

Obverse: A child between a rose tree and a rising sun exhibits its arm; at its feet a serpent. Legend: DANK DER GUTIGEN VORSEHUNG. Exergue: Kruger. *Reverse:* Within a pearled octagon: WOHL THATIGE ENTDECKUNG DER SCHUTZ-POCKEN DURCH ED. JENNER. Silver.

Obverse: Bust, facing, within palm branches. Inscription: EDWARD JENNER. To left: HAMEL ET LECOMPTE. Beneath: 1749 (the date of Jenner's birth). *Reverse:* Between laurel branches: MEDAILLE DE 1RE CLASSE. Inscription: COMITE CENTRAL DE VACCINE DU DEPARTEMENT DU NORD. Silver.

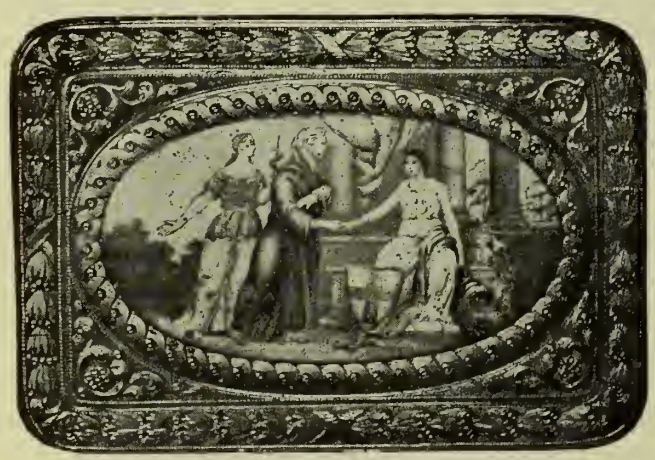
Obverse: Like preceding, but bust somewhat towards the left and on pedestal, on the base of which is the date. *Reverse:* A laurel wreath, beneath which: MEDAILLE DE 2E CLASSE. Field vacant for name of recipient.

Obverse: Bust upon an oval shield between two females holding over it a crown. Beneath, an elongated shield upon which is a cow, to right. *Reverse:* Blank. Plaster-of-paris.

Obverse: Bust, clothed, to left. Upon truncation: (T. R.) Poole, 1809. No inscription. *Reverse:* Blank. Of pinx wax upon colourless transparent glass. (In Library Royal Medical and Chirurgical Society of London.)

List of Diplomas, Honours, etc.

Chronological list of diplomas, honours, addresses, etc., presented to Jenner, compiled from the Appendix to Baron's "Life."



Several of these diplomas are in the collection of Jenner relics formed by Mr. Mockler. An effort is now being made to raise a fund for the purchase of this collection, so that it may be deposited in Bristol.

1801. February 20th. Plymouth Dock. Address from Dr. Trotter and forty-four medical officers of the navy, subscribers to the Jennerian Medal.

May 29th. Address of respect and application for imbued threads, from the "Physician delegated" of the Department de l'Agogna (Cisalpine Republic).

16 Thermidor. Address from the Bureau of the National Institute of France, and thanks for the dissertation communicated to them.

September 14th. Diploma of Fellow of the Royal Society of Sciences at Göttingen.

1802. February. Certificate of the success of Vaccine Inoculation, and complimentary address thereupon, from the staff of the Manchester Infirmary.

February 20th. Diploma of Fellow of the Physical Society of Guy's Hospital.

February 25th. Testimonial and address from the Presidents and members of the above Society.

March 7th. Diploma of Fellow of the Royal Medical Society of Edinburgh.

24 Ventose. Diploma of Foreign Associate of the Medical Society of Paris.

30 Germinal. Official address from the Medical Society of Indre et Loire.

May 25th. Diploma of Fellow of the American Society of Arts and Sciences.

July 29th. Official letter of respect and congratulation upon the general success of vaccination in France, from the Central Committee of Vaccination.

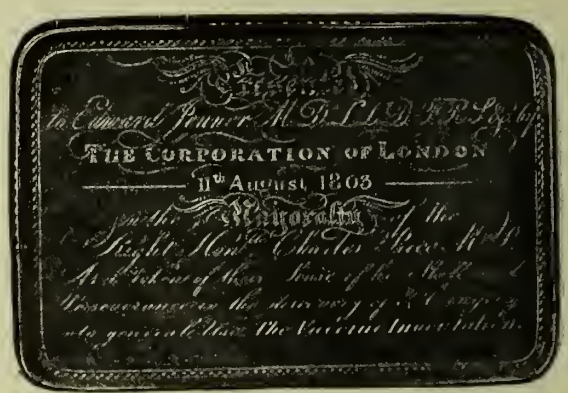
August 10th. Letter from the Dowager Empress of Russia, signed "Marie," and accompanied by a ring set in diamonds.

2 Messidor. Diploma of Corresponding Associate of the Medical Society of Tours.

27 Brumaire. Appointment of Associate from a Society at Avignon.

1803. March 16th. Diploma of Member of the Society of Medicine at Avignon.

August 11th. Freedom of the City of London, presented in a gold box of the value of 100 guineas. The gold box mentioned was sold by auction on October 25th, 1893, by Messrs. Debenham, Storr and Sons. It was described in the catalogue as "A magnificent 18-carat gold presentation snuff-box, beautifully enamelled with the arms of the City of Lon- and other subjects, and bearing an interesting inscription, date 1803, 11 ozs. 11 dwt." The inscription reads as follows: "Presented to Edward Jenner, M.D., LL.D., F.R.S., etc., by the Corporation of London, 11th August, 1803, in the Mayoralty of the Right Hon. Charles Price, M.P., as a token of their sense of his skill and perseverance in the discovery of and bringing into general use the vaccine inoculation." In describing it as a "snuffbox" the auctioneers fell into



error. At the sale the casket fetched what it originally cost, 100 guineas. It is now the property of the Society of Apothecaries. The document originally contained in the box is in Mr. Mockler's collection of relics.

August 15th. Diploma of Fellow of the Royal Medical and Economical Society of Madrid.

August 31st. Diploma of LL.D. from the Senate of Harvard University.

September 14th. Diploma of Honorary Member of the Royal Humane Society of London.

28 Vendemiaire. Diploma of Foreign Associate of the School of Medicine at Paris.

21. Frimaire. Diploma from the Society of Medicine, Departement du Gand.

1804. March. Freedom of the City of Dublin.

April 7th. Diploma of Member of the American Philosophical Society.

October 31st. Freedom of the City of Edinburgh.

December. Diploma of Fellow of the Imperial University of Wilna.

1806. March 31st. Diploma of Foreign Associate of the Royal College of Physicians at Stockholm.

May 20. Diploma of Honorary Fellow of the Royal College of Physicians of Edinburgh.

1807. March 5th. Diploma of Honorary Associate of the Royal Economical Society of Valencia.

April 1st. Freedom of the Borough of Liverpool.

April 23rd. Diploma of Foreign Associate of the Royal Academy of Sciences at Stockholm.

November 8th. Address of the Five Nations of Indians assembled in Fort George in Upper Canada. With the address was sent a belt and string of wampum.

1808. March 28th. Diploma of Fellow of the Royal Academy of Sciences at Munich.

May 25th. Diploma of the New Hampshire Medical Society.

June 20th. Diploma of Corresponding Member of the National Institute of France in the class of Physical and Mathematical Sciences.

September 1st. Freedom of the City of Glasgow.

1809. April 27th. Freedom of the Burgh of Kirkcaldy.

1810. April 27th. Diploma of Honorary Member of the Literary and Philosophical Society of Manchester.

1811. May 13th and 19th. Diploma of Foreign Associate of the Imperial Institute of France in the class of Physical and Mathematical Sciences.

1813. December 3rd. Diploma of Doctor of Medicine of the University of Oxford. This was a great honour to Jenner, as the granting of an Honorary M.D. by the University is a very rare occurrence.

1814. July 1st. Diploma of the Royal Society of Medicine at Bordeaux.

October 20th. Address of the Inhabitants of Brünn, in Moravia.

1815. January 20th. Address of Honorary Associate of the Physico-Medical Society of Erlangen.

1821. March 16th. Appointment of Jenner as Physician Extraordinary to H.M. King George IV.

1822. August 30th. Diploma of Foreign Correspondent to the Medico-Chirurgical Society of Berlin.

SMALL-POX BEFORE JENNER.

Early History of the Disease.

A vast amount of erudition has been expended to little purpose in debating whether or not small-pox was known to the Greeks and Romans. It is certain that it is not mentioned by name either by Hippocrates or by Galen, and certain exanthematous affections mentioned by the latter which have been supposed to refer to variola can hardly, even when allowance is made for the vagueness of the clinical descriptions given by old writers, have been the disease now known as small-pox. It is certain, however, that small-pox was a familiar scourge in India and in China long before the days of Hippocrates. Alexander's army is said by Quintus Curtius to have suffered from a contagious tetter when encamped near the mouth of the Indus. In the sixth century, almost contemporaneously with the birth of Mohammed, small-pox is said to have been brought into Arabia by an Abyssinian army which was attacked by the disease when besieging Mecca. Dr. Greenhill says that all authorities are agreed that the first definite account of small-pox was given by Ahrun or Aaron, a Christian priest and physician who lived at Alexandria in the reign of the Emperor Heraclius (A.D. 610—641). John Mesuë, Johannes Serapion, and ot her Arabian writers on medicine refer to it, and Rhases (A.D. 900 or thereabouts) wrote a treatise on it. Haly Abbas (A.D. 980) seems to have been the first to point out that the disease was contagious, and in the following century Avicenna differentiated small-pox from measles. Both he and Rhases knew that a person might be attacked more than once by the disease, an observation the accuracy of which was denied by no less a person than Richard Mead, to the great confusion of men's minds for a long time afterwards.

Of the prevalence of small-pox in Europe in the Middle Ages little is known. It may well be that, as has been suggested, epidemics reported by chroniclers under various designations—*ignis sacer*, *pestis*, etc.—were visitations of small-pox, but the meagreness and vagueness of the descriptions and the obscurity in which the whole subject is wrapped owing to the confusion of small-pox with measles, chicken-pox, and other eruptive disorders, make it quite impossible to be certain what is meant. After all, these questions are of little interest except to Dryasdust and his kind. It is enough for our purpose to know that by nearly every writer who treated of small-pox till the beginning of the vaccination era the disease was looked upon as practicably unavoidable by members of the human family.

An Inevitable Accident of Human Life.

As this article is only intended as an outline sketch of the subject, only a few quotations can be given as illustrations of the statement just made, but it would be easy to extend the list.

In the ninth century Isaac Judæus wrote *de febre variolarum quæ fere omnibus accidit*. Rhases invented a theory to explain "why hardly any escapes it," and particularly "why children, especially males, rarely escape being seized with this disease." In the sixteenth century we find Mercurialis taking it for granted that everyone must have small-pox at least once in his life. In 1593 Kellwaye, the author of the first systematic treatise on small-pox in English, says: "I need not greatly to stand upon the description of this disease because it is a thing well known unto most people." In 1747 Mead refers to the fact that it had "been found by experience that nobody was seized with the small-pox a second time, and that scarce one in a thousand escaped having it once." In 1788 Dr. Black, in his *Comparative View of the Mortality of the Human Species at all Ages* (p. 103) says in reference to small-pox being an infantile disease:

> In every large metropolis small-pox is an annual epidemick. In country towns and open districts its invasions are more distant; at uncertain intervals of some years when numbers contiguous are attacked at the same time.....*Very few of the human species escape the small pox*, especially in populous cities and towns wherein there is always lasting variolous fuel.. ... A mere handful of the native progeny of the metropolis can be supposed to have escaped an infection with which they are constantly enveloped.

Sir Gilbert Blane told a Committee of the House of Commons that at the end of the last century an adult person who had not had small-pox was scarcely to be met with or heard of in the United Kingdom. Bichat in his *Anatomie Pathologique* includes the fact that "usually all men experience it" among characteristic features of small-pox. In Buchan's *Domestic Medicine* (14th ed., 1794, p. 214) the following passage occurs:

> This disease, which originally came from Arabia, is now become so general that very few escape it at one time or another. It is a most contagious malady, and has for many years proved the scourge of Europe. The small-pox generally appear towards the spring. They are very frequent in summer, less so in autumn, and least of all in winter. Children are most liable to this disease, and those whose food is unwholesome, who want proper exercise, and abound with gross humours, run the greatest hazard from it.....This disease is so generally known that a minute description of it is unnecessary.

Further on (p. 232), speaking of inoculation, he says:

> Such as have not had the small-pox in the early period of life are not only rendered unhappy, but likewise in a great measure unfit for sustaining many of the most useful and important offices. Few people would choose even to hire a servant who had not had the small-pox, far less purchase a slave who had the chance of dying of this disease. How could a physician or a surgeon who had never had the small-pox himself attend others under that malady? How deplorable is the situation of females who arrive at mature age without having had the small-pox! A woman with child seldom survives this disease; and if an infant happen to be seized with the small-pox upon the mother's breast, who has not had the disease herself, the scene must be distressing. If she continue to suckle the child it is at the peril of her own life; and if she wean it, in all probability it will perish. How often is the affectionate mother forced to leave her house and abandon her children at the very time when her care is most necessary? Yet should parental affection get the better of her fears, the consequences would often prove fatal.

Nor is it only in medical books that one finds proofs of the extent to which small-pox was looked upon as an almost inevitable accident of human life. In the early part of the eighteenth century, Lady Mary Wortley Montagu, writing to a lady friend about her intention of introducing inoculation into England, says:

> I should not fail to write to some of our doctors very particularly about it, if I knew any of them that I thought had virtue enough to destroy such a considerable branch of their revenue for the good of mankind. But that distemper is too beneficial to them not to expose to all their resentment the hardy wight that should undertake to put an end to it. Perhaps if I live to return, I may, however, have courage to war with them. Upon this occasion admire the heroism in the heart of your friend.

People used to advertise for servants who had got over small pox in much the same way as we now advertise for a dog "over" distemper. The following may be taken as a specimen:

> Wanted, a man between 20 and 30 years of age, to be a footman and under butler in a great family; he must be of the Church of England and have had the small-pox in the natural way. Also a woman, middle aged, to wait upon a young lady of great fashion and fortune; the woman must be of the Church of England, have had the small-pox in the natural way, very sober, steady, and well behaved, and understand dress, getting up lace and fine linen, and doing all things necessary for a young lady that goes into all public places and keeps the best company.—Enquire of the printer of this paper.—Oct. 1st. 1774.

These quotations are sufficient to show that Sir John Simon spoke "by the card" when he stated in his evidence before the Royal Commission on Vaccination that in the

last century small-pox was a common current contagion in the country and everybody expected to have it, and sooner or later nearly all got it. The difficulty of getting through life without small-pox was expressed in a popular saying very current in Germany in the eighteenth century: "*Von Pocken und Liebe bleiben nur Wenige frei* (Few remain free from small-pox and love)."

A CONSTANT DREAD.

If a man somehow escaped the disease in childhood, the danger of it remained with him as an abiding dread. As Sir John Simon says: "For those who boasted 'I have not had small-pox' there was the saying *Nemo ante obitum beatus*." And, indeed, in the words of Thebesius, 'no nation, no rank, no constitution, neither age nor sex, escaped small-pox; all trembled in mentioning its name.'" Macaulay tells us how people felt about the disease at the end of the seventeenth century. The passage is almost a stock quotation, but may appropriately find a place here. In speaking of the death of Queen Mary from it in 1694, he goes on:[1]

> That disease over which science has since achieved a succession of glorious and beneficial victories was then the most terrible of all the ministers of death. The havoc of the plague had been far more rapid: but plague had visited our shores only once or twice within living memory, and the small-pox was always present, filling the churchyards with corpses, tormenting with constant fears all whom it had not yet stricken, leaving on those whose lives it spared the hideous traces of its power, turning the babe into a changeling at which the mother shuddered, and making the eyes and cheeks of the betrothed maiden objects of horror to the lover.

A LOATHSOME SCOURGE.

The following letter from Sir Matthew Hale (1609-1676) to one of his grandsons shows the horror which it inspired:

> First, therefore, touching your late sickness (small-pox) I would have you remember these particulars: 1. The disease itself in its own nature is now become ordinarily very mortal, especially to those of your age. Look upon even the last year's general bill of mortality, you will find near two thousand dead of that disease the last year; and, had God not been very merciful to you, you might have been one of that number with as great likelihood as any of them who died of that disease. 2. It was a contagious disease that secluded the access of your nearest relations. 3. Your sickness surprised you upon a sudden, when you seemed to be in your full strength. 4. Your sickness rendered you noisome to yourself and all that were about you; and a spectacle full of deformity, by the excess of your disease beyond most that are sick thereof. 5. It was a fierce and violent sickness; it did not only take away the common supplies of Nature, as digestion, sleep, strength, but it took away your memory, your understanding, and the very sense of your own condition, or of what might be conducible to your good. All that you could do was only to make your condition more desperate, in case they that were about you had not prevented it, and taken more care of you than you did, or could for yourself. 6. Your sickness was desperate, in so much that your symptoms and the violence of your distemper were without example; and you were in the very next degree to absolute rottenness, putrefaction, and death itself.

That the "rottenness" of which Sir Matthew Hale speaks was no mere figure of speech is shown by the following passage from a letter of Horace Walpole's dated April 2nd, 1750:

> Lord Dalkeith is dead of the small-pox in three days. It is so dreadfully fatal in his family that, besides several uncles and aunts, his eldest boy died of it last year, and his only brother, who was ill but two days, putrefied so fast that his limbs fell off as they lifted the body into the coffin.

PREVALENCE OF POCK MARKS.

Dr. Creighton in his *History of Epidemics in Great Britain*, vol. ii, p. 454, makes a great point of the fact that in the offers of rewards for the apprehension of "wanted" persons which appeared in the *London Gazette*, one of the earliest of English newspapers, between December, 1667, and June, 1774, only 16 in 100 are described as "pock marked" or "full of pock holes." These expressions denote a degree of pitting that implies a very severe attack of the disease; the number of persons so disfigured could hardly therefore be taken as an index to the percentage of runaway apprentices, servants who had robbed their masters, horse stealers, highwaymen, and other criminals who had had small-pox. As Dr. Creighton himself points out (*ibid.*, p. 456), "at that time most had small-pox in infancy or childhood, when the chances of permanent marking would be less." The following notice, however, which appears in the *London Gazette*, February 23rd to 27th, 1688, seems to have escaped Dr. Creighton's attention. It relates to an utterer of counterfeit coin, who is described as follows:

> Thomas Bayly, a short, burly man, fair and fresh-coloured, without pock holes, flat-nosed, under 40 years old, commonly wears a fair Perriwig, and useth a blue as well as a red coat.

Surely the fact that the absence of "pock holes" should have been considered a help to identification is, as Carlyle would say, "significant of much." To what an extent small-pox had left its mark on the faces of the English people in the eighteenth century may be gathered from the report of the National Vaccine Board for 1822:—

> We confidently appeal to all who frequent theatres and crowded assemblies to admit that they do not discover in the rising generation any longer that disfigurement of the human face which was obvious everywhere some years since.

Even in the early days of the present century there were places where a large proportion of the population bore the scars of the disease. Mrs. Crossland, a lady of some literary distinction, who a year or two ago at the age of 80 published reminiscences of her life, mentions that when she was a child nearly everyone was more or less pock pitted. Most people whose life has reached beyond the common span could confirm this.

RAVAGES OF SMALL-POX IN EUROPE.

Of the ravages of small-pox in Europe before the vaccination era an idea may be formed from the estimates of the number of deaths caused by the disease made by various writers. Differing, as they do, in their figures they agree that the mortality was enormous. Lettsom, in his evidence before the Committee appointed by the House of Commons to consider the question of a grant to Jenner, estimated that 210,000 persons annually fell victims to it. Pissin[2] puts the number at 400,000; Bohn[3] at half a million. Oesterlen[4] calculates that before the introduction of vaccination Europe lost from one-twelfth to one-tenth of its population from small-pox, which was especially fatal to children, one-half to three-fifths of the mortality among them in some years being due to the disease. Duvillard[5] estimated that two-thirds of all the children born were attacked, the average death-rate being 1 in 7 or 8 of the cases; in severe epidemics the mortality sometimes rose to 1 in 3. Bernouilli, the celebrated mathematician, believed that no fewer than fifteen millions of human beings were destroyed by small-pox every twenty-five years, that is 600,000 annually. De la Condamine estimated that it destroyed, maimed, or disfigured a fourth part of mankind.

FRANCE.

Taking the several European countries separately, we find that in 1811 the French Minister of the Interior put the mortality from small-pox in France at 150,000. De la Condamine calculated that small-pox was responsible for one-tenth of all deaths in France. In 1774 Louis XV, who had already had the disease when he was 14, died of it at the age of 64. Readers of Carlyle will remember the account of his last moments:

> The Louis that was lies forsaken, a mass of abhorred clay, abandoned "to some poor persons and priests of the Chapelle Ardente," who make haste to put him "in two lead coffins, pouring in abundant spirits of wine."

A Dauphin of France died of small-pox in 1711.

GERMANY.

In Germany it is estimated that the annual number of deaths from the disease averaged 72,000. In the year 1796 Prussia, then a small state, lost 25,000 of its population in one epidemic. According to Bohn, in the last century one twelfth to one tenth of the inhabitants of Berlin died of small-pox every year. Casper[6] states that in Berlin, before the vaccination era, the average mortality from small-pox among infants was 1 in 12.

SWEDEN.

As regards Sweden during a period of 28 years (1774 to 1801) for which accurate statistics are forthcoming, the average annual mortality from small-pox was 2,050 per 100,000; in 1779 it was 7,200, and in 1784 it was 5,800 per 100,000 of population. A Queen of Sweden died of the disease in 1741.

DENMARK.

Denmark, from the middle of the seventeenth to the beginning of the nineteenth century, was visited by severe outbreaks every three or four years.

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[1] *History of England*, vol. iv, p. 532

[2] *Reform d. Schutzpockenimpfung durch d. Vaccination direct von Kühen*, Berlin, 1868.

[3] *Bedeutung und Werth d. Schutzpockenimpfung*, Berlin, 1867.

[4] *Handbuch d. med. Statistik*, Tübingen, 1864.

[5] *Analyse et Tableaux de l'Influence de la petite Vérole sur la Mortalité à chaque age, etc.*, Paris, 1806.

[6] *Beiträge zur med. Statistik f. 1825.*

Turkey and the Levant.

Constantinople was visited by frequent epidemics of small-pox, in many of which it destroyed one half of those whom it attacked. In the Levant in some years one-third of those who caught the disease perished.

Russia.

In Russia, according to Sir Alexander Crichton, before the vaccination era 1 out of every 7 children born died of small-pox. The disease was said to have caused 2,000,000 deaths in the Russian Empire in a single year. In 1630 Siberia was visited by an epidemic of such severity that, according to Clowzow, it was impossible to bury the dead. Small-pox is described by one authority as the chief obstacle to an increase of the population in some parts of Siberia. Russia was visited in 1691 by a terrible epidemic which destroyed the whole population of several towns. In 1730 the Czar Feodor fell a victim to the disease, in spite of a stringent order issued by him two or three years before, that no one in whose house a case had occurred should be allowed within the precincts of his palace. Werewkin's statistics show that in the period 1804-1810 small-pox destroyed 827,000 lives; taking the proportion of deaths to cases as 1 in 10, this gives a total number of 8,000,000 of persons attacked in six years. In 1856 small-pox caused 100,000 deaths in Russia; in 1875 the disease claimed 12,760 victims in the Biatzky Government alone, and in the Kasansky Government 61,467 persons died of the disease in the period 1866-1880. These figures make it almost needless to state that vaccination is not compulsory in Russia.

England.

As regards England, small-pox first came into prominence in the reign of James I. It became more and more painfully familiar in the course of the seventeenth century; in 1690 we find Sir Thomas Browne writing: "The Small-pox grows more pernicious than the great." The scourge reached its height in the eighteenth century, but it is difficult to form any precise estimate of the extent to which it actually prevailed. E. C. Seaton, in a report presented to the Local Government Board in 1874, estimates the annual small-pox death-rate in England in the last century at 3,000 per million inhabitants; and it is computed that one in every six attacked by the disease died. Jurin estimated that it caused one-fourteenth of the total number of deaths within the Bills of Mortality; and the periods—1667-86 and 1701-22—on which he based his calculations were not those of the greatest prevalence of the disease. Lettsom submitted to a Committee of the House of Commons a document drawn up from the yearly Bills of Mortality, from which it appeared that in the forty years between 1667 and 1722 the average number of deaths occasioned by small-pox was 72 per 1,000 of the total number of deaths from all causes, and that in forty-two years —1731-1772—after inoculation (which protected those who submitted to it but spread the disease to others) had come into full use, the proportion rose to 89 per 1,000. This closely agrees with Heberdler's estimate that the small-pox death-rate was 70 per 1,000 of the total deaths in the first thirty years of the eighteenth century, whereas in the last thirty years it was 95 per 1,000. It has been calculated that the death-rate from small-pox in England during the last half of the eighteenth century was such that if applied to the present population it would give an average of 70,000 deaths a year. In short, the disease was a standing menace to the country, as may be judged from the fact that it is said to have been imported into the English Channel more than one hundred times in the space of seven years; in 1800 it was brought to our shores twenty times by the Channel Fleet alone.

Royal Victims.

Queen Mary the Second was not the only royal personage in this country who fell a victim to small-pox. If we set aside on the ground of insufficient evidence the case of Elfrida, daughter of Alfred the Great, and of her grandson, both of whom are said by historians to have died of the disease, we find Mary's uncle, the Duke of Gloucester, and an aunt, who died of it at Whitehall in 1660. Her husband, William the Third, had his constitution permanently damaged by small-pox in his youth, and his father and mother had died of it. It may be mentioned that the House of Hapsburg suffered with especial severity from small-pox. Joseph the First fell a victim to it at the age of 33, and in the course of the eighteenth century, besides him, the disease killed two empresses and six archdukes and archduchesses. It also proved fatal to an Elector of Saxony and to the last Elector of Bavaria.

The Terrible Legacies of the Disease.

The ravages of small-pox cannot be fully estimated simply by counting the victims whom it slew. Those who survived an attack were frequently mere wrecks—consumptive, scrofulous, asthmatic, dropsical, lame, deaf, blind. A report of the Institution for the Indigent Blind, quoted by Sir Gilbert Blane, states that two-thirds of those who applied there for relief had lost their sight from small-pox. According to Pissin the records of hospitals for diseases of the eye at Dresden and Munich show a very large proportion of cases of blindness due to small-pox. As Tralles, writing in 1765 puts it: "From the time small-pox became known to the present day there have been myriads of examples of the sad traces which they have left in the human body and all its parts."

Wholesale Destruction among Uncivilised Peoples.

Of the awful destruction wrought by small-pox among uncivilised peoples some striking examples were collected by Sir John Simon in his "Papers Relating to the History and Practice of Vaccination" (1857). It was introduced into Mexico by the Spaniards, and in a short time killed $3\frac{1}{2}$ millions of human beings in the words of Prescott, "sweeping over the land like fire over the prairies, smiting down prince and peasant.....leaving its path strewn with the the dead bodies of the natives, who (in the strong language of a contemporary) perished in heaps like cattle stricken with the murrain." A Spanish historian says: "There was no one to bury them (*No habia quien los interrasse*)." In an epidemic which visited Mexico in 1779, small-pox caused nearly 9,000 deaths among nearly 39,000 attacks in the capital alone, and in 1797 it caused in the same city 4,451 deaths in 24,516 attacks. In 1563 whole races were destroyed by the disease, and about the same time it killed more than 100,000 Indians in the single province of Quito. At a later period it spread through Peru, sweeping away all the Indians and mulattos in the cities of Potosi and De La Paz; the country was left desolate, and the mines were for a long time deserted.

North America.

Nor was the scourge less devastating in North America. Catlin writing in 1841 says:

> Thirty millions of white men are now scuffling for the goods and luxuries of life over the bones and ashes of twelve millions of red men, six millions of whom had fallen victims to the small-pox, and the remainder to the sword, the bayonet, or whisky.

Elsewhere the same author says:

> I would venture the assertion from books that I have searched, and from other evidence, that of the numerous tribes which have already disappeared and of those that have been traded with quite to the Rocky Mountains each one has had this exotic disease in their turn, and in a few months have lost one-half or more of their numbers.

It is recorded that a translation of the Bible having been made for the Six Nations, when it was finished there was not one left to read it, the whole nation having been exterminated by small-pox.

Iceland, Greenland, Kamstchatka.

In 1707 the disease killed 18,000 out of a population of 50,000 in Iceland. In 1734 nearly two-thirds of the inhabitants of Greenland were swept away. Crantz in his *History of Greenland* gives some terrible details. He speaks of "empty depopulated houses and unburied corpses, some within and some without the houses." He says that "in one island they found only one girl with the small-pox upon her and her three little brothers; the father having first buried all the people in the place, had laid himself and his smallest sick child in a grave raised with stone, and ordered the girl to cover him." In Kamschatka Captain Cooke speaks of it (in 1767) as "making its progress with ravages not less dreadful than the plague, and seeming to threaten their entire extirpation."

India.

As regards India, the following account of its ravages in Bengal by Holwell (1767) will serve to give an idea of what small-pox was there in the middle of last century:

Every seventh year, with scarcely any exception, the small-pox in these provinces during the months of March, April, and May, and sometimes until the annual returning rains about the middle of June put a stop to its fury. On these periodical returns (to four of which I have been a witness) the disease proves universally of the most malignant confluent kind, from which few either of the natives or Europeans escaped that took the distemper in the natural way, commonly dying on the first, second, or third day of the eruption. The usual resource of the Europeans is to fly from the settlements and retire into the country before the return of the small-pox season.

Thibet and China.

The capital of Thibet, after a visitation of the disease, remained unpeopled, a city of the dead, for three years. In China, Clarke says in his travels, the mortality from small-pox was "incalculable." In a letter dated "Macao, 28th of June, 1805" (quoted in Bacon's *Life of Jenner*, vol. ii, p. 82), the following passage occurs: "It is known that one-third of the people of this extensive empire when the natural small-pox is raging are supposed to fall victims to it." This is confirmed by a very recent traveller, Dr. G. E. Morrison,[7] who says:

Small-pox, or as the Chinese respectfully call it, "Heavenly Flowers," is a terrible scourge in Western China. It is estimated that 2,000 deaths—there is a charming vagueness about all Chinese figures—from this disease alone occur in the course of a year in the valley of Tali.....Vaccination introduced into Western China would be a means, the most effective that could be imagined, to check the death-rate over that large area of country which was ravaged by the civil war, and whose reduced population is only a small percentage of the population which so fertile a country needs for its development. Infanticide is hardly known in that section of Yunnan of which Tali may be considered the capital. Small-pox kills the children. There is no need for a mother to sacrifice her superfluous children, for she has none.

"He Jests at Scars that Never Felt a Wound."

If in these days the fear of small-pox has become—for those who are content to be guided by the logic of facts without allowing their common sense to be led astray by "quips and cranks and crooked wiles"—almost as remote as the fear of leprosy, we owe our deliverance to Jenner. Were it not for the safeguard with which he provided us, it is scarcely too much to say that with the present ease and rapidity of communication between the most distant parts of the earth, the human race would be in constant danger of decimation by small-pox. As for the fools and fanatics who decry Jenner, and seek to undo his work, it is only charitable to believe that "they know not what they do."

SMALL-POX INOCULATION.

Antiquity and Wide Diffusion of the Practice.

As it was universally believed among peoples who had had experience of the scourge that it was almost impossible for anyone to escape small-pox, it was not unnaturally thought—as mothers often think at the present day in regard to measles—that the sooner it was got over the better. The fact that the inoculation of matter from a mild case would often produce a mild form of the disease which would suffice to protect the person against the graver one appears to have been pretty widely known, especially in the East, from a very remote period. In India inoculation was practised by Brahmins, who went on circuit at regular seasons for the purpose; it was also in common use in Persia, Georgia, Armenia, Arabia (where, according to some, the knowledge of its efficacy had been handed as a tradition from the old Arabian physicians, who wrote much on small-pox), and other oriental countries.

In China, "sowing the small-pox" (by the insertion of dried crusts reduced to powder into the nostril) was practised long before inoculation was known to the medical profession of Europe; the method is fully described by the Jesuit missionary d'Entrecolles in letters from Jao Tcheon (1715) and Pekin (1725), which were published in the *Lettres Edifiantes et Curieuses* (t. x, p. 225; t. xi, p. 343). The method is still in use in China; one of the most recent travellers in that country, Dr. Morrison,[1] speaking of Western China, says:—

[7] *An Australian in China*, London, 1895.
[1] *An Australian in China*, London, 1895, p. 213.

Inoculation is practised, as it has been for centuries, by the primitive method of introducing a dried pock scab on a lucky day into one of the nostrils.

Inoculation was also practised in Senegal and other parts of Africa by the negroes; Cotton Mather learnt it from a Garamantee slave, who showed him the scar of the wound made for the operation, and told him that no one ever died of the small-pox in his country that had the courage to use it. Mather adds:—

I have since met a number of these Africkans, who all agree in one story: that in their country grandy-many dy of small-pox: but now they learn this way: People take juice of small-pox and cutty-skin and put in a drop; then by 'nd by a little sicky, sicky; then very few little things like small-pox; and nobody dy of it, and nobody have small-pox any more. Thus in Africa, where the poor creatures dy of small-pox like rotten sheep, a merciful God has taught them an infallible preservative. 'Tis a common practice, and attended with constant success.

"Buying the small-pox" was also a custom in some parts of Wales and in the Highlands of Scotland long before inoculation was brought to the notice of the medical profession.

Its Introduction into England.

The procedure was first described in this country in 1715 by a medical practitioner named Kennedy; shortly after further accounts of it as practised among the Turks were given by Timoni and Pylarini. The introduction of small-pox inoculation into England, however, was due to Lady Mary Wortley Montagu, whose husband was Ambassador at Constantinople. The following extract from a letter written by her in 1717 tells the story in her usual lively manner:

Apropos of distempers, I am going to tell you of a thing that I am sure will make you wish yourself here. The small-pox, so general and so fatal among us, is entirely harmless here by the invention of ingrafting, which is the term they give it here. There is a set of old women who make it their business to perform the operation in the month of September, when the great heat is abated. People send to one another to to know if any of their family has a mind to have the small-pox. They make parties for the purpose, and when they are met—commonly fifteen or sixteen together—the old woman comes with a nutshell full of the best sort of small-pox and asks what vein you will please to have opened. She immediately rips open the one that you offer to her with a large needle, which gives you no more pain than a common scratch, and puts into the vein as much venom as can lie upon the head of her needle, and after binds up the little wound with a hollow bit of shell, and in this manner opens four or five veins. The Grecians have commonly the superstition of opening one in the middle of the forehead and in each arm and on the breast, to make the sign of the cross; but this has a very ill effect, all the wounds leaving little scars, and it is not done by those who are not superstitious, who choose to have them in the legs or in that part of the arm that is concealed. The children or young patients play together all the rest of the day, and are in perfect health till the eighth; then the fever begins to seize them and they keep their beds two days, very seldom three. They have very rarely above twenty or thirty in their faces, which never mark, and in eight days' time are as well as before their illness. Where they are wounded there remain running sores during their distemper, which I doubt not is a great relief of it. Every year thousands undergo this operation, and the French Ambassador says that they take the small-pox here by way of diversion, as they take the waters in other countries. There is no example of anyone that has died in it, and you may believe I am very well satisfied of the safety of the experiment since I intend to try it on my dear little son. I am patriot enough to take pains to bring this useful invention into fashion in England.

Maitland, the surgeon to the British Embassy, inoculated Lady Mary's son in 1717. Her infant daughter was inoculated in England in 1721, the event exacting the greatest interest in fashionable as well as in medical circles. It was not, however, till the method had been successfully tried on some condemned criminals in Newgate that people's minds were reassured as to the safety of the practice. In 1722 the Princess of Wales had her two daughters inoculated, and this went far to remove prejudice. Still, however, there was a great deal of opposition to inoculation; parsons denounced it as sinful; doctors called it "an artificial way of depopulating a country" and "a barbarous and dangerous invention," and more temperate controversialists pelted each other with statistics. The practice slowly gained ground, however, and in 1746 a hospital for the inoculation of the poor was established in London. In 1754 two scions of royalty were inoculated, and the procedure received what may be termed its scientific consecration from the Royal College of Physicians, who issued a declaration to the following effect:

The College having been informed that false reports concerning the success of inoculation in England have been published in foreign countries, think proper to declare their sentiments in the following manner, namely: That the arguments which at the commencement of this practice were urged against it have been refuted by experience; that it is now held by the English in greater esteem, and practised among them more extensively than ever it was before; and that the College thinks it to be highly salutary to the human race.

The enthusiasm of the public found a voice in a poet, of

whose name we must sorrowfully confess our ignorance, who wrote a Pindaric ode on the subject, beginning, "Inoculation, Heavenly maid!"

Improvements in technique made inoculation less dangerous. Daniel Sutton and his assistants are said to have inoculated 20,000 cases without a single death that could "fairly" be attributed to the operation. Another famous inoculator was Dimsdale, who in 1768 was summoned to Russia to inoculate the Empress Catherine and her son, receiving for his services a fee of £10,000, with an annuity of £500, with the title of Baron, which is still held by his descendant. Inoculation also found favour in North and South America, and in the West Indies.

Small-Pox Disseminated by Inoculation.

But inoculation, although it protected those who submitted to it, may have served to disseminate the disease among those who did not. In 1763 it was prohibited in Paris, as an official investigation showed clearly that a very virulent epidemic was kept up and increased, if not originated, by the practice. In Germany the practice, owing to the opposition of the medical profession, never made good its footing. Gœthe says in his *Wahrheit und Dichtung* that "speculative Englishmen" visited Germany and received handsome fees for the inoculation of the children of persons free from prejudice; the people as a whole, however, would have none of it.

That inoculation helped to spread small-pox was maintained by Heberden, who writes as follows: The following passage puts the case so clearly that no excuse is needed for quoting it:

> The inoculation of the small-pox having been first used in England since the beginning of the eighteenth century, and having been now for many years generally adopted by all the middle and higher orders of society, it becomes an interesting inquiry to observe, from a review of the last hundred years, what have been the effects of so great an innovation upon the mortality occasioned by that disease. But however beneficial inoculation prove to individuals, or indeed to the nation at large, the Bills of Mortality incontestably show that in London more persons have died of small-pox since the introduction of that practice. The poor, who have little care of preserving their lives beyond the getting of their daily bread, make a very large part of mankind. Their prejudices are strong and not easily overcome by reason. Hence while the inoculation of the wealthy keeps up a perpetual source of infection, many others who cannot either afford to do or do not choose to adopt the same method, are continually exposed to the distemper, and the danger is still increased by the inconsiderate manner which it has lately been the custom to send into the open air persons in every stage of the disease without any regard to the safety of their neighbours. It is by these means that while inoculation may justly be esteemed one of the greatest improvements ever introduced into the medical art, it occasions many to fall a sacrifice to what has obtained the distinction of the natural disease.

On the other hand, Gregory and others held that inoculation diminished small-pox prevalence, and there is something to be said for this view.

Inoculation a Serious Affair.

It may be added that when inoculation had became fairly established it was a serious affair. Moore, the historian of small-pox, says that the preparatory treatment commonly lasted a month, and medical attendance was requisite for five or six weeks longer. Jenner, as Baron tells us, had a painful recollection of the severe discipline which he himself had passed through as a preliminary to inoculation. "There was," to use his own words, "bleeding till the blood was thin; purging till the body was wasted to a skeleton; and starving on vegetable diet to keep it so." It is easy to believe, therefore, that families in moderate circumstances and timid mothers were not very easily induced to incur the expense and risk of such a process.

Diffusion of the Practice.

According to Moore, the practice, though widely diffused, was in a great measure confined to the opulent, but this hardly agrees with Gregory's view as to the very wide diffusion of inoculation in London. Sir John Simon, however, says: "What was the state of the remaining millions of the population of England? A principal point of improvement in the treatment of the inoculated was, wherever their strength allowed, to send them abroad into the open air; and as small-pox in its inoculated variety was not less infectious than in its natural form, the result may be imagined. Especially in the metropolis it could be observed; for here, under the influence of those doctrines which (so far as concerned the primary patients alone) made the chief improvements in treatment, inoculated persons were allowed to become incessant sources of general contagion."

Final Prohibition.

Inoculation was finally prohibited by Act 3 and 4 Vict., c. 29, sec. viii, passed on July 23, 1840.

A CENTURY OF VACCINATION.

A hundred years have passed away since Jenner's first successful vaccination on May 14th, 1796. Jenner's brilliant idea, pondered over for more than twenty-five years, was that small-pox might be abolished by the universal adoption of vaccination. Others had vaccinated before Jenner, but he was the first to rouse the civilised world to take an active interest in the subject; and we must not forget that vaccination was not the outcome of laboratory experiments, but a practice resting upon a common experience in many countries of Europe, not to mention Mexico and Persia, that dairy-maids and others who had "sore hands" from milking cows affected with cow-pox were afterwards found to be protected against small-pox. The present time invites us to review the progress of vaccination in this and other countries, with the concomitant alterations in the mortality from small-pox, and to make an attempt to gather into a few lines the teachings of a century.

Average Mortality Last Century.

What was the average yearly mortality per million living from small-pox, which we will throughout call the mean rate, during the last century? In the large cities it was over 3,000, and in the whole nation it was at least over 2,000. This is the mean rate; during some years the mortality rose as high as 5,000 or 6,000 per million, and even higher.

Influence of Vaccination.

Now we find a rapid fall of small-pox in every country which we examine as soon as vaccination became common. The fall was abnormal in one respect because the adult population of Europe then consisted largely of survivors of small-pox in childhood. This fall is closely connected with the rise of vaccination in every country separately.

Sweden.

Thus in Sweden, during the 28 years 1774-1801, before vaccination the mean rate is 2,045; during 15 years 1802-16 of permissive vaccination it is 480, and during 77 years 1817-94 of compulsory vaccination it is 155. During the last 10 years the mortality is insignificant.

England.

In England in the last century the mean rate was over 2,000, according to able statisticians; during 12 years of permissive vaccination, 1838-53, the mean rate is 417; during the succeeding 18 years of enjoined vaccination the rate sinks further to 154; and the mean rate since the epidemic of 1871-2 under enforced vaccination is only 53, that is, for the 22 years 1873-1894; while for the 10 years 1885-94 the mean rate is 26. The law really enforcing vaccination dates only from 1871.

Prussia.

In Prussia vaccination was encouraged only, not enforced on all children, till the law of 1874, after which all children born in the German Empire were required to be vaccinated by the end of the second year of age, and all school children to be revaccinated. Well, the permissive era yields a mean rate of 309, but the 18 years 1875-92 have a mean rate of only 15, and during the last 10 years of this the deaths from small-pox in Prussia average only 7 per million yearly.

Austria.

In Austria vaccination is not compulsory yet, and the mean rate there corresponds to the rate of the permissive stage in other countries. It is even higher, notwithstanding the advance in sanitary knowledge since the beginning of the century. Austria's mean rate during the 35 years 1847-1882 is 580.

Belgium.

One more example of a country still without compulsory vaccination, namely, Belgium. The mean rate for the ten years 1875-84 is 441. This, again, is a rate resembling that of England or Sweden in the permissive era. In fact, we can

say with confidence what the vaccination law is in any country from a mere inspection of the small-pox mortality for some years.

ITALY.

Italy has followed Germany since 1888. Vaccination in infancy was then made universally compulsory, and also the revaccination of all children attending public schools. The mean rate per million in the chief townships during the nine years previous to the law as put in practice is 440, just as we might have expected; the average during the five years 1890-94 is 100; the average for all Italy during this latter period is 110.

DIMINISHED MORTALITY NOT DUE TO SANITATION.

We are dealing now with large countries and vast populations, and we are considering the small-pox mortality alone, apart from the question of the vaccinated or non-vaccinated condition of those who died. Examples enough have been given to show the remarkable uniformity that exists in the death-rates of various countries, according to the state of the law in those countries. No other cause than vaccination can account for this. That man or woman must be, we will not say a lunatic, but certainly a very prejudiced individual, who can stand up and deny that vaccination is the cause of the reduced mortality from small-pox. It cannot possibly be improved sanitation that has caused the remarkable changes in the mean death-rates above given, for more than one reason. Compare Prussia with Austria. There is a sudden and striking change in the small-pox death-rate of Prussia in the period succeeding the law of 1874. Now Austria shows no such change in the death-rate, and Austria is still without compulsory vaccination, while Austria has participated in the sanitary improvements of the age. And, on the other hand, Prussia did not suddenly jump into an ideal sanitary condition between 1870 and 1880. But further, the reduction in small-pox mortality has not affected all ages alike, whereas improved sanitation does affect all ages alike.

NO NATURAL DECLINE OF SMALL-POX.

Again, it is absurd to talk of a natural decline of small-pox, as plague has declined and vanished, from this country at least, when we observe the virulence of small-pox in local outbreaks, and when we think of the very large mortality which countries like Spain and Russia still show, countries where there is very little vaccination. Here are the small-pox death-rates per million living, for the single year 1889 in the following provinces of Spain: Almeria, 3,080; Murcia, 2,670; Coruña, 1,230; Malaga, 1,340; Cadiz, 1,330; Cordoba, 1,400. The rate for Germany is 4 for the same year.

FALSEHOODS AND FUTILITIES.

"Improved sanitation" and "natural decline of small-pox" are the only serious arguments which antivaccinists can bring forward. But there are many objections made against vaccination, some of which are false, some futile, and some faddish. It is a false objection that Prussia had a general compulsory vaccination law, except as regards the army, before 1874. It is a futile objection that since most of the adult male population of Prussia belongs to the army, where all recruits are revaccinated, therefore the small-pox mortality of Prussia (what there is of it) ought to affect exclusively or mainly the female population. And it is a sentimental fad to talk about personal liberty where the health and lives of our neighbours are concerned in our condition as to susceptibility to small-pox, and in a country with rate-paid compulsory education.

INFLUENCE OF REVACCINATION.

An altogether new field of argument is entered on if we take into consideration the vaccination condition of those attacked by small-pox. In order to treat the subject exhaustively, we require to know also the condition as to vaccination of every individual of the surrounding community, and such information cannot possibly be obtained for the whole population of a country, though it has been obtained in some separate towns, and is known in some distinct classes. So many elements of uncertainty enter into this question, that the Berlin Imperial Board of Health preferred to rely exclusively on statistics of the small-pox mortality alone, when the German Vaccination Commission met in 1884. Since then we have advanced somewhat in reliable statistics on the above subject, and the results already obtained form a striking and convincing body of evidence in favour of vaccination and revaccination. As regards nurses and servants in small-pox hospitals, Dr. Marson said that in thirty-five years he had never had a nurse or a servant with small-pox; he revaccinated them when they came. In 1871, out of a total of 110 attendants at Homerton, all but two were revaccinated, and these two took small-pox. Again, in 1876-77, all the attendants but one were revaccinated and this one died of small-pox. In 1881, the 90 attendants in the *Atlas* small-pox ship were all revaccinated except one, who took small-pox. Similar instances might be cited from other special classes in which the vaccination condition is known beforehand, for example, the police and post-office officials. Turning to special towns, the chief modern instance is Sheffield, where, during the epidemic of 1887-88, the whole population was examined as to the vaccinated condition. The amazing contrast between the fatality amongst the unvaccinated and that amongst the vaccinated is already well known to our readers. The complete statistics are given in an interim report of the Royal Vaccination Commission, and in a separate official report by Dr. Barry, who made the investigation.

LESSONS OF THE CENTURY'S EXPERIENCE.

What are the lessons which a hundred years' experience of the practice of vaccination by various nations taught mankind?

First, we know that the rapid spread of this practice was partly due to an erroneous idea of the early vaccinators, Jenner himself included, namely, that one vaccination in childhood was sufficient to protect for life.

Secondly, we know that the most rigidly enforced vaccination in infancy alone in any country is insufficient to prevent severe outbreaks of small-pox.

In Bavaria in 1871 no fewer than 30,742 persons contracted small-pox, and 29,429 of these had been previously vaccinated. In fact, Bavaria was considered the best vaccinated country in Europe, and von Kerchensteiner told the German Commission that as to the large number of cases in vaccinated persons, "……this was the very reason why they had adopted compulsory revaccination. It was seen that primary vaccination was quite insufficient." Again, in well-vaccinated Sheffield, that is as regards vaccination in infancy, thousands of cases occurred in vaccinated persons, and of these over 200 died.

Thirdly, primary vaccination vastly reduces the mortality from small-pox, but it also shifts the incidence of this mortality from childhood to adult life. The natural susceptibility towards small-pox sinks of itself from the first year of life till the end of childhood or the beginning of puberty when it is lowest, after this it rises gradually with age.

In the last century the survivors of small-pox in childhood were permanently protected. We substitute the less permanent protection of a single vaccination in infancy, a protection which as a rule lapses more or less with age, and the result is that there is a vast saving of human life on the whole. This saving is entirely amongst the young. More adults now die of small-pox than in the early days of vaccination.

COMPULSORY REVACCINATION A NECESSITY.

But statistics teach us that a successful revaccination during school-age completely alters the situation, and renders a person safe for life against small-pox, with rare exceptions. Even a survived attack of small-pox does not absolutely protect against death from a second attack. Germany over twenty years ago acted upon these well-known truths, and by the law of 1874 enforced both the compulsory revaccination of all school children and the vaccination of all children before the age of 2 years. And in Germany small-pox epidemics are abolished, and most of the few cases which occur are on the boundaries of the empire. Italy has now followed suit. England has never been a well-vaccinated country in the proper sense. Compulsory revaccination of all children, rich and poor, is an imperative necessity, and it must be made an Imperial measure, independent of local authorities, and certainly independent of the administration of the Poor Law, with which vaccination ought never to have been associated.

Lastly, revaccination must be made universal, because while even revaccination is not an absolute protection against death from small-pox, statistics teach us that the protection which an individual has acquired by vaccination and revaccination is very greatly strengthened by the well vaccinated condition—the phrase is convenient—of the surrounding community. The Prussian army plainly shows this. Revaccination has been compulsory in this army ever since 1834, but up to the year 1874 it was placed amongst a badly vaccinated population, and numerous deaths occurred yearly.

Since 1875 this army has found itself amongst a well vaccinated population, and for a great many years not a single death from small-pox occurred in the whole Prussian army; one solitary death has since occurred, under exceptional circumstances. When England, the place of origin of vaccination, shall have adopted in a proper manner this means of preventing that dire scourge, small-pox, it may be safely predicted that small-pox mortality will be even lower here than in Germany, for Germany has Austria and Hungary and Poland for her neighbours, whereas we have the isolating sea.

THE DIFFUSION OF VACCINATION: HISTORY OF ITS INTRODUCTION INTO VARIOUS COUNTRIES.

The story of the introduction of vaccination into the various countries of the world still remains to be told. The materials for it are abundant but they are widely scattered, and for the present we do not propose to do more than collect some of the most easily accessible facts. Yet it is interesting to observe how great an influence the English nation has had in diffusing the benefits attaching to a discovery which was wholly of English origin. Too often we have neglected our own discoveries and have paid undue importance to those of foreign origin.

ASIA.

The East Indies.

Small-pox from time immemorial had been a scourge amongst the densely populated countries of Hindustan, and its devastating effects were so well recognised that one of Jenner's earliest attempts to promote vaccination was directed towards India. At the end of the year 1799 he sent copies of his works upon vaccination and a large quantity of lymph on board the *Queen*, an East Indiaman, for conveyance to our possessions in Asia, but the vessel was unfortunately wrecked upon the outward voyage, and neither books nor vaccine ever reached its destination. He renewed his attempts, but the lymph was transmitted upon lancet points or by means of threads soaked in the virus, and the length of the voyage and the vicissitudes of climate for a time rendered futile all attempts to transmit vaccination to the East. Eventually the genius of Jenner triumphed, for he secured the services of a series of volunteers who were successively vaccinated during the voyage, and cow-pox was thus transmitted from arm to arm until it reached Ceylon and India. Vaccination, however, was not practised in the Madras Presidency until February 22nd, 1804, when Dr. James Anderson, Physician-General and President of the Medical Board, interested himself in its diffusion, and with characteristic shrewdness pointed out its pecuniary importance. He showed that each life was worth 8s. a year to the Presidency, on account of the taxes which had to be paid. In the meantime a supply of lymph had entered India from another source through Bombay, for in the spring of 1799 Dr. Pearson sent to Dr. de Carro, a Genevan by birth, then settled in Vienna, a supply of lymph upon threads. Dr. de Carro vaccinated successfully with it, and in turn sent some of his lymph to Thomas Bruce, Earl of Elgin (1766-1841), the collector of the Elgin marbles, who was then our ambassador at Constantinople. He, with the courage of a Wortley Montague, first vaccinated his own son, and then transmitted some of the lymph to Bombay, whence the practice of vaccination spread rapidly. The new method was at first opposed by the natives, but their objections were in part overcome by a "pious fraud." Mr. Ellis, of Madras, composed a short Sanscrit poem on the subject of vaccination. This poem was inscribed on old paper, and was said to have been found, that the impression of its antiquity might influence the minds of the Brahmins, whilst stress was laid upon the fact that the benefit was to be derived from their sacred cow.

Public vaccinators were soon appointed for the different presidencies in India. There were at first superintendents-general of vaccination, under whom were civil surgeons at certain stations, with a special allowance for their services, and each with a staff of one or two native vaccinators. The system did not work well, and vaccination in India was put upon a sound footing by the Honourable Mountstuart Elphinstone (1799-1854), who ruled at Bombay from 1819-1827. He divided the whole of the Presidency into four grand divisions, to each of which he appointed a European vaccinator, with an establishment of native vaccinators under him. The European vaccinator was liberally paid, and was exempt from all local control—civil, military, or medical. He was at liberty to carry on his operations in any part of his district, but he was called upon to make a monthly report to the Medical Board at Bombay. This system had the great merit that it brought vaccination directly to the natives instead of allowing the natives to seek for the vaccinators. It has undergone many changes, but the vaccination reports still make an important feature of the medical history of India.

Vaccination was introduced from Bombay into the Isles of France and Bourbon by the French Government during the years 1806-10, and during these years William Scot, a surgeon in the service of the Honourable East India Company, was in charge of vaccination on the Coromandel Coast with a staff of four native vaccinators. He proceeded from Madras in 1810 to introduce vaccination into the Mauritius.

Ceylon.

Although vaccination was introduced very early into Ceylon, the practice never flourished, and the natives in the interior were only persuaded to be vaccinated with the greatest difficulty. The practice was adopted systematically during the year 1816, and it was then found that the Kandyans supposed small-pox to be of divine origin, and, as they were anxious to propitiate its goddess, Patina (Deyane Karia), the people always spoke of small-pox patients with the greatest respect. They thought, too, that vaccination was performed for the purpose of procuring a permanent cicatrix upon the arm to enable the Government at a future time to recognise individuals and to call them out for personal service. These prejudices had to be overcome little by little, but in course of time vaccination was successfully introduced even into the most remote parts of Ceylon.

Dr. de Carro transmitted some of his lymph to Dr. Short, a physician at Bagdad, whence it was transmitted to Bussora.

Persia.

Mr. Jukes, in 1805, introduced afresh the practice of vaccination into Bushire by means of equine matter sent from Vienna, and for some time he did much to promote the practice throughout Persia.

Japan.

The history of vaccination in Japan has been very chequered, not from any animus against the operation, but rather from a universal apathy in the pre-reformation days of the country. The operation was first introduced into Japan by Philipp Franz von Siebold (1796-1866), the celebrated naturalist, who was then acting as chief surgeon at the factory in the island of Deshima. Von Siebold obtained his supply of lymph from the Dutch Government in Java, where the operation had been regularly performed for some years. He instructed native vaccinators, and for a time all went well. Von Siebold left the factory, and the master mind being removed the practice rapidly fell into disuse. It was reintroduced by Dr. Mohnike in 1849, who also obtained his lymph from Java, and again regular instruction in vaccination was given, this time in the hospital at Nagasaki. The operation was thoroughly performed so long as Dr. Mohnike remained in Japan, but when he left in 1852 it again fell into the hands of the native practitioners of medicine, who soon allowed it to become a lost art. In January, 1858, Dr. Pompe van Meerdevoort, who had been selected by the Japanese Government to

inaugurate a school of scientific medicine, once more introduced vaccination into Japan, and in 1860 the Daïmio of Satsuma ordered that all children born in his district should be vaccinated before they were two years old. A vaccine institute was established at Tokio in 1874 under the immediate control of Dr. Nagayo Sensai, the Minister of Public Health. It has attached to it a vaccine farm from which calf lymph is distributed to the different local authorities every spring and autumn or whenever small-pox happens to be prevalent. An elaborate code of rules was promulgated in regard to vaccination on April 12th, 1876. Public vaccinators were required to be properly trained. All children were to be vaccinated between the time they were 70 days and 1 year old, and revaccination was to be performed between the ages of 5 and 7. The operation was rendered compulsory, for non-compliance with the law was to be punished by a fine.

EUROPE.

Switzerland.

Vaccination entered Europe almost simultaneously by several different routes. We have already seen how Dr. de Carro obtained his lymph at Vienna in the spring of 1799. He sent some to his friends at Geneva, and from that centre vaccination soon spread through Switzerland.

Mediterranean Coast.

In 1799 Dr. Joseph H. Marshall, then living at Eastington in Gloucestershire, had vaccinated his own children with lymph obtained directly from Jenner, and he was so satisfied with the results that he very soon became a professional vaccinator.

Our fleet and army were at this time acting on the offensive along the shores of the Mediterranean, and we find that Dr. Marshall and Surgeon John Walker sailed from Portsmouth in H.M.S. *Endymion* on July 1st, 1800, vaccinating, in season and out of season, wherever the ship touched. They advocated the operation of "cowpocking" with such zeal that in July, 1800, Admiral Keith and Sir Ralph Abercrombie ordered that all the sailors and soldiers under their respective commands who had not had small-pox should be compulsorily vaccinated. The garrison at Minorca was vaccinated in September, that at Gibraltar in October, and afterwards that at Malta, where Dr. Marshall remained from December to March.

Sicily.

About the same time an outbreak of small-pox at Palermo so frightened the Viceroy of Sicily that Dr. Marshall was enthusiastically received there, and for some time found full employment in vaccinating the majority of its inhabitants.

Italy.

Vaccination was introduced into Northern Italy by Dr. Saccho, who, says Dr. Crookshank, was so instrumental in persuading the Milanese Government to adopt strong measures that proclamations were read from every pulpit, vaccination was practised in every church, and the clergy gave such effectual aid that the professor and his associates vaccinated 70,000 persons in three years, and extinguished the small-pox in Lombardy. In South Italy the custom spread from Sicily to Naples, where a Jennerian establishment, with Dr. Marshall at its head, was founded by Royal ordinance. A certain number of surgeons from each province was ordered to attend Dr. Marshall's instruction in all that appertained to vaccination, and as soon as they were proficient they returned home to practise the operation, whilst Dr. Marshall himself accompanied the expedition to Egypt under Sir John Abercrombie.

France.

Vaccination was first introduced into France by Dr. Colladon, of Geneva, who brought lymph from England and made some trials with it at the Salpêtrière in Paris. These attempts proved abortive, but the whole subject was warmly taken up by the Paris Vaccination Commission under the able guidance and indefatigable industry of its Secretary, Henri M. Husson. This committee, formed May 11th, 1800, sent Dr. Aubert to London to inquire into the practice of vaccination, and to ascertain why the early attempts of the French operators had failed in spite of the care with which they had been made. Jenner sent Woodville back with Aubert to France to teach his method and to convey some lymph. The formalities connected with Woodville's passport caused a day's delay at Boulogne-sur-Mer, where the opportunity was taken of vaccinating some children. The event proved that this was a fortunate precaution, for on his arrival in Paris Woodville's lymph was found to be as useless as the previous supply. The vaccinations at Boulogne, however, were successful, and from these children a sufficient supply of lymph was obtained.

Spain.

Vaccination spread from Paris to Spain, where Don Francisco Piguilem inoculated four boys on December 3rd, 1800. The operation was early adopted at the Spanish Court, and, as we shall see presently, the Royal interest was sufficient to spread vaccination throughout the enormous tracts of South America.

Scotland.

The practice of vaccine inoculation, both in private and at the Vaccine Institution, established at Edinburgh in 1801, increased very rapidly throughout Scotland, where it so entirely gained the confidence of the public that vaccination very soon displaced inoculation with small-pox.

In Glasgow a child of Dr. T. Garnett was vaccinated on May 30th, 1799, but it was not until the year 1801 that the procedure was generally admitted to be one of any great value. In May of that year the Faculty of Physicians and Surgeons advertised as widely as possible that they would vaccinate all comers at their Hall in St. Enoch's Square every Monday, and two of the Members were regularly told off by rotation every month to perform the work. The first vaccination register, says Mr. Duncan, in his excellent *Memorials* of the Faculty, is still preserved, and in less than five years 10,000 persons had been gratuitously vaccinated in Glasgow alone. The numbers continued to increase yearly, until a small deposit was required from every applicant, to be returned if the case were shown on the proper day. This method was continued with trifling variations until the passing of the Vaccination Act, by requiring a certificate of successful vaccination, compelled the child to be brought back for subsequent inspection. In 1813 the Faculty reported that the practice of variolous inoculation had been totally abandoned in Glasgow and the West of Scotland.

Ireland.

The practice of vaccination was introduced into Dublin about the beginning of the year 1801, and at first appears to have made inconsiderable progress. A variety of causes operated to retard its general adoption, amongst which the novelty of the practice, the extraordinary effects attributed to vaccination by the uneducated, and even by those who should have known better, and the antagonism of the professional inoculators naturally took the lead.

In the beginning of the year 1804 the Cow-pox Institution was established, under the patronage of the Earl of Hardwicke, and from this period dates its general introduction to all parts of Ireland. The success of the institution in forwarding the new practice is to be attributed in a great measure to the diligence, zeal, and attention of Dr. Labatt, the secretary and inoculator, and of John Creighton, President of the College of Surgeons in 1812 and 1824, one of the earliest and most ardent of Jenner's disciples.

Russia.

In October, 1801, vaccine was sent from Breslau to Moscow by Dr. Friese. The lymph was transmitted upon threads, and upon Dr. de Carro's ivory points. The Empress Dowager zealously promoted the practice, and, as is well known, she desired that the name of "Vaccinoff" might be given to the first child who underwent the operation. The young Vaccinoff was afterwards conveyed to St. Petersburg in one of her Imperial Majesty's coaches, and was placed in the Foundling Hospital, where a special provision was settled upon her for life. In 1802 the Empress sent Jenner a letter, signed with her own hand, with a valuable diamond ring. The operation was willingly adopted by the people, and vaccination committees were established in each of the chief towns, whilst an economic society, founded more than a

century since, provides for the distribution of lymph, receiving a subsidy from the Government for its services in this respect. Compulsory vaccination has never been enforced but a return of the children vaccinated is made twice a year to the Minister of the Interior by the various vaccination committees throughout the Empire. The actual operation is performed by one or more vaccinators in each district—young men who have been taught by the doctors, and who in return for their services are exempt from the payment of taxes and from military service. Each vaccinator may receive a gold medal from the National Health Society on the completion of a certain number of successful operations.

GERMANY.

In Germany, Ballhorn and Stromeyer were vaccinating busily in Hanover as early as March, 1800, and by the beginning of 1801 they had performed nearly 2,000 operations.

DENMARK.

Dr. Marcet took some of Jenner's vaccine lymph to Copenhagen in the summer of 1801 and the operation was immediately taken up by the King, who appointed a committee to investigate its value on December 5th, 1801.

SWEDEN.

The practice spread from Denmark to Sweden, where the first vaccination was performed in 1801, and spread so rapidly that in 1803 the Medical Board proposed its general adoption. Royal letters patent in 1804 and 1805 decreed that measures be taken for the encouragement of vaccination. The operation was not to be compulsory, but information and advice about it were inserted for the information of the public in the almanacks for 1806.

TURKEY.

In Turkey, Dr. Auban, a French physician settled at Constantinople for upwards of thirty years, wrote to Dr. de Carro, then living at Prague, that on May 16th, 1827, he vaccinated successfully three children born on the Imperial throne and two other young ladies of the harem. This was the first occasion on which the Sultan's family had been vaccinated, though the operation had long been a common one in the country, for it was introduced soon after its discovery and was lost in 1802. Dr. de Carro sent a fresh supply of lymph in 1803, whilst Lord and Lady Elgin with Dr. Scott their physician carried it into Greece and the Archipelago about the same time.

AMERICA.

UNITED STATES.

Early in the year 1799 Dr. Lettsom sent a copy of Jenner's work, *Variolæ Vaccinæ*, to Dr. Benjamin Waterhouse, Professor of the Theory and Practice of Physic in the University of Cambridge, Massachusetts. Dr. Waterhouse was not slow to estimate the advantage of the discovery, and he published a short account of cow-pox in the *Columbian Sentinel*, March 12th, 1799, under the heading "Something Curious in the Medical Line." Not long afterwards he brought the subject before the American Academy of Arts and Sciences. John Adams, President of the United States, who was also President of the Academy, was at the meeting, and received the communication in a manner worthy of his exalted position. After several unsuccessful attempts to obtain cow-pox matter from England, Dr. Waterhouse at length succeeded in getting some from Dr. Haygarth, of Bath, who forwarded it from Bristol after procuring it through Mr. Creaser from Jenner's stock. Dr. Waterhouse inoculated, on July 8th, 1800, seven of his children with this supply, and six of the vaccinations were successful. In order to confirm the prophylactic value of the method three of the children were sent to the small-pox hospital, where one of them, Daniel, aged 12, was inoculated with small-pox. There were some slight appearances of infection on the fourth day, but they soon died away and left no traces of their action. A fresh supply of lymph from Jenner arrived in Boston early in the spring of 1801, and with this President Thomas Jeafferson and his son-in-law vaccinated nearly 200 persons in the course of the following July and August.

Vaccination was introduced into the Southern States by the personal interest of the same President, Thomas Jeafferson, who, being himself from Virginia, was well able to understand the ravages of small-pox among the large black population. The first and second supplies of lymph sent to Dr. Gantt failed, but the third supply proved effectual, and vaccination was soon established successfully in Richmond, and other parts of Virginia.

Dr. John Redman Coxe made most laudable efforts to introduce the inoculation of the cow-pox into Philadelphia, Penn., and in 1802 he published his *Practical Observations on Vaccination or Inoculation of the Cow-pock*, and Philadelphia has long been distinguished by the efficient manner in which the practice of vaccination has been carried out.

SPANISH AMERICA.

Vaccination was unknown at Lima, Peru, till the month of November, 1802. Small-pox prevailed at that time on the coast of the South Sea, and a merchant vessel, *Santa Domingo de la Calzada*, put into Lima on the passage from Spain to Manilla. Someone in Spain had had the good sense to send a supply of vaccine matter by this vessel to the Philippine Islands, and this supply was in part utilised at Lima, where several vaccinations were performed by M. Unanue, the professor of anatomy. Vaccine inoculation was introduced at Mexico in the month of January, 1804, through the agency of Don Thomas Murphy, who brought the virus from North America. The introduction of vaccination was almost unopposed, for the Indians had long been accustomed to inoculation with small-pox.

The supplement to the *Madrid Gazette*, dated October 14th, 1806, contains the announcement that "On Sunday, September 7th last, Dr. Francis Xavier Balmis, Surgeon Extraordinary to the King, had the honour of kissing his Majesty's hand on the occasion of his return from a voyage round the world, executed with the sole object of carrying to all the possessions of the Crown of Spain situated beyond the seas the inestimable gift of vaccine inoculation." This voyage forms one of the most interesting episodes in the history of the diffusion of vaccination. The expedition consisted of three frigates with several physicians and twenty-two children who had not had the small-pox, and who were destined to preserve the valuable fluid by a successive vaccination from arm to arm during the voyage. They sailed from the port of Corunna on November 20th, 1803, touched at the Canaries, Porto Rico, and Caraccas. They then separated into two parties; one went to South America, the other proceeded to the Havannahs, and from thence to Yucatan. Material for vaccination was lavishly distributed through the northern parts of Spanish America, and in each capital a central society was formed. It consisted of the highest authorities and the most zealous medical practitioners. Dr. Balmis, who was in medical charge of the expedition to promote vaccination, then started afresh from New Spain, taking with him twenty-six children to be successively vaccinated. The children, many of whom were very small, were placed under the charge of a matron brought from the orphan asylum at Corunna, and in this, as in the previous voyages, the greatest attention was paid to their cleanliness and comfort. The expedition arrived at the Philippine Islands, and propagated the practice of vaccination throughout their length and breadth. It then proceeded to the vast archipelago of the Visayas Islands, until it arrived at Macao and Canton. Fresh and active vaccine lymph was thus introduced into the Chinese Empire, where its subsequent distribution was left to the English factory.

The Peruvian part of the expedition was wrecked in one of the mouths of the River Madelaine, but it was succoured by the natives, and the sub-director with his three physicians and the children were taken charge of by the Government of Carthagena. This expedition passed across the Isthmus of Panama, and are said to have vaccinated no fewer than 50,000 persons along the Peruvian coast. Familiarity with the dreadful effects of small-pox in tropical countries led to many affecting scenes in the course of the expedition. It was often publicly received by the bishops, military governors, and persons of the greatest distinction, who took into their arms the little children who were to carry the cow-pox to the indigenous Americans and the Malays of the Philippine Islands, and returned thanks to God for having been the witnesses of so happy an event.

A SKETCH OF THE LEGISLATIVE MEASURES RELATING TO VACCINATION.

MOST of the Governments of Europe made provision for affording the benefits of vaccination to their respective populations very soon after Jenner's discovery of its prophylactic value in small-pox. In many cases, as in Germany, Spain, and Russia, the ruling Sovereign personally interested himself in its diffusion. An ordinance in regard to vaccination was published in Sweden as early as 1803, and special enactments were soon afterwards made in Denmark and in many of the German States. The first Austrian regulations were laid down in 1808, and when Jenner died in 1823 there were very few European Governments except our own in which one or more regulations were not in force upon the subject of vaccination.

Vaccination was practically approved by the Government in England on June 2nd, 1802, when a Committee of the House of Commons unanimously voted "that it is the opinion of the Committee that a sum not exceeding £10,000 be granted to His Majesty to be paid as a remuneration to Dr. Edward Jenner for promulgating the discovery of the vaccine inoculation, by which mode that dreadful malady the small-pox was prevented." The National Vaccine Establishment was appointed on June 8th, 1808, at an annual cost of about £5,000, for the purpose of keeping up and distributing supplies of vaccine lymph, but it was not until the year 1840 that the first Act of Parliament was passed to regulate the practice of vaccination. This Act appointed one or more medical practitioners to vaccinate gratuitously in each Poor-law district, but it failed in part because its administration was entrusted to the guardians at a time when everything connected with the Poor Law was excessively unpopular, and in part because some ignorant guardians were unable to appreciate the fundamental economic principle that it was better to spend a small sum annually in prophylactic measures rather than to incur the heavy expense necessarily attendant upon a widespread epidemic. The Vaccination Extension Act (1853) made vaccination compulsory under penalty, whilst various Acts have been successively passed to ensure a national supply of lymph and to regulate the performance of vaccination (the Public Health Act of 1858); to secure an adequate inspection of the results of public vaccination (1860), and "to consolidate and amend the statutes relating to vaccination in England" (the Vaccination Act of 1867). This Act, of which the provisions are tolerably well known by every medical practitioner, and by most of the public, imposes certain duties upon the parents or custodians of children; on the local authorities charged with its administration; on the appointed public vaccinators, and on the registrars of births and deaths. Its main provisions still hold good, but it has been amended in several important particulars by the Acts of 1871 and 1874.

The Central Committee of Vaccination in Paris controlled for many years the practice of French vaccination. The Royal Academy of Medicine afterwards continued the work of the Central Committee, and issued a series of annual reports upon the state of vaccination in France.

Vaccination was made compulsory in Bavaria in 1807, and in all the schools and official establishments of the Grand Duchy of Baden in the following year. It became compulsory in Denmark in 1810, and in 1812 a Committee of the Diet in Sweden ventured to recommend a law for the compulsory and general introduction of the practice. The principle was approved by the Diet, but it was not confirmed until 1815, nor was the Royal Edict, making the non-performance of vaccination punishable by fine and imprisonment, issued until March 6th, 1816. Würtemberg, Hesse, and other German States made vaccination compulsory in 1818, Prussia in 1835, Roumania in 1874, Hungary in 1876, and Servia in 1881. In Italy it was only so lately as June 18th, 1891, that the Minister of the Interior consolidated the various regulations about vaccination, and enacted that all children must be vaccinated within the solar half year subsequent to their birth unless they had small-pox or were in ill-health. It has been compulsory in South Australia since 1872, in Victoria since 1874, and in Western Australia since 1878. A compulsory Act was passed in Tasmania in 1882, and the operation was rendered obligatory in Calcutta in 1880, in Madras in 1884, and in Bombay a few years earlier.

Vaccination is compulsory by local laws in 10 out of the 22 Swiss cantons, but an attempt to pass a Federal compulsory law was defeated by a *plébiscite* in 1881.

Vaccination is not compulsory in France for the upper and middle classes, but it is so, practically, for the poor, as they can neither obtain relief nor can their children be admitted to the schools unless they have been vaccinated.

Compulsory vaccination has never been necessary in Russia, as the operation has always been adopted willingly by the people, nor is it compulsory in Spain, Portugal, Belgium, Norway, or Turkey, though in these countries, as in France, various classes are practically compelled to undergo the operation.

There is a vaccination statute in only a few States or cities of the American Union; in Canada there is none, nor is there any compulsory vaccination in New South Wales, though the greatest facilities are there offered for free vaccination of those members of the community who choose to avail themselves of its beneficial effects.

REVACCINATION.

Dr. Goldson, in 1804, first announced that the protective effects of vaccination were diminished by lapse of time; and in 1823, Dr. Herder, at St. Petersburg, pointed out that the prophylactic value of infantile vaccination became impaired about the age of 14. The great epidemic of small-pox in Paris in 1825, when the mortality was greatest among adults, frightened the chief Governments in Europe, and led them to insist upon revaccination. It was accordingly practised on an extensive scale in Germany, Sweden, Denmark, Prussia, and France. It was made compulsory for the recruits of the Würtemburg army in 1833, and for those of the Prussian army in 1834, whilst Hanover and the other German States adopted it between the years 1835 and 1842. In Belgium, where vaccination has never been required by law, the Government, at the suggestion of the Royal Academy, on October 31st, 1857, strongly recommended the practice of revaccination to the local authorities. It was made compulsory in Denmark in 1871; in Roumania in 1874, and in 1872 it was enacted that all school children in Holland should be revaccinated.

Dr. Gregory, Physician to the Small-pox Hospital, read a paper before the Royal Medical and Chirurgical Society of London in 1838, pointing out that small-pox increased in severity as life advanced both in the vaccinated and in the unvaccinated. He did not suggest, however, that revaccination should be performed, and it was left to Dr. Marson in 1858 to adduce before the same Society evidence of the value of the practice. He showed in his paper that for upwards of seventeen years, the time during which he had been connected with the Small-pox Hospital, not one of the servants or nurses of the hospital had been attacked with small-pox, although vaccination had been the only protection of many of them, but that each had been carefully revaccinated on their first coming to live at the hospital. On rebuilding the hospital a large number of workmen were employed for several months after the arrival of the patients; most of these workmen consented to be revaccinated, two only were attacked by small-pox, but they were amongst the few who were not revaccinated. In spite of this and similar evidence it was not until the epidemic of 1871, when young adults were chiefly affected, that the practice of revaccination was adopted to any great extent in England. It has not even yet made much way in France, though the Academy of Sciences issued a report upon the subject as early as 1845, stating that revaccination is rationally indicated for a great number of individuals. This report, though not an unfavourable one, seems to have long hindered the practice in the same manner as did the denunciation of the National Vaccine Establishment in 1851, that revaccination was as incorrect in theory as it was uncalled-for in practice. The French revaccinate their army, but at the time of the Franco-Prussian war it was done in so slovenly a manner as to call forth much comment from the Prussians, who roundly accused the prisoners of being centres for the dissemination of small-pox. In Italy the consolidated Vaccination Regulations of 1891 make revaccination compulsory after the age of eight years.

COW-POX AND SMALL-POX:

JENNER, WOODVILLE, AND PEARSON.

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Some Early Vaccinations and their Results.

The reproduction in the British Medical Journal of the beautiful and valuable series of plates by George Kirtland, so fortunately discovered at an old bookstall by Mr. G. W. Collins, affords a convenient opportunity of discussing, in connection with the Jenner centenary, one of the most interesting and curious episodes in the early history of vaccination.

In the year 1799 (the year following the publication of Jenner's *Inquiry*, in which work he first gave to the world the results of his investigations regarding the variolæ vaccinæ) the whole project of vaccinal prevention of small-pox ran serious risk of disaster. The risk was due, not to its enemies, but to one or two of its most active friends and promoters, and that utter collapse did not overtake the new prophylaxis was due partly to the shrewdness and sagacity of Jenner himself. At this time Dr. William Woodville was physician to the "Hospital for Small-pox and for Inoculation," which had been established in 1746 for the double purpose, as its name indicates, of treating small-pox cases and of carrying on the practice of variolous inoculation. It was only in 1796 that Woodville had published the first volume of his *History of Inoculation*, the second volume of which, though nearly ready for the press, was destined never to appear, owing not to Woodville's death, but to the introduction of the vaccine inoculation. Woodville was intensely interested in Jenner's work. Towards the end of January, 1799, he heard of an outbreak of cow-pox in a dairy in Gray's Inn Lane. The disease had infected the hands of several milkers. Armed with a copy of Jenner's plates he visited the dairy, accompanied by the President of the Royal Society and other well known men of the time. There being no doubt of the nature of the malady, and the vesicle on the arm of a milker, Sarah Price, being very perfect, Woodville at once started from this stock the practice of vaccination. In the middle of May he published the results of his operations under the title of Reports of a Series of Inoculations for the Variolæ Vaccinæ or Cow-pox. These inoculations had all been done at the Small-pox Hospital, *and in a total of 500 cases about 300 had had a general eruption.* As eruption had been the ordinary accompaniment of variolous inoculation, Woodville looked on these appearances following on his new procedure, not as of essential consequence, but yet as disappointing, and he certainly had not expected them after what Jenner had published. But the occurrences did not make him propose to discontinue vaccination and return to variolation, as, in spite of the eruptions, he found the new disease to be on the whole much milder than the old. Jenner, however, was greatly disturbed by these proceedings. He communicated with his friends regarding them, and he declared, axiomatically, that wherever variolous eruptions were produced, variolous matter must have produced them. A singular fact was that Jenner himself had received some matter from Woodville, taken from a patient, Ann Bumpus, who had 310 pustules on the body, and that that matter had been sent by Jenner to Dr. Marshall, who had done many inoculations with it indistinguishable in their results from those done from other sources and without eruption.

Dr. George Pearson, of St. George's Hospital, who was one of the first to take up the new inoculation, had obtained matter—also in January, 1799—from a dairy in Marylebone Fields as well as from the Gray's Inn Lane stock. No doubt he also was in the habit of visiting the small-pox hospital and of getting matter from the cases there. On March 12th of that year Pearson sent out to medical correspondents in the country and elsewhere 200 threads soaked in matter for vaccine inoculation.

What was the Lymph Used?

In addition to the lymph from the two London dairies, various other stocks were originated and distributed and interchanged by Jenner and Woodville and Pearson. Woodville states that he often went back to the cow for fresh inoculative material, and also that he got some from Jenner. It is now, however, impossible to disentangle all the records of all the strains of lymph that were brought into use and continued or discontinued, and I do not propose here to follow the details of the heated controversy which arose regarding Woodville's eruptions, and Jenner's criticism of the hospital results. My first object is to examine the question whether it is likely that much or any variolous matter was mistakenly distributed and used and propagated as vaccinal or whether it is probable or possible that, instead of cow-pox, the matter which survived the controversies and was ultimately brought into general use was really small-pox.

A careful examination of Woodville's Reports of his 500 cases reveals some interesting facts. These cases are in two series, of 200 and 300 respectively. Much more detail is given regarding the first or earlier series than regarding the second. As I have already mentioned, 300 cases of the total 500 had eruptions. Of the first series of 200 cases, 91 had eruptions, and in the second series of 300 cases the proportion of eruptive cases was even greater. In many of the cases, however, the pustules were few; in the 91 eruptive cases of the first series, 31 had only 5 pustules or less, 11 had from 6 to 10 pustules, and only 24 had over 100 pustules. In many of the slighter cases quite possibly the eruption may not have been variolous at all. Where, however, the eruption was of appreciable abundance and severity, it may be assumed to have been variolous.

Were these variolous eruptions due to the insertion of small-pox virus, or were they due to infection of the hospital atmosphere, or were these two separate agencies at work in different cases? No inherent impossibility attaches to any of the alternatives. There is abundant evidence that there may be a local development of vaccinia on the arm whilst small-pox is incubating in the blood. Looking to the close relationships of vaccinia and variola, this is exactly what one would expect. Cow small-pox and human small-pox are so nearly allied that the two may be cultivated on the same skin at the same time, and while the results of such experiments and observations are not always the same, and while the one virus may often modify the effects of the other, it seems to me a safe rule that vaccination should not be relied on as a certain preventive of small-pox by infection, until the vaccine vesicle has had time to develop.

As regards Woodville's cases, it appears that the great bulk of the eruptions which were really variolous in his first series of 200 cases must have been due to infection from the tainted atmosphere of the Small-pox Hospital. It is fortunate that in his notes Woodville clearly distinguishes between matter taken from the arm—from the vesicle of inoculation—and matter taken from pustules of the general eruption. The great majority of his 200 cases belong to the former category. There were, however, a few cases—about 14 or 15 in the 200—for which he used matter from a pustule on the body, and these we may take as variolous inoculations. All these cases had a general eruption, amounting in half a dozen of them to from 100 to 300 pustules. But when these cases are traced in the records, it is very important to note that they were not themselves used as sources of inoculation of future cases. In every one of them we come to a full stop, so that the strain of variolous matter was not continued.

Woodville's Blunder.

Towards the end of his 500 cases, however, Woodville's practice greatly degenerated, and he began to take matter much more freely from the pustules of the general eruption. It was on January 21st, 1799, that his first series of cases began. This series was completed shortly before the end of March. His Reports were published in the middle of May, but he does not state exactly when his second series of cases ended.

The next noteworthy point is that almost immediately after publication of his Reports—very likely as a result of publication—Woodville became alive to the fact that he had been blundering. On June 13th he wrote to the *Medical and Physical Journal* giving information which, he said, "I deem of con-

siderable importance, as it leads to a conclusion widely different from that published in the reports." This information was to the effect that "the results would probably have been more favourable if the matter used for communicating the infection had been taken from those only in whom the disease proved to be very mild." This statement as to great mildness is rather vague. Very likely Woodville did not care to go into too much detail as to his previous mistakes. Three weeks later, however, we learn indirectly exactly what it was that Woodville meant. On July 6th John Ring, a surgeon well known in early vaccination history, wrote to the same journal as follows: "Of those whom I have inoculated or seen inoculated with vaccinia matter, few have had any considerable eruption, and those few were inoculated with matter which there is reason to believe was not taken from the original pustule on the arm, *a circumstance which Dr. Woodville has proved to be of great consequence in this disease.*" (The italics are mine.) This letter of Ring's quite sufficiently indicates Woodville's meaning, and the change which had taken place in his practice immediately after the publication of his Reports.

It is not possible to ascertain quite accurately how long Woodville had been blundering; perhaps the time might extend to about a month, possibly a week or two longer; but even during that time he did not of course blunder with regard to all his cases, or with regard to anything like all of them. Through the medium of the medical periodicals of the time, and through the constant stream of correspondence that was passing between town and country regarding the new prophylaxis, it is not to be doubted that the profession as a whole quickly became aware of what had been going on, and that any practitioner who, during that month or six weeks, had received small-pox lymph in mistake for cow-pox, would be very unlikely to continue to propagate the infection.

Pearson's Threads.

Coming now to Pearson's practice, I have already stated that on March 12th, 1799, he issued to medical correspondents 200 threads of material for inoculation. I cannot find the origin of this material stated in the publications of the time. Pearson had begun with two stocks of lymph—one from the Gray's Inn Lane outbreak and the other from Willan's dairy in Marylebone Fields. Very likely it was lymph from these sources that he sent out; but we cannot exclude the possibility of some of his material having come from cases operated on at the Small-pox Hospital. He states, however, at a later date that in March, 1799, he got another stock of lymph directly from the cow. If he received this lymph in time it is more than probable that it formed part of the material which he sent out on the 12th of that month. Supposing, however, that part of his stock came from the cases operated on at the hospital, is it likely that any of the matter was variolous? Almost certainly it was not so. Any hospital lymph which he sent out on March 12th must have had its immediate origin in operations performed at least eight days earlier. But Woodville's hospital practice had not then begun to deteriorate. He was at that time engaged on his first series of cases, and, as already noted, in the few instances in which he used matter from the general eruption, he did not take any matter from those who were thus operated on, so that these strains of small-pox lymph were at once discontinued.

Moreover, Pearson himself, before he sent out his threads, had already been occupied with the question of the nature of the eruptive cases. On February 15th, 1799, he wrote to Jenner, stating that in the case of a child whom he had inoculated from one of Woodville's patients "the disorder proceeded exactly as the inoculated small-pox," and that, in consequence, he had suspected that Woodville might have used in mistake a variolating lancet; but Woodville had replied that the lancet had been newly ground, and was above suspicion. All the same, Pearson told Jenner that he intended to satisfy himself by making some experiments—"by inoculating patients with the matter of the eruptions." On March 12th, therefore, he was fully aware of the need there was for care as to the lymph he was about to send out to his medical brethren; and in the October number of the *Journal* he reports the results as follows: "From my correspondents I have not had a single case of eruption like the variolous since that of Dr. Redfearn's, of Lynn; not one of this sort in Dr. Kelson's, of Sevenoaks, report of about 100 patients; not one in Dr. Mitchell's, of Chatham, of about 50 patients; not one in the report of near 100 patients from Dr. Harrison, of Horncastle, communicated to the Right Hon. Sir Joseph Banks; and, in short, not one case with these eruptions appear in the accounts from my other correspondents." De Carro, of Vienna, the principal vaccinator there, received his original supply of lymph from Pearson on March 20th, and very likely this was part of the 200 threads sent out on March 12th. This lymph was ultimately allowed to die out in Vienna, but the kind of material that Pearson was using and distributing at this time is indicated by the fact that in September, 1799, in writing to Pearson and Coleman for more lymph, de Carro stated that what he had already got from Pearson had given results like those depicted in Jenner's plates, as published in his *Inquiry;* and in October, 1800, he wrote that he had never seen eruptions. Pearson also sent matter to Paris, but the stock died out.

The Lymph given to Jenner by Woodville.

Now we come to the interesting point as to the matter which Jenner received from Woodville, from the case of Ann Bumpus, who had 310 pustules. Is it possible that Jenner himself on this occasion mistook small-pox matter for cow-pox, and caused it to be distributed as such? Very fortunately there is sufficient evidence to indicate that this was not so, and that what Jenner got from Woodville was cow-pox, not small-pox. The date of the operation on Ann Bumpus herself was February 6th. It has already been noted that Woodville carefully recorded whether matter had been taken from the inoculated arm or from the pustules of the general eruption.

The exact pedigree of this lymph is as follows: On January 21st a girl, Collingridge, was inoculated on the left arm with matter taken from the teats of one of the cows affected at the Gray's Inn Lane Dairy. On the fifth day the vesicle had formed, and on that day Woodville inserted, no doubt as a test, variolous matter on the other arm. On the thirteenth day an eruption began to appear on the body. This was probably too early to be caused by the variolous inoculation, so that atmospheric infection again appears to have been the cause. But on the ninth day (January 30th) cow-pox matter had been taken from Collingridge's arm and inoculated on the arm of Sarah Butcher. No general eruption occurred in her case, and the test of variolous inoculation was applied on the sixteenth day (February 14th), when incrustation of the cow-pox vesicle had occurred. "The variolous inoculation produced a little redness, which disappeared in a few days." On the eighth day of this case (February 6th) cow-pox matter had been taken from Sarah Butcher's arm, and inserted in the arm of Ann Bumpus. I have already mentioned that it was at the Small-pox Hospital that these inoculations were being carried on by Woodville. On the eleventh day (February 17th) two or three pustules appeared on the face of Bumpus, and this was the beginning of an eruption which by the fifteenth day reached to a total of 310 pustules. It was from this case that Woodville gave lymph to Jenner. Jenner, however, received the lymph on February 15th (the ninth day), and it had been taken from the arm of Bumpus. At this date, indeed, there was nowhere else to take it from, as the general eruption had not begun. Variolation was not performed until the twenty-second day; and if Woodville had only recognised that the eruption was in all probability small-pox due to atmospheric infection in the hospital, he might have saved himself the trouble of so futile a test.

Woodville records five operations as done from Bumpus. Four of these had not a single pustule, and the other had 174 pustules. The strong contrast between these results—the total absence of pustules in four cases, and the large number present in the other—suggests that in the eruptive case another or additional agency had come into play—the agency of atmospheric infection. The suggestion further is that the matter which did not produce a single pustule in the four cases was vaccinal and not variolous. The lymph which Jenner got from Bumpus was obtained on February 15th. The general eruption appeared on Bumpus on the 17th, and on the 18th or 19th March, W. Walker was inoculated from

Bumpus. In Woodville's practice at this time he does not appear to have hesitated to go back to the same arm over and over again on different dates. He gives the date of Walker's inoculation as February 18th. It happens, however, that the father of Walker was an engraver, and took much interest in what was being done, and that he made sketches of the appearances on the arm at various dates during the progress of the case, and that these sketches were published in the first volume of the *Medical and Physical Journal*. Walker gives the date of the operation as Monday, February 19th, and states that it was done by Woodville in presence of Dr. Willan. No pustules resulted on the body. Close to and in contact with the two insertions made on the arm by Woodville, which developed in the ordinary way, there are four or five small vesicles which are noted as having appeared between the eleventh and the fourteenth day.

Cow-pox or Small-pox?

If we assume that Woodville, in the course of his second series of cases, or accidentally at any other time, or that Pearson, among some of his 200 threads, had actually sent out variolous matter under the name of cow-pox, the question remains whether there was any chance of this being largely propagated in the country, or whether the profession in the earliest years of vaccination had the means at hand to enable them to distinguish between inoculated variola and inoculated vaccinia. Of cow-pox on the cow very few of them knew anything, but with the phenomena of small-pox inoculation every medical man was well acquainted, the practice having been very extensively in vogue throughout the country for more than half a century.

To complete the argument it may be as well to show, from the records of what was actually done, that the difference between local cow-pox and small-pox was recognised by the profession, and that the material in use was really cow-pox.

The Hospital Atmosphere.

In the first place, it may be convenient to show that Woodville himself came to recognise the eruptions which occurred in his hospital cases as due to the hospital itself. In the latter part of the year 1800 he wrote thus to the *Medical and Physical Journal:*

"I had not long practised the vaccine inoculation at the hospital before I was requested to extend it into private families in the metropolis, where I soon discovered that the cow-pox uniformly appeared in its mildest form, and was never attended with eruptions. I also supplied several medical gentlemen with the vaccine matter, which was used by them with the like result. Hence I began to suspect that there existed some peculiar cause which rendered the patients under vaccine inoculation in the hospital more liable to pustules than others, and that this suspicion was well founded I have since, from daily experience, been fully convinced. At various times I procured the vaccine virus, as produced in different cows, and with it inoculated patients in the hospital, but the effects of all the matter I tried were perfectly similar, and pustules proved to be not less frequently the consequence of these trials than of those made with the matter formerly employed. The last matter of the vaccine poison which I introduced into the hospital was obtained from Dr. Jenner, and originally taken from Clark's cow before noticed; with this matter I inoculated at the hospital on the same day three patients, on one of whom about 100 variolous-like pustules were produced. This instance, and numerous others of the like kind which I could adduce, decidedly prove that where there can be no doubt entertained of the purity of the cow-pock matter with which the patients in the hospital are inoculated, pustules will frequently be the consequence."

It is curious, however, that he seems to have been slow in recognising the *modus operandi* of the hospital atmosphere, for in his *Observations on Cow-pox*, published in the middle of the same year, he writes regarding the eruptions: "I am disposed to attribute them to the adventitious co-operation of the variolous atmosphere to which the patients were exposed;" but "in what way the variolous myasms act in thus modifying the cow-pox, or why they co-operate in some and not in all cases of vaccine infection, I shall not even venture a conjecture." But in the *Medical Journal* of December, 1800, he writes: "Respecting those to whom I have communicated the infection out of the hospital or among my private patients, I have not yet met with one instance in which variolous-like pustules took place." And in the same letter he says: "That the variolous effluvia, even after the vaccine inoculation has made a considerable progress, have in several instances occasioned an eruption resembling that of the small-pox;" and he begins to sum up thus: "From the preceding observations we may infer that in this metropolis and its vicinity, where the small-pox constantly more or less prevails, the vaccine inoculation must sometimes be attended with a pustular eruption of which it is not the cause."

Woodville's Own Description.

In the course of his Reports on his 500 cases—published, it is to be borne in mind, in 1799, before his Observations and before his letter above quoted—Dr. Woodville writes thus regarding the local appearances of cow-pox and small-pox: "However, the local tumour excited from the inoculation of the cow-pox is commonly of a different appearance from that which is the consequence of inoculation with variolous matter; for if the inoculation be performed by a simple puncture the consequent tumour in the proportion of three times out of four, or more, assumes a form completely circular, and it continues circumscribed with its edges elevated and well defined, and its surface flat through every stage of the disease; while that which is produced from variolous matter either preserves a pustular form or spreads along the skin and becomes angulated and irregular, or disfigured by numerous vesiculæ." This is a particularly interesting statement. The mention of the ratio "three times out of four" shows that Woodville had not always found what he called vaccinia to produce the typical vaccine appearance. The natural suggestion is that exceptions might well be expected, looking to the fact that towards the end of his 500 cases, on which he is here reporting, he had not infrequently been using matter from the general eruption. But in the first removes from the cow there may well have been some vaccine vesicles which showed their cousinship to small-pox by some modification in shape or course, and Collingridge's case, in which there were supernumerary vesicles, is an example of this. He is very clear, however, that the two diseases could proceed *pari passu* on the same subject and yet preserve their distinctive characters: "The general character of the tumour formed by the inoculation of the small-pox is very different from that of the cow-pox; and though on the same day a person be inoculated in one arm with the matter of the cow-pox and in the other with that of the small-pox, yet both tumours preserve their respective characteristic appearances throughout the whole course of the disease. This is certainly a strong proof that the two diseases, in respect of their local action, continue separate and distinct."

Testimony of Other Practitioners.

In the medical literature of the period there is abundant evidence that the profession generally was well acquainted with the difference between vaccination and variolation. Ring stated in his *Treatise on Cow-pox* that where matter from eruptive cases was used, that is, variolous matter, it never recovers the vaccine appearance by passing through different constitutions even when used from arm to arm. Fosbrooke, writing to the *Journal* in February, 1800, has no doubt that cow-pox is not accompanied by eruption. A pamphlet published in 1800 under the title of A Comparative Statement of Facts and Observations relative to the Cow-pox also distinguishes between the local appearances of the two diseases.

In January, 1801, Stokes, of Chesterfield, writing to the *Journal*, showed that he was similarly aware of the distinction, and two months later Hutchinson, of Manchester, wrote that "the absence of eruption is so striking that the public distrust cow-pox." They had been so used to the eruption of small-pox inoculation, that they doubted the virtue of any non-eruptive preventive. Writing in May, 1799, when Woodville's hospital practice was at its worst, the editor of the *Medical and Physical Journal* says that 97 per cent. of cow-pox cases were like Walker's, in which case there was no

eruption. In November, 1799, the *Medical Journal* gives the results of 300 cases inoculated at Finmere with matter which had been got from Woodville in the summer of that year, subsequent to the publication of his Reports, and only 4 of these had any eruption. From the same source over 700 cases were done at St. Helens, and they were practically without eruption. In February, 1800, Dr. Stewart recorded in the *Journal* 43 cases of which 1 only had a very trifling eruption, which disappeared quickly without suppuration. In October, 1800, Dr. Barry, of Cork, reported 250 cases, of which only 3 had eruptions, also disappearing without suppuration. In the *Medical Review* Mr. Taynton, of Bromley, wrote in April, 1800, that though he had vaccinated a great many cases, in no instance had there been anything like an eruption; and Dunning, of Plymouth, in his *Observation on Vaccination*, published in 1800, declared that cow-pox never gives rise to a general eruption. Even in the present day we are not unacquainted with occasional trifling eruptions of generalised vaccinia.

The Effects of Woodville's Blunder not Permanent.

From such facts as these it appears to me that no other conclusion can be arrived at than that the errors committed by Woodville had no permanent or appreciable effect on the nature of the inoculative matter which came into use in this country and on the Continent. The nature of his mishaps was at once recognised by others, and was soon in effect admitted by himself. The profession as a whole all over Europe was well aware of the appearances and results of small-pox inoculation, and was in little danger of confusing the new disease with the old. The thousands of inoculative variolous tests which were performed after the early vaccinations in order to ascertain whether there still remained any remnant of susceptibility to small-pox were genuine tests, and cannot be set aside on any supposition that the original protective operation had been itself a variolation and not a vaccination, and the stocks of lymph which came into existence in these early times consisted not of small-pox attenuated by cultivation from arm to arm, but of cow-pox.

What is Cow-pox?

In calling cow-pox "variolæ vaccinæ" Jenner indicated his own opinion as to the nature of the disease. Some of his contemporaries who accepted vaccination as a preventive of variola denied altogether that it was small-pox of the cow. It was left to Robert Ceely, of Aylesbury, in the year 1839 to show that cows really can be inoculated with small-pox with the result of producing a result indistinguishable from that of cow-pox both locally and on its transference to the human skin. Badcock, of Brighton, got similar results in the following year, and much evidence has recently accumulated to the same effect. Surgeon-Major King of Madras, Hime of Bradford, Simpson of Calcutta, Haccius of the Swiss Vaccinal Institute, and Copeman and Klein for the Local Government Board have laboured in the same field, with the general result that in the course of a few removes the matter obtained has become suitable for using from arm to arm for purposes of ordinary vaccination. Occasionally, as in Chauveau's hands, small-pox and not cow-pox has resulted, so that it does appear as if small-pox matter may remain unchanged in the surface tissues of the cow, and may be again transferred to human beings. The age of the cow is perhaps of importance here, as calves appear to be more useful than older animals in effecting the desired transformation of the disease.

Cow-pox itself, then, is only attenuated small-pox, and its peculiarity is that the attenuation has left it, as an inoculable material, safe, convenient, and effective for the protection of the individual, while it is safe also in producing a disease which does not spread by atmospheric infection. The question remains, Could any other method of attenuation produce a like effect? There seems nothing inherently impossible in this. In the history of the subject, there are some interesting records of such attempts, and the more important of these are worthy of a little consideration. Here again, for the beginnings of this line of research we have to go back to Jenner. In the last century there was a practically unanimous belief in the medical profession that one attack of an infectious disease was an absolute and lifelong protection against all future attack. True small-pox could not recur. When a person who was pitted with small-pox from a severe attack in infancy developed in later life a very mild attack, it was dubbed stone-pock, water-pock, horn-pock, etc., and was not small-pox.

"Swine-pox."

Jenner, however, working away in his own fashion, slow yet persevering, had evidently concluded that these eruptions were variolous in their nature, and so early as 1789 he inoculated one of his own family with a modified variola which at that time and place was called "swine-pox." The inoculation was successful, and the test of variolation, afterwards applied, showed that the child had been protected against small-pox. But we hear no more of this line of inquiry on Jenner's part, his other investigations being confined to cow-pox.

"Pearl-pox."

In the year 1807, Dr. Adams, Woodville's successor at the Small-pox Hospital, tried an exactly similar method. He took matter from an outbreak of what, owing to the whitish appearance and small size of the vesicles, was called "pearl-pox," and he declares that "at last" he had got the vaccine appearance. But the singular fact is that an examination of his records shows that he got the vaccine appearance not merely at last but at first. The very first case that he did with the matter of pearl-pox had on the tenth day a "vaccine appearance." Along with this local result there was an eruption of 150 pustules. In the first remove from this case, the local result was "perfectly vaccine in all its stages," and in the second remove the remarks are similar. In some there was more or less of a pustular eruption, and in others there was no eruption. Owing, however, as Adams states, to prejudice against vaccination, the operations were not continued. It is very unfortunate that no plates or diagrams illustrate the register of these cases, and that we have nothing to guide us in the way of description beyond such terms as "vaccine" or "perfectly vaccine." It is unfortuate also that these experiments with pearl-pox appear never to have been repeated, and indeed, so far as I am aware, there is no further mention of pearl-pox itself.

"Varioloid."

In another series of experiments in the direction of variolous attenuation, vaccination itself played a prominent part. In the *Journal Général de Médecine* for 1827 there is an account of a discussion which took place in the Academy of Medicine regarding certain inoculations which had been performed by a surgeon named Guillou. In the course of a small-pox epidemic, the disease when it attacked the vaccinated manifested itself as varioloid. Guillou's stock of vaccine lymph had become exhausted. In the emergency he took matter from the varioloid eruption. The matter was taken on the fifth day of the eruption from a girl, aged 15, and with it a baby was inoculated in 10 places. The result, he says, consisted of 10 fine vaccine vesicles. From these he inoculated 40 infants, and from these again another 100. Satisfied with his success, he began a new series of operations, choosing two *écoliers* suffering from varioloid, who had been vaccinated a long time previously, but whose age is not stated. Here, also, he declares that the result was excellent, but he mentions that there was not wanting in some cases an accompaniment of general eruption with fever. These operations of Guillou's, however, were brought to an end through the interference of the Minister of the Interior, who was advised by the Committee of the Academy that the experiments were dangerous and that the local result was variolous, not vaccinal. Curiously enough, in Ireland, a good many years ago the authorities of that time similarly objected to the use of vaccine matter which had been produced in the cow by the insertion of variola. Guillou's own thesis appears to have been that a vaccinated human subject, a considerable time after his vaccination, occupies the same position, with regard to attenuation of variola, as we now believe, and as Jenner from the very beginning suspected or believed, that the bovine animal occupies. Just

as small-pox inserted in the calf may be modified into cow-pox, so small-pox inserted in a vaccinated subject may be similarly modified.

Thiele's Experiments.

In his *Papers on Vaccination* (published 1857) Sir John Simon gives an extract from a paper by Dr. Thiele, of Kasan, recording certain experiments made towards attenuation of small-pox. Thiele held that cow-pox as manifested in the cow has its source in human small-pox, and that small-pox could, without the interference of the cow, be artificially modified, so as to give it all the properties of vaccinia. To accomplish this attenuation he said that it was essential that the lymph from human small-pox should lie for ten days between glasses sealed with wax, and should then be diluted with warm cow's milk and inoculated like common vaccine. At first he said such an inoculation causes large pustules at the points of insertion, and is accompanied by a preliminary fever about the third or fourth day, and by a secondary and more violent fever between the eleventh and fourteenth day. Locally there is a considerable areola, and small pustules surround the inoculated places. The cicatrix is larger and deeper than usual, and the edges are sometimes sharp. He lays it down that this procedure must be observed during ten generations. By that time the pustule will have gradually become equal to a vaccine vesicle. When the secondary fever ceases to appear, the vaccinator can safely proceed to arm-to-arm inoculation without further attenuation of the lymph by cow's milk. The reader of these extracts is apt to feel curious as to the particular reasons which made Thiele resort to cow's milk in his experiments. Had he any half-formed theory that as cow-pox was in his opinion derived from human small-pox, and was itself developed on the cow's teats, the secretion of the cow's udder might have some peculiar virtue in the direction of dilution or attenuation of small-pox? The extracts given by Simon, however, throw no light on this side question.

Experiments of Trousseau and Delpech.

In the second volume of his *Clinical Medicine* Trousseau records a series of experiments made by himself and Dr. Delpech for the attenuation of small-pox. He used modified small-pox, which he defines as "simply small-pox modified either by antecedent small-pox or antecedent vaccination." If, as is most likely, the cases he chose as sources of inoculative material had their modification due to vaccination, then his experiments were similar to those of Guillou. His results, however, are not similarly described. "In spite of that precaution (the selection of mild cases) I always communicated natural small-pox, of the distinct form, it is true, but still unmistakable, natural small-pox."[1] Further on[2] he reports the results a little more favourably. "We obtained the desired result in some children, to the extent that the mother pustule (*le maître bouton*), the pustule of inoculation was alone developed, and that around it there were little pustules, its satellites.....In some cases I attained the complete success of having only the pustule of inoculation; but in others, in which the very tame virus had been employed, there were general eruptions, and, worse still, communication of small-pox to non-inoculated persons. In one case.....the small-pox resumed all its original violence, after having passed through a succession of individuals in a series of inoculations." For such reasons he found it his duty "to renounce inoculation." It will be observed in Trousseau's description of the local result that he does not assert that he got the typical vaccine appearance—"around it there were little pustules, its satellites." Such pustules are shown in Kirtland's plates of inoculated small-pox. In one of Woodville's earliest cases, the case of Collingridge already mentioned, and vaccinated directly from the cow, it is noted that on the eleventh day the inoculated part was "beset with minute confluent pustules," so that here also we have not the typical vaccine appearance.

I am not going to attempt to appraise the total value of these various experiments of Adams, Guillou, Trousseau, and Thiele. The weight to be attached to them, as a whole, must be matter of opinion. We know nothing of pearl-pox nowadays; the local results got by Adams are not delineated, and are not sufficiently described, and Trousseau had not the same experience as Guillou. Under the law prohibiting variolation, the experiments cannot be repeated in this country, and so it almost seems as if we must remain in the dark regarding the possibilities of small-pox attenuation without the intervention of the cow. Even, however, if the small-pox could be cultivated down to the mother pustule, with or without its satellites, and could then be established permanently as a local and non-infectious disease, we would still have to pursue the inquiry as to the thoroughness and duration of protection acquired in this way. In the last century there was a small percentage of variolous inoculations—perhaps 6 or 7 per cent.—in which there was no eruption, and opinions differed greatly as to whether such a result gave much protection against natural small-pox.

The Jennerian Attenuation.

With regard to cow-pox the case is different. Jenner formed the opinion that it gave life-long safety. Among milkers there are many instances on record which would go to support this view, were it not for one important difficulty. Obviously, the accidental inoculation of a milker's hands was a vaccination, not of an infant or child, but of an adolescent or adult. It was like a primary vaccination done in adult life in the present day, and was, as regards the age at which it was performed, equal to an ordinary revaccination. There was no subsequent growth and development and increase in bulk of the individual such as occurs after the primary vaccination of a baby, and renders necessary a repetition of the protective procedure. Needless to say, the excessive inflammation which often accompanied casual cow-pox inoculation had nothing in it protective against future small-pox. Extraneous filth inoculated along with cow-pox had no virtue, and the fact that the inoculation usually took place not on a carefully protected spot on the upper arm, but on parts of such mobility as the fingers or hands, constantly in use and constantly exposed to dirt and injury, would make the inflammation and general disturbance all the worse, without adding one whit to the protection. In our own day we have got fairly rid of these extraneous complications, and we have fairly gauged and measured the powers of vaccination, both as to the amount and duration of its protective influence, and as to the amount of local inoculation necessary to produce a satisfactory result. We have concluded that infantile vaccination, properly and sufficiently performed, gives a protection which during juvenility leaves little or nothing to be feared from small-pox. As adolescence advances this protection diminishes in value, though it by no means disappears. On account of this diminution it is an essential precaution in the interests of the maximum amount of safety that vaccination should be repeated, and this second operation is fairly sufficient for the rest of life, as no such subsequent change takes place in the tissues of the protected individual as had taken place after the infantile vaccination. In the presence of a small-pox epidemic even a third vaccination might be desirable, especially in circumstances of exceptional exposure, and after a very long interval from the second vaccination. There is no evidence that other systems of small-pox attenuation would give equal, or nearly equal, protection. While, therefore, the whole subject of disease attenuation is of the greatest possible interest, there is, after all, little practical reason to concern ourselves with the possibilities and powers of variola attenuated by other methods, and there is no reason for departing from that particular method of attenuation which we owe to the genius of Jenner.

Early Illustrations.

An examination of the facts shows that there was abundant opportunity to learn the exact appearances of vaccinia. In his *Inquiry* in 1798, these had been delineated by Jenner in coloured plates. In April, 1799, or just after Pearson had sent out his threads, and while Woodville's practice was at its worst, the *Medical and Physical Journal* published a plate giving on a hand and arm several examples of the typical rounded form of vaccine vesicles. In the following year a little work was published by C. R. Aikin, in which he depicted the successive stages of local vaccinia. The *Medical and Physical*

[1] *Sydenham Society's Transactions*, pp. 79-80.
[2] Page 92 *et seq.*

Journal states that this book was sold in thousands. Its second edition was published in 1801, and the plate to that edition is dated October 10th, 1800. There could be no possibility of any medical man who chose to look at any of these plates failing to note the differences between vaccination as shown by Aikin and others and inoculated small-pox as known from everyday experience. In 1802, as a frontispiece to a work published by Pearson, entitled *An Examination of the Report to the House of Commons*, there is a plate giving side by side at successive dates the course both of vaccination and small-pox inoculation. In 1801 the Society of Medicine in Paris published a plate showing the local results of the matter that had been taken to Paris by Woodville himself, after that which had been originally supplied by Pearson had died out. This visit of Woodville's to Paris was made in July, 1800, after he had become aware of the faultiness of his proceedings in April, 1799. This French plate of 1801 was reproduced in 1840 in a *Memoir on Revaccination* published in Paris. The vesicles shown are typical of vaccinia and give no suggestion of variolation.

Indeed, I have met with no evidence in the history of inoculation that any such vesicles as were pourtrayed by Jenner, Aikin, and others, had ever before been seen or heard of as a result of any inoculative process. The appearances shown in the plates in question were those of vaccinia as we still know it. No such plates had ever before been published, because no such disease had ever before been known, and the very existence of the plates is proof of the nature of the inoculative material that was being used.

We thus have on record not merely the written description but a delineation of the actual appearance of vaccinia as known to Jenner and Pearson and Woodville. A plate by Ballhorn and Stromeyer, published in Germany, also shows, though not so explicitly as the others, the contrast between vaccinia and variola. Ring's *Treatise on Cow-pox*, in 1803, contained a series of similar illustrations.

Kirtland's Coloured Drawings.

None of these plates, however, are at all equal in detail and elaboration to those which are published in the British Medical Journal to-day. These drawings of Kirtland's do not seem ever to have been reproduced, and no doubt the cost would make it almost impossible to publish them at the time.

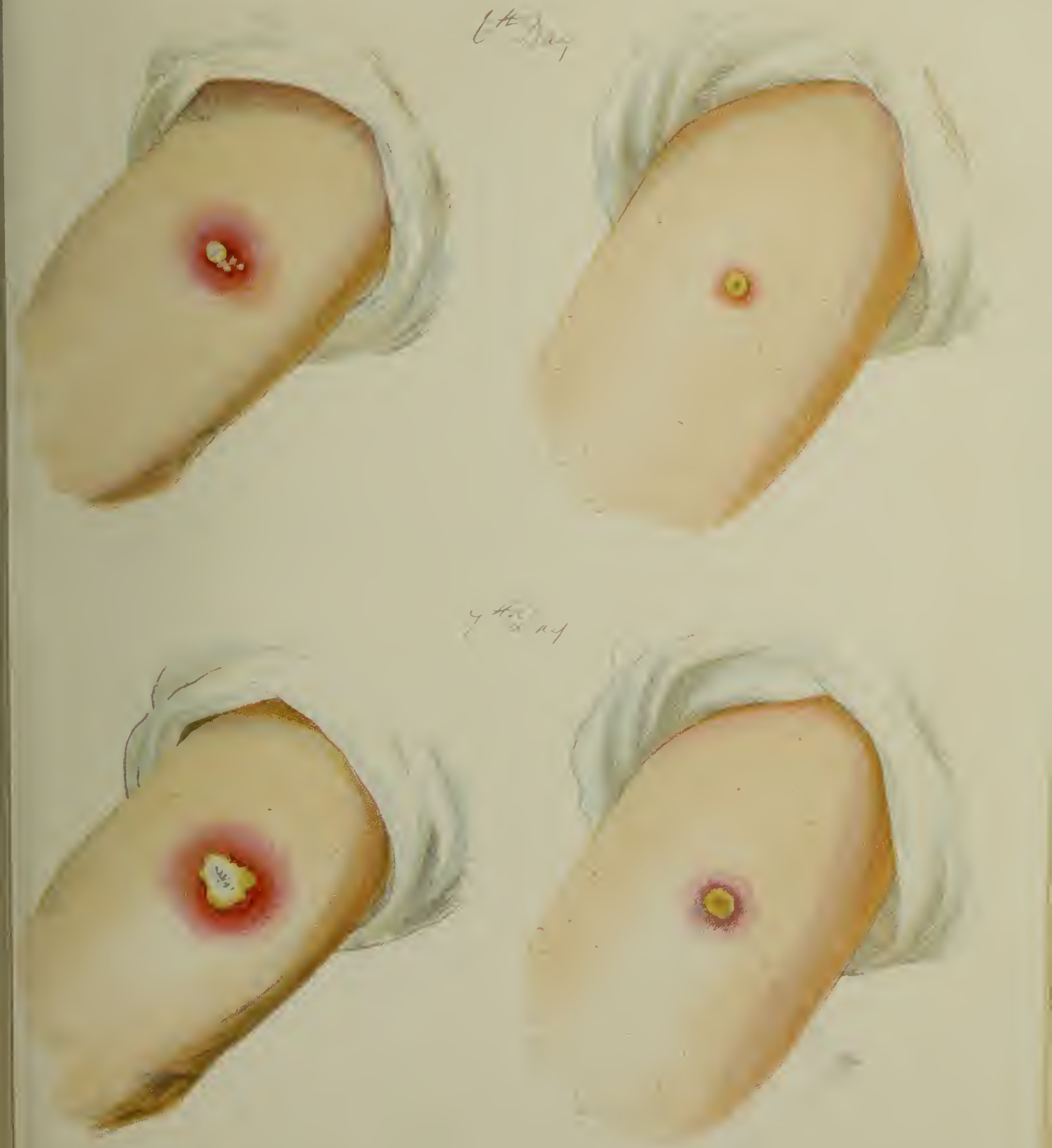
Kirtland's plates are themselves so eloquent that it is almost an act of supererogation to attempt to describe what is so well depicted. They show vaccination and variolation day by day from the second to the sixteenth day, both inclusive. Up till the fifth day the difference appears to be merely in degree of size and inflammation. Both are circular and both are growing, but on the fifth day there is just an indication of the nature of the difference which is about to develop itself. At the variolated spot there is an appreciable beginning of an areola, and close to the vesicle two very small vesicles or satellites have just made their appearance. On the following day (the sixth) there are two or three more supernumerary vesicles. On the seventh day all have coalesced so as to make a single irregularly-shaped figure, and the surrounding redness is much increased. By this time also the vesicle has become a pustule, yellowish at and near the margin, and bluish in the centre. On the eighth day this sore has extended its borders, and a new group of satellites has appeared around it. On the ninth day there is an addition to the satellites, but the striking feature is the deepening of the areola. In the centre the colour is becoming darker. On these last two days two little vesicles, becoming pustular, have established themselves outside the general areola. All this time the vaccine vesicle has been pursuing its course as we know it to do in the present day. The circular form is retained throughout; there are no satellites, and on the ninth day the areola somewhat resembles that of the variolous inoculation of the sixth day. On the tenth day there is shown a decided change on the variolated arm. Instead of scattered satellites there is a broad circle of confluent vesicles surrounding the original spot. On the eleventh day these have become yellower in hue, the areola has again extended, and round the confluent circle there are new satellites; but in addition the general eruption has begun to show itself on the arm and forearm, the eruption at this time consisting of red papules, which on the twelfth day are vesicular at the apex, and have become pustular by the fourteenth day. By the fifteenth day the areola surrounding each of these pustules of the general eruption has disappeared. Umbilication is not so clearly indicated by Kirtland in these eruptive pustules as might have been expected. With regard to the congeries of supernumerary pustules surrounding the inoculated spot, on the eleventh and twelfth day they are shown with a central punctated depression, but by the thirteenth day the "bridle" has given way underneath, the umbilication has gone, and we have instead a globular appearance. On the fourteenth day the globules are much enlarged and distended, and their yellow colour has at one part of the circle a tendency to darkening into brown, and here also the pustules are contracting rather than distended. The centre of the original inoculation is also getting darker, and in the heart of it there is just an indication of a crust. The surrounding inflammation has certainly not extended since the twelfth day, but is rather moving towards diminution. By the fifteenth day there is obvious decadence of the whole process; the areola is rapidly disappearing, the pustules are much darker, there is considerable incrustation, especially at the part which had shown this tendency on the previous day, and the centre also is darker. The series of plates closes with the sixteenth day. The pustules have lost their separate existence, the surrounding areola has disappeared excepting for a narrow line just at the edge of the circle, and there is a general contraction of the affected area. One could almost have wished that the plates had been continued for a day or two longer so as to show whether the red line at the base of the crusts on one side is merely a remainder of the areola, or whether there is here a tendency to a separation of the crust and the leaving of an ulcer to heal by granulation from the base and margins. It is unnecessary to follow in detail the course of the vaccine inoculation. The same appearances can be seen at the present time by any medical man who watches the course of one of his own cases. The vaccination of 1802 is identical with the vaccination of 1896, and there is cultivation neither upwards nor downwards.

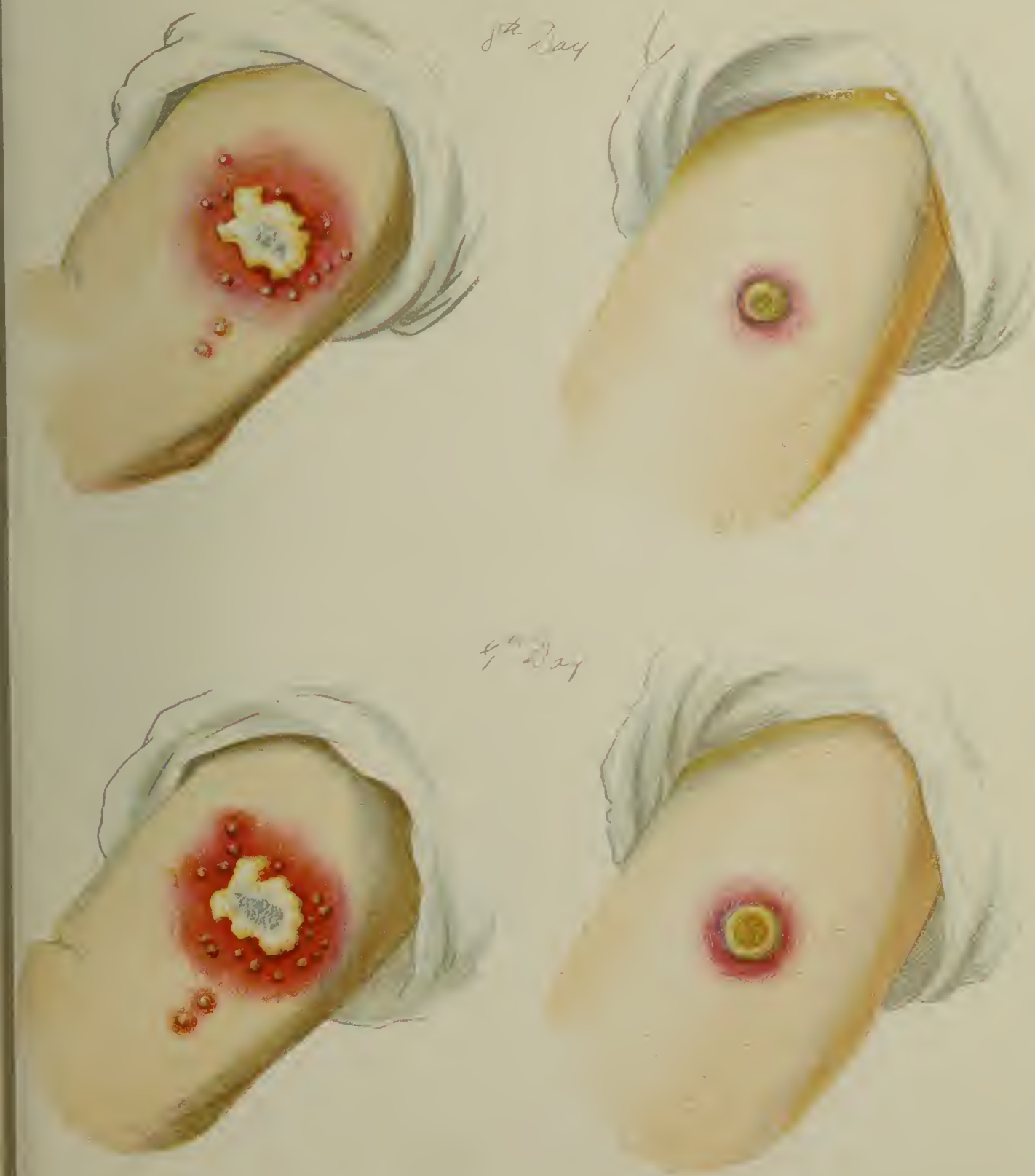
The appearances of small-pox inoculation being such as are recorded by Kirtland and Pearson and others, it is simply impossible to suppose that medical men, knowing what small-pox inoculation was like—knowing it to be as we have it depicted by Kirtland and others—and knowing, further, from Jenner and Aikin and the *Medical and Physical Journal*, etc., what vaccinia was like, could readily blunder between the two. It is impossible to account for the capacity for error of particular individuals, and here and there a mistake no doubt occurred; but such exceptions weigh nothing with regard to the general question as to whether the material used for vaccination in the early years was cow-pox or small-pox.

[*The Chromographic reproductions of George Kirtland's coloured drawings of vaccinia and inoculated variola will be found facing this page.*]


2 Day
or 48 hours
completed
3 Day
G. Kirtland fec.t 1892


4th Day
5th Day

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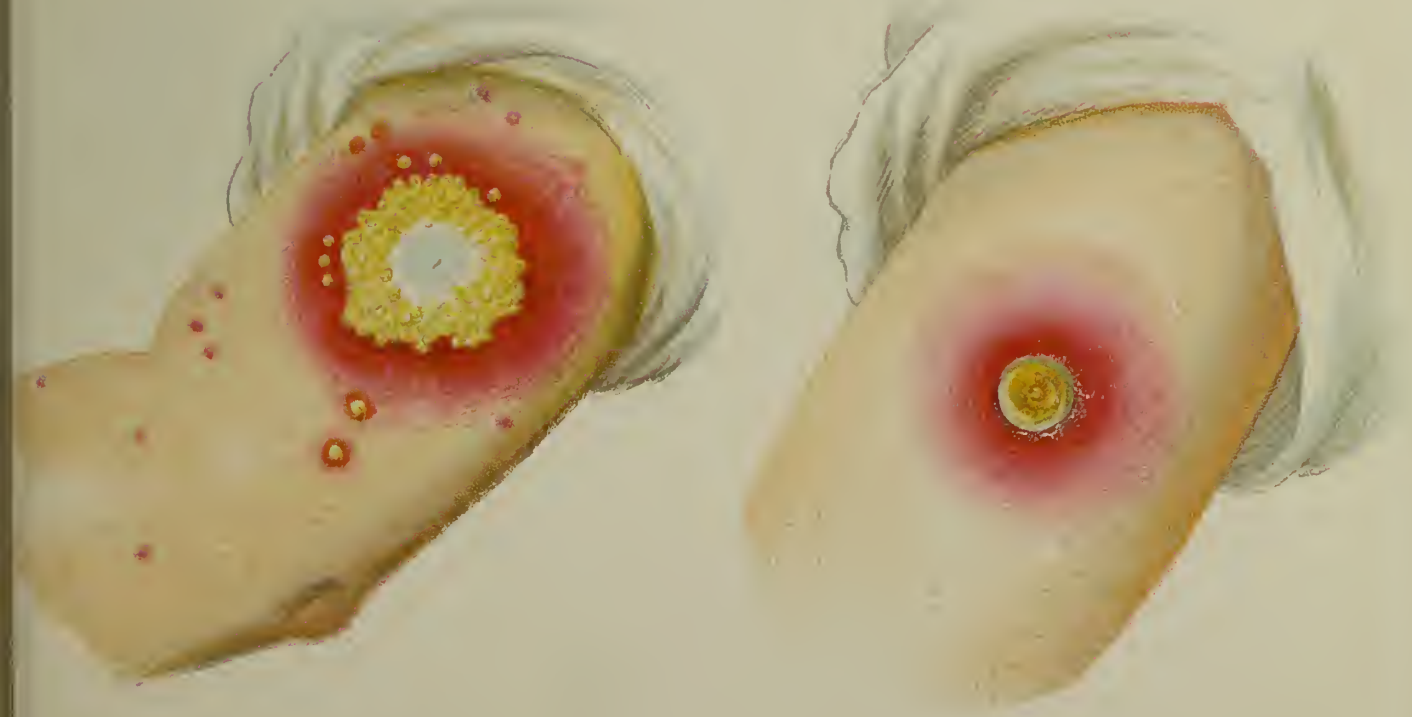


12th Day
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THE BACTERIOLOGY OF VACCINIA AND VARIOLA.

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Although it is now just a hundred years since the process of vaccination was first introduced by Jenner as a prophylactic against subsequent invasion of the system by small-pox, it is a somewhat remarkable fact that until quite recently our knowledge of the intimate pathology of both vaccinia and variola has been extremely scanty.

There has been, indeed, no lack of workers in the field; the extreme interest of the subject generally, and particularly the controversy which almost from Jenner's day has raged around the question as to the true relationship of these affections to one another, having been sufficient to attract a great number of observers into this field of research.

Micro-organisms in Vaccine.

The first impulse was given to the work when Chauveau[1] and Burdon Sanderson[2] demonstrated almost concurrently by means of filtration and deposit experiments that lymph when freed from its contained particles and inoculated on a living animal no longer causes the appearance of vaccinia; while, on the other hand, the precipitate or deposit when employed in similar fashion is capable of producing the disease. In consequence, numerous bacteriologists have since then devoted themselves to the search in vaccine lymph for a micro-organism to which the special and peculiar effect resulting on the inoculation of such lymph is due.

Among the earlier observers who, though they cannot be considered to have succeeded in their search for an organism specific to either vaccinia or variola have yet, by a vast amount of patient research, done much to clear the ground for their successors may be mentioned Keber, Burdon Sanderson, Cohn, Quist, Buist, Carmichael, and Pfeiffer, the names being set out in accordance with the dates of publication of the results of their work.

The first account of the discovery of micro-organisms in vaccine and small-pox lymph was that given by Keber,[3] of Dantzig, who evidently regarded the bodies found by him as being the carriers, if not the actual generators, of the virulent principle of these diseases. Within the next two years the occurrence of similar bodies in vaccine lymph was described by Burdon Sanderson and Klebs. In 1872 a most important paper was published by Cohn,[4] of Breslau, in which he treated the morphological aspects of the subject with much completeness. His observations, which related to both vaccine and variolous lymph, have, as regards the lymph obtained from mature vesicles at least, received entire corroboration from all subsequent workers, with the exception that while he apparently believed the micro-organisms found by him to be of one species only, and to which accordingly he gave the name micrococcus vaccinia or variolæ, as the case might be, later observers have shown that organisms of more than one species are usually to be found in any given specimen of lymph.

Cohn calls attention to the fact that in perfectly fresh vaccine lymph the "corpuscles" for the most part occur singly, others being joined together in pairs in a form resembling the figure 8, and he states that after the preparation has been kept for a time, the numbers of "these double cells increase, and soon chains of four begin to be distinguishable. These chains are usually curved or in zigzags; their attachment one to another is evidently very slight, as they can readily be displaced ..... After a few hours' observation they are seen to be all aggregated into irregular colonies or clumps, each consisting of 16, 32, or more corpuscles." He also notes a point of importance in connection with the opacity which is apt to occur in stored lymph, namely, that "in capillary glass tubes the multiplication of colonies sometimes lasts a long time so that they acquire considerable size, and present themselves as flocculi."

A short communication by Weigert,[5] dealing with the microscopical appearance met with in the skin at the site of small-pox pustules, was published just previously to the appearance of Cohn's paper. Weigert found that the lymphatic vessels of the cutis were plugged with granular masses of what appeared to be micrococci, provided that the preparations were obtained from persons who had died at a comparatively early period of the disease. When death happened at a later period the micrococcus masses could not be distinguished owing apparently to the abundant corpuscular infiltration of the tissue, which was always noticeable after a certain stage of the disease.

Culture of Micro-organisms: Quist's Experiments.

About ten years later Quist[6] published a series of experiments dealing with the possibility of cultivating outside the animal body the micro-organisms present in vaccine lymph. He obtained the best results with a culture fluid composed of equal parts of blood serum, glycerine, and distilled water, which he rendered alkaline by the addition of $\frac{1}{300}$ part of carbonate of potash. After sterilising this fluid by exposing it to a temperature of 60° C. for an hour and a-half on three successive occasions it was inoculated with a minute piece of sterilised sponge soaked in clear lymph, or with a piece of vaccine "crust" which had been washed in distilled water and then carefully dried.

Quist found that growth eventually occurred both on and below the surface, the former consisting of minute scales, while the latter gradually settled to the bottom of the vessel as a fine sediment. The scales, forming a scum on the surface of the fluid, he found to be composed of swarms of micrococci, which when inoculated into the skin of animals in some cases gave rise to a typical eruption of vaccinia.

He does not, however, appear to have been successful with subcultures. Still he showed, as also did Müller, that the specific contagium of vaccinia could exist for a time at any rate in a fluid composed in part of dilute glycerine, and it was probably in consequence of their work that this substance has come to be much used as an addition to vaccine lymph when it is required to be stored.

Carmichael's Experiments.

A certain small measure of success appears also to have attended inoculation experiments in the hands of Carmichael,[7] who does not, however, give any detailed description of the morphological characteristics of the growths which he obtained, and which, by the way, although differing from one another in colour, he seems to consider were the product of one species of micrococcus only. As was doubtless the case in Quist's experiments, the few instances in which true vaccine vesicles resulted at the site of his inoculations must in all probability have been due to the presence, in the material employed, of a small proportion of the lymph originally used for the seeding of his culture medium.

Buist's Experiments.

Probably the most extensive and laborious series of experiments dealing with the isolation of the various micro-organisms found in vaccine and in variolous lymph are those detailed by Buist,[8] of Edinburgh, in a work published by him in 1886.

His experiments resulted in the separation of three different species of micrococci, which, when grown on the ordinary nutrient media, gave rise to cultivations of a white, yellow, or orange colour. All these three, Buist appears to have considered to be essential constituents of vaccine lymph, as is evidenced by the fact that he speaks of them as white, yellow, and orange vaccine respectively.

From specimens of variolous lymph he succeeded in obtaining one organism only, the colour of which was white when grown on solid media. With none of these cultures did he obtain any definite result on the inoculation of calves, monkeys, or human beings.

[1] *Comptes Rendus*, lxvi, 1868.
[2] Intimate Pathology of Contagion: 13th Report of the Medical Officer to the Privy Council.
[3] *Virchow's Archiv*, xlii, 1868.
[4] *Loc. cit.*, lv, 1872.
[5] *Centralb. f. Bakt.*, 1871, p. 609.
[6] *Berlin. klin. Woch.*, No. 52, 1883.
[7] *Trans. Philosophical Society of Glasgow*, 1887.
[8] *Vaccinia and Variola*, 1886.

Pfeiffer's Researches.

It was reserved for Pfeiffer[9] to show that the various micro-organisms isolated by his predecessors, although constantly to be found in lymph, were identical with certain named species with which he was familiar as also occurring in various tissues and body fluids under circumstances which had no relation either to vaccinia or variola. In consequence, none of these organisms could be regarded as concerned in the specific action of the lymph.

Crookshank's List of Bacteria.

Crookshank[10] in his evidence before the Royal Commission on Vaccination, and also in a paper communicated to the International Congress of Hygiene in 1891, states that he has succeeded in isolating from vaccine lymph by the method of plate cultivations an immense number of bacteria, of which he sets out a detailed list.

All of these he recognises as well-known saprophytic bacterial forms, many of which have been shown to be concerned in the processes of suppuration, and none of which, he says, can be regarded as the contagium, seeing that no one of them is constantly present in either human or calf lymph vaccine. As regards the latter statement, I find myself entirely in agreement with him, but the evidence of his portentous list of the bacterial contents of vaccine loses whatever weight might otherwise have attached to it as proving the danger likely to be incurred in the operation of vaccination, for the reason that no statement is made as to whether any, and if so what, precautions had been taken with regard to the collection of the lymph, neither is any attempt made to distinguish between those bacteria which are commonly to be found and those whose presence is exceptional.

Three Species of Micro-organisms.

As the result of my own work,[11] it would appear, however, that there are at least three species of micro-organisms—namely, Staphylococcus albus epidermis, S. pyogenes aureus, and S. cereus flavus, corresponding probably to Buist's white, orange, and yellow vaccine respectively, one or more of which are almost universally to be found in every specimen of vaccine lymph examined; of these the Staphylococcus albus epidermis is usually to be found in the upper layers of healthy skin.

Of more importance is the fact that in certain cases, though rarely, I have been able to satisfy myself as to the presence of the streptococcus pyogenes, and moreover it is on record in certainly one instance at least that the streptococcus of erysipelas has also been isolated from a specimen of vaccine lymph. That untoward results should occasionally in certain cases follow the additional inoculation during the act of vaccination of one or other of the various extraneous organisms which may be present in the lymph employed is hardly to be wondered at; indeed it would appear rather a matter for congratulation that the evil results following the present somewhat empirical practice of vaccination have been in the past so few in proportion to the vast numbers that have undergone the operation.

The Variola Bacillus.

In this connection, however, attention may be called to the fact that recently Klein[12] and myself[13] have found it possible by the use of certain staining methods to demonstrate both in vaccine and in variolous lymph the presence of a small (spore-bearing?) bacillus, sometimes in considerable numbers.

This bacillus, which has also been found by Kent and myself[14] in sections of skin passing through the site of a vaccine vesicle obtained from the calf, is to be found most readily in early lymph, that is, lymph taken on the fourth or fifth day (seventy-two to ninety-six hours) in the calf, and in the human vaccine (or variolous) vesicle about the fifth day of eruption, while later lymph, such as that obtained at the ordinary period for purposes of vaccination, contains but a few at the most.[15] This fact, which not unlikely has relation to spore formation by the bacilli at about the time of maturity of the vesicle, probably accounts for their presence having been overlooked by previous workers in this field. If proper precautions as to time and method be taken in the collection of lymph, it is usually found that although these bacilli are present, often in extraordinary numbers, other bacteria are conspicuous by their absence.

The fact that these apparently identical bacilli are to be found both in vaccine and in variolous lymph of about the fifth day of eruption tends to support the hypothesis that they in reality constitute the active contagium of the diseases in question, and the further fact that it has not been found possible to cultivate them in any of the artificial media ordinarily employed renders it practically certain that they are not merely "extraneous" saprophytic organisms.

Although not capable of growth on gelatine, agar, etc., the writer has succeeded in obtaining cultivations of the variola bacillus[16] by employing for the purpose the hen's egg, inoculated with an emulsion of small-pox crusts in normal saline solution, and incubated for about a month at the body temperature. With material obtained from such an egg a series of calves have been inoculated, and with lymph of the third remove from the egg numbers of children have been successfully vaccinated.

Without resorting to cultivation experiments, it is possible to prepare with ease and certainty from vaccine lymph a material containing what must be regarded as a pure culture of the organism peculiar to vaccinia,[17] and which, therefore, is of special value for purposes of vaccination.

Glycerinated Calf Lymph.

As already stated, it has been abundantly demonstrated that vaccine lymph, as ordinarily obtained, gives rise, when inoculated into different nutrient media, of which plate cultivations are subsequently made, to growths of various "extraneous" saprophytic organisms. If, however, previous to making a plate cultivation the lymph has been intimately mixed with equal parts of a sterilised 50 per cent. solution of chemically pure glycerine in water and subsequently kept protected from the air and light in hermetically sealed capillary tubes, for a period of from a few days to a couple of months, it will be found that all "extraneous" organisms have now been killed out and no growth occurs in gelatine or agar plates inoculated with the contents of such tubes.[18]

In glycerinated calf lymph properly produced we have therefore a preparation which, while even more active as vaccine than the original lymph, can, to the best of my belief, be produced absolutely free from the "extraneous" organisms which at one time or another have been isolated from fresh or stored lymph, with the possible solitary exception when the lymph is obtained from the calf, of bacillus subtilis, the common hay bacillus, which, however, possesses no pathogenic properties. This statement, if it rested on my own authority alone, might no doubt be received with hesitation; but, seeing that since I first published the experiments on which it is based, ample corroboration has been afforded by the fact that other observers, including Chambon, Ménard, and Straus[19] in France, Leoni[20] in Italy, and Klein[21] in England, have arrived at similar results, there can be, I think, no longer any question about the matter.

Such glycerinated lymph, moreover, would appear to offer the most favourable opportunity for the further study of the specific organism of vaccinia and variola, as possible fallacies induced by the presence of "extraneous" organisms of any kind would thus be obviated.

Supposed Psorosperms in Lymph.

In consequence, no doubt, of the apparent impossibility which existed until recently of isolating any bacterium from

[9] *Zeitschrift f. Hygiene*, iii, 2, p. 189.
[10] *Trans. Internat. Congress of Hygiene*, 1891, vol. ii.
[11] *Loc. cit.*
[12] Report of Medical Officer to the Local Government Board for 1892-93 (1894).
[13] British Medical Journal, September 22nd, 1894.
[14] *Loc. cit.*
[15] Besser (*Centralbl. f. Bakt.*, May 4th, 1893) has described a small bacillus as found by him in the papules of a case of small-pox at the fifth day, which can be stained by all the ordinary aniline dyes. He succeeded in growing the microbe, which is aërobic, on agar and broth kept at the body temperature, but not upon gelatine, serum, or potatoes.
[16] British Medical Journal, January 7th, 1896.
[17] *Trans. Internat. Congress of Hygiene*, 1891, vol. ii., and *Proc. of Royal Soc., 1893.*
[18] *Journ. of Pathology*, May, 1894.
[19] *Gazette des Hôpitaux*, December 15th, 1892.
[20] *Revue d'Hygiène*, August 20th, 1894.
[21] Private communication.

AN EPITOME OF CURRENT MEDICAL LITERATURE.

MEDICINE.

(377) Diagnosis of Porencephalus.

Brissaud (*Sem. Méd.*, April 10th, 1896) discusses the difficulty of diagnosing true porencephalus from other causes of infantile cerebral hemiplegia, that is, cerebral hemiatrophy, sclerosis of one hemisphere or lacunar cysts, either ischæmic or hæmorrhagic. Pseudo-porencephalus is hard to distinguish from the true variety, as in both there is hemiplegia, with contraction, athetoid movements, and arrest of development on the paralysed side. True porencephalus is a defect of conformation rather than a destructive lesion, though a secondary atrophy, due to crowding of the convolutions and traction from the bottom of the cavity, may take place as the brain grows, this explaining the late appearance of some clinical phenomena. Epilepsy or mental deficiency is not usually found. On the other hand, simple sclerosis or atrophy of the convolutions give rise to epilepsy, mental disturbances, dulness, or idiocy. Softening or hæmorrhage is accompanied by descending degeneration and permanent contraction; these conditions are rarely associated with porencephalus. The malformation of the head, common in sclerosis or simple atrophy, is chiefly marked in the interior of the cranial cavity; plagiocephaly does not generally exist in extensive lesions of the brain. But in porencephalus some degree of deformity is the rule. It is probable that deformity of the skull without corresponding deformity of the face, in a non-degenerated subject affected with spasmodic hemiplegia who has never presented symptoms of convulsive or mental disturbance, is due to limited arrest of development of one cerebral hemisphere. The condition described as hemiatrophy is not, of course, a retrogressive phenomenon; growth is merely retarded without obvious deformity, and with an insignificant difference in the length of the bones. The deviation from perfect symmetry is slight. Growth is retarded in the limbs because they have little or no function, not because the influence of the centres is interfered with. The muscles most directly subject to the will show the most marked degree of atrophy, this only becoming apparent when voluntary movements begin to be exercised. In infantile spinal paralysis the muscles and bones no longer receive stimulation from the centres, and are atrophied to a much higher degree. A genuine arrest of development does not justify the inference that the nerve centres are, or have been, diseased.

(378) Primary Splenomegaly: Primary Carcinoma of the Spleen.

Under this title, Picou and Ramond (*Archiv. de Méd., Expériment et d'Anat. Path.*, 1896, March, p. 168) give an account of a case of the disease first described in 1882 by Gaucher (*Th. doct.*, Paris). It presents a definite clinical picture. There is uniform and marked enlargement of the spleen, enlargement of the liver, pain increasing with the progress of the disease in the left hypochondrium. The abdomen becomes prominent and distended from the visceral enlargement, and may by compression give rise to dyspnœa, palpitation of the heart, œdema of the legs, difficulty in micturition, etc. There is no ascites. Hæmorrhages from the skin, nostrils, and gums occur. Jaundice is sometimes present. There is no enlargement of lymphatic glands. There is oligocythæmia without any leucocytosis, and the blood never contains pigment granules. The disease lasts a long time, and death is usually due to some complication. The spleen is greatly enlarged, fibrosed, and contains infarcts. Microscopically the tissue of the organ is replaced by alveoli containing large epithelial cells 16-36 μ, with nuclei 4-8 μ. In some of the spaces there may be extravasations of blood. The Malpighian bodies disappear, and the vessels are narrowed and sclerosed. The case was that of a woman, aged 32, who had never had ague, but since a fall four years ago had complained of abdominal pain, worse in the last year. The gums were spongy; there was œdema of the legs, and anæmia from menorrhagia. There was a large abdominal tumour, which was diagnosed as a uterine fibromyoma. Laparotomy for its removal showed that it was an enlarged spleen, weighing 2,800 grammes; it was successfully removed, and the patient recovered, with improved though not perfect health. At the time of the operation the liver was normal in size; subsequently, however, it enlarged. The blood was not examined until after the operation, and then showed a moderate degree of traumatic anæmia, with some leucocytosis. Cultures from the spleen were negative. Microscopically the spleen showed the appearances described by Gaucher, but differed in the following points: The presence in the pigment in the fibrous alveolar walls; pigmentary degeneration of some of the epithelial cells; the presence of giant cells; in the fact that the Malpighian bodies remained, and that the lymphatic glands in the hilum of the organs were similarly affected. The nature of the change in the spleen is discussed at some length. Gaucher regarded it as a primary carcinoma. Cornil, however, considered that the appearances could be explained merely as the result of hyperplasia. The authors do not regard it as an endothelioma, because, except for some sclerosis, the vessels were normal; they conclude that it was a primary carcinoma derived from fragments of the pancreas included during fœtal life in the substance of the spleen. Such cells they had seen in sections of a three months' human embryo, and they considered them as identical with the cells described by Peremeschko in the spleens of embryos, young children, and suckling women. Collier (*Path. Soc. Trans.*, London, vol. xlvi, p. 148) described a case of enlarged spleen in a child, aged 6, which would appear to be another example of this extremely rare condition. The spleen was referred to the Morbid Growths Committee, who reported that it was not lymphadenoma or sarcoma, but were unable to make any dogmatic statement as to its nature.

(379) Gastroptosis and Chlorosis.

Leo (*Deut. med. Woch.*, March 19th, 1896) comments on Meinert's contention that chlorosis is produced by the gastroptosis brought about by the pressure of the corset. In cases of considerable gastroptosis where the upper curvature of the stomach lies below the liver and the abdominal walls are lax it may be easy to define the limits of the stomach previously distended; but in young subjects, such as chlorotic girls, the abdominal walls are not lax. In his investigations, carried out upon a large number of chlorotics who wore corsets, the author has never been able to map out the lesser curvature of the stomach. It is usual, however, in such cases to find the greater curvature extending lower down than usual. This may be due to an abnormal distensibility of the stomach, and this view is borne out by the displacement of the lateral limits of the organ. This condition is the result of chlorosis, but is also seen in other young anæmic individuals who have never worn the corset, as is shown by the author's investigations into another series of cases. The author thinks from other considerations, however, that gastroptosis is not infrequent in corset-wearing chlorotics. Koester has repeatedly found such gastroptosis in the bodies of young women who have worn corsets. Leo does not regard the gastroptosis as the cause of chlorosis, for chlorosis is not infrequent in those who have never worn corsets, and only a few among corset-wearing individuals develop chlorosis. Although Meinert's views of the causal relation between chlorosis and corset wearing cannot be accepted, yet his work is very important as further pointing out the ill effects produced by the corset.

SURGERY.

(380) Suture of the Heart.

Cappelen (*Norsk Magazin for Lægevidenskaben*, March, 1896) reports the following case: A man, aged 24, had some hours before admission received a stab from a knife in the left side. He went home alone, and about an hour afterwards was found lying in a pool of blood. He was brought to the hospital in a cab, and on admission was found to be unconscious; the pulse could not be felt, but pure though weak heart sounds could be heard to the right of the sternum, on a level with the fourth rib; the impulse could not be felt. In the fourth left intercostal space, in the middle axillary line, parallel with the rib, was a punctured, non-bleeding

wound 1 c.cm. long. After a camphor injection the patient began to breathe and the pulse could be felt. The left side of the chest did not move in respiration. Under chloroform narcosis a resection of the fourth rib was made after enlarging the wound. The pleural cavity was filled with partly liquid, partly coagulated blood, compressing the lung. After evacuating the blood, which was estimated to be about 1,400 c.cm., the lung dilated and was found not to be wounded. By resecting 5 cm. of the third rib a wound 1 cm. long could be seen on the pericardium, bleeding freely. The sac was filled with coagula, and on enlarging the opening a wound 2 cm. in length was seen on the left ventricle, causing the bleeding. The wound was sutured and an artery tied, after which the hæmorrhage ceased. The needle was brought half way through during a contraction and then dropped, and when the heart dilated after a second contraction the point was grasped and the needle brought completely through. The suturing was made very difficult by the rhythmic movements of the lung, which covered the whole operating field, and by the heart contractions, which, however, were perfectly regular and quiet all the time. The pericardial cavity was emptied of clots as far as practicable. The pulse after the operation was very quick and feeble, but improved after a subcutaneous saline injection. The patient sank gradually, however, and died two and a-half days after the operation. At the necropsy it was found that a large branch of the coronary artery had been wounded; the wound had begun to heal, but there was evidence of pericarditis, and various bacteria were found in the fibrinous exudation. The knife had passed through the pleura in front of the lung without wounding it, and again through pleura and pericardium into the heart.

(381) The Dangers of the Operative Treatment of Enlarged Prostate.

Dumstrey (*Centralbl. f. Chir.*, No. 18, 1896) records a case of enlarged prostate treated by ligature and resection of the vas deferens, which shows that this operation cannot be regarded as a simple one and free from risk. A man, aged 65, in all other respects strong and healthy, came under the author's care with complete urinary retention and severe cystitis due to considerable prostatic enlargement. Partial resection of the vas deferens on both sides was followed in the course of a few days by decided relief of the local symptoms, the man being able to pass urine spontaneously and the urine becoming much less turbid and containing day by day less pus and blood. The prostate, which just before the operation had been as large as a fist, was reduced in size by about one-half. These good results, however, were associated with serious impairment of both the physical strength and the mental condition of the patient. He speedily presented the appearance of a very old and feeble person. His movements became slow and clumsy, and he was unable to comprehend what was said to him and also to express his own thoughts. After an interval of about a fortnight his condition commenced to improve, but the change for the better was very slow and gradual.

(382) Prostatic Retention Treated with the Galvanic Current.

Minervini (*Rif. Med.*, April 11th, 1896) reports the case of a man, aged 68, who had suffered for three years from dysuria, and for the last six months for hæmaturia and ischuria. The prostate was enlarged and a calculus found in the bladder. On December 24th, 1895, suprapubic cystotomy was performed, and eight small calculi were extracted. The middle lobe of the prostate was distinctly seen to be enlarged. As no improvement occurred in the dysuria the author on January 29th applied a modified Apostoli method, consisting in the introduction of insulated electrodes into the urethra and rectum, and then using currents of 30 m., increasing up to 100 m. Before treatment the patient could not emit a drop of urine spontaneously. After six applications he began to urinate by drops, after ten in a filiform stream; after the twentieth the patient felt so much better that he wished to leave the hospital; after the thirtieth and last he could do without a catheter, and would not continue the treatment. The ischuria disappeared rapidly, and undoubtedly a certain amount of reduction of the prostate occurred. Each application lasted from five to ten minutes. As a rule the negative pole was put in connection with the urethral conductor at first, and the direction of the current changed three or four times in each sitting. A sense of burning and some tenesmus occurred, especially on changing the current.

MIDWIFERY AND DISEASES OF WOMEN.

(383) Albuminuria in Pregnancy, Labour, and Childbed, and its Relation to Eclampsia.

Saft (*Arch. f. Gyn.*, li, 207) concludes from a large number of observations that albuminuria occurs during the latter half of gestation in 5.41 per cent. of all cases, more frequently towards the end of pregnancy and oftener in primiparæ (5.9 per cent.) than in multiparæ (4.1 per cent.); it is more common also in the former (32.08 per cent.) than in the latter (22.6 per cent.) during labour. As a rule it disappears within a few days after delivery, but is more likely to persist in primiparæ in whom the effects of gestation upon the kidneys are altogether much more serious than in multiparæ. White and red corpuscles in non-albuminous urine of pregnant women come from the bladder, but neither during pregnancy nor labour are cylinders found without albumen, though their presence does not seem to depend on the degree of albuminuria, nor to influence its duration. Twins and hydramnion are predisposing factors, contraction of the pelvis also, but in multiparæ only during labour. Premature labour is a frequent result. There is an affection of the kidney due solely to the condition of pregnancy, the pathological changes in which are merely degenerative; this affection is quite different from nephritis; when not complicated it is of favourable prognosis, and not likely to terminate in chronic inflammation; but when accompanied by actual nephritis or disease of the heart is of very doubtful issue. The cause of this affection is probably the autointoxication of the system by some product of tissue change, such as is the origin of the molimina graviditatis and of the nervous disturbances of the pregnant state. The muscular exertion during labour throws extra work on the kidneys, and it is the overloading of the system by this poisonous product that causes eclampsia and the secondary changes in the kidneys, liver, and other organs. There is thus an intimate, if not a causal, connection between albuminuria and eclampsia, and the only proper way to solve the mystery surrounding the latter is to try to determine the nature of the active poison by observations made during gestation.

(384) Porro's Operation.

Schwarz (*Centralblatt f. Gynäk.*, No. 15, 1896) successfully delivered by this operation a rickety dwarf, aged 19. She was only 3 ft. 3 ins. in height, well nourished and muscular. There was lordosis with extremely pendulous abdomen. The pelvic deformity was remarkable, even in a dwarf. Between the iliac spines the measurement was $7\frac{2}{5}$ inches, between the trochanters 10 inches. The conjugata vera was $1\frac{1}{2}$ inch (4 centimetres or 1.56 inch). The patient was in the ninth month of pregnancy. Pains set in on January 16th; in a few hours the membranes burst spontaneously. Pains continued through the night, but were quite ineffective. Schwarz saw her early on the morning of January 17th. The temperature was 104°, the pulse 180. Septic peritonitis was present. Porro's operation was at once performed with full precautions. The child was a fully-developed female, $19\frac{1}{2}$ inches long and 5 lbs. in weight. It was saved and reared. For two or three weeks the patient's life was in great peril through septic symptoms with peritonitis, followed by diarrhœa. The stump of the uterus was treated subperitoneally. By February 5th convalescence was in steady progress.

(385) Twin Extrauterine Pregnancy: Successful Extirpation of Sac and Contents after Retention of a Fully Developed Fœtus for Fifteen Years.

Folet (*Ann. de Gyn. et d'Obs.*, p. 190, 1896) reports the following case. A uniformly hard, dull tumour, devoid of tenderness, movable in its lower part, and reaching four fingers' breadth above the umbilicus, in a Fleming,

aged 49, who could not make herself well understood, was diagnosed as a fibroma, partially calcified, and abdominal hysterectomy decided upon. As soon as the abdomen was opened an edge of bone (one parietal overriding another) was felt through a moderately thick sac of supple tissue, and the diagnosis at once amended to one of extra-uterine pregnancy. The sac did not appear to contain any fluid; it was partially adherent to the abdominal wall, from which it had to be detached with caution; it had many adhesions to the intestines, which were easily separated by the finger, and were evidently the results of recent peritonitis. Only one ligature was required, and the tumour was only retained by its base, when with a circular rent it burst, and five-sixths of the sac came away with the contents, leaving a funnel formed by the remaining sixth attached by its outer surface to the pelvic organs. In the interests of the patient no endeavour was made to determine the exact relation of the sac to its surroundings; the edge of the funnel was fastened by eight silk sutures in the lower part of the abdominal wound, a large drain wrapped in iodoform gauze inserted in the peritoneum, and the remainder of the incision closed. Recovery was perfect. The temperature never rose above 37.5°, and in six weeks the cavity of the cyst was obliterated and the healing complete. The structure of the cyst seemed to show it to be a tubal one. It contained two fœtus; one (female) 46 c.cm. in length, with well-formed nails, had lived to term; it was not, properly speaking, a lithopædion; the tissues, though dense, were supple, and nowhere calcified, and, on sections of thigh and arm, the skin and muscles were recognised by the naked eye and microscope. The other fœtus had died about the third month; the thorax and head were much compressed, but could be made out, and the members were distinct. The cords of both ended at the lower end of the sac in a single placenta, the degenerated tissue of which was represented by reddish-brown matter like touchwood, and broke into flakes on the slightest traction. Some days after the operation it was ascertained, through an interpreter, that sixteen years previous the woman had become pregnant, having before that had four children at term. She duly quickened, but at nine or ten months had a false labour; blood and membranes came away, and she had hæmorrhage for six weeks. As she ceased to feel the movements of the child, and nothing further happened, she persuaded herself she had been mistaken, and that she had not been pregnant, the more easily because her abdomen diminished a little in size, and her catamenia returned, and continued till she was 46. A doctor whom she consulted two or three years afterwards, while giving no definite diagnosis, deprecated any treatment. She was led to apply to Folet on account of repeated attacks of pain during the last year, probably due to the peritonitis which caused the intestinal adhesions.

(386) Calcified Fibroid from Cremated Corpse.

YAMAGIWA, of Tokio (*Virchow's Archiv*, Vol. cxliv, Part 1, 1896) describes a specimen of calcified fibroid found after cremation in the ashes of a woman in whom myoma of the uterus had been diagnosed during life. She died of paraplegia at the age of 70. When 28 she noticed for the first time a tumour in the hypogastrium; next year she married, but never bore a child. The tumour grew slowly till she was 38; then it ceased to increase, and became very hard. At 45 the patient lost her husband. When 50 she complained that the growth had become very heavy. In 1882 a doctor examined her, and noted that the tumour was of stony hardness and freely movable. Paralytic symptoms appeared, and lasted for about three years; they reappeared seven months before death. Debility and emaciation then followed. Yamagiwa does not distinctly make out that the paraplegia was due to pressure of the tumour on nerves. The fibroid removed from the ashes of the patient looked like a petrified human brain. It weighed 6 lbs. 10 ozs., and measured from before backwards nearly 8 inches, transversely over $5\frac{1}{2}$ inches, and vertically a little less than $5\frac{1}{2}$ inches. On histological examination uterine fibres were discovered. The mass was due to pure calcification, and there was no ossification.

THERAPEUTICS.

(387) Antistreptococcus Serum in Scarlet Fever.

A. BAGINSKY (*Berl. klin. Woch.*, April 20th, 1896) describes the use of Marmorek's serum obtained from the Pasteur Institute. He first refers to some of the complications of scarlet fever which are due to the streptococcus, and he draws attention to the close relationship between the virus of scarlet fever and the streptococcus. He was not always able to use a sufficient quantity of the serum, and this may perhaps account for some want of success. During four months he has thus treated 57 cases. Nine of these must be deducted, 2 cases were removed too soon from the hospital, 1 died in severe collapse four hours after admission, 1 case was complicated with fracture of the jaw and another with phthisis, and 4 others were still under treatment. Among the remaining 48 cases the course was unusually favourable in 27. A suppurative otitis only occurred in 4 cases, and in only 1 case was there nephritis. A striking feature was the rapid fall of temperature after the injections. Very exceptionally was there albuminuria, and in only 1 case casts, blood cells, etc. The author gives details of 7 fatal cases; perhaps an insufficient amount of serum was used. In another group of non-fatal cases the patients seemed uninfluenced by the treatment. In a third group of cases the serum was only used in advanced cases, owing to complications. In 1 case, with ulcerative endocarditis, etc., no effect on the course of the disease was visible. In 4 other cases the results were favourable. In 48 cases there were 7 deaths, namely, 14.6 per cent., the usual mortality during five years varying from 22.6 to 34.4 per cent. The death-rate among 238 other cases not treated with serum, and belonging to the same epidemic, amounted to 24.9 per cent. The cases treated with serum were not of a less severe type than the others. The author concludes that Marmorek's antistreptococcus serum is worthy of a further trial in scarlet fever.

(388) The Cause of Death in Serum Injections.

ADAMKIEWICZ (*Wien. med. Presse*, May 3rd, 1896) discusses the possible reasons of the fatal issue in a recent case at Berlin. Langerhans attributed the death to the poisonous action of the antitoxin upon a healthy subject when unneutralised by a pre-existent toxin. This seems *a priori* improbable considering the large number of cases of suspected diphtheria which have been treated by antitoxin without ill-effects, and in which the suspicion has been proved unfounded. Nor does the evidence show that the injection of serum into a vein is in all cases *per se* an element of danger, since the blood is able to tolerate the introduction of considerable quantities of indifferent substances with impunity. That the fatality was due to the amount of carbolic acid in the injection is not in accordance with the known effects of that substance, and the death was far too sudden to have resulted from poisoning by the serum itself, serum intoxication having been shown by Eulenburg to be always a more or less chronic process. The entrance of the serum into a vein and its employment in too concentrated a form having also been excluded, one is compelled to seek another cause for the intensification of its action in this case. This Adamkiewicz finds in a disturbance of the adaptive mechanism of the organism. The living body is provided with a self-regulating apparatus which protects it against noxious influences within certain limits; once these are passed the animal is lost. In his recent experiments with "cancroin" he found that several patients showed without apparent reason alarming signs of collapse after injection, and by careful exclusion was forced to conclude that the cause was sudden passage beyond the bounds of the regulating mechanism. This was confirmed by the discovery that no such effects resulted when the injection was gradually given so as to allow the organism time for adaptation; in consequence of this Adamkiewicz now injects "cancroin" in tenths of a cubic centimetre, allowing some seconds after each injection for the self-regulating mechanism to act. He further extended his experiments to the injection of atmospheric air into the veins of the guinea-pig, and found that a considerable quantity could be taken up and eliminated without danger if it were given in small doses; thus 10 c.cm. injected in this way pro-

duced no ill-effects, while 2 c.cm. were stantly fatal when injected at once and forcibly. Any substance, serum included, may have a double noxious action when introduced into the body, proportional to, first, the force with which it is injected; and, secondly, the specificity with which it acts on the blood or through the blood on other constituents of the body. The virulence increases with the force of injection, and this may well account for the death under consideration.

(389) Serum Injections in Acute Rheumatism.

WEISS (*Centralbl. f. inn. Med.*, April 25th, 1896) observes that it has been proved that blood serum taken from individuals convalescent from a disease is able to protect animals against the infection in question. This principle has already been applied to influence or cut short disease in man. The author has thus treated 10 cases in Drasche's clinic, the serum being obtained from patients who had just passed through an attack of rheumatic fever. No specific curative action could be proved to exist, although in some cases after two or three injections the disease ended in an unusually short time. In the 10 cases 22 injections were given, and on 9 occasions a favourable effect was noted both as regards swelling in the joints and pain. In 6 cases no result was visible, and in another 3 an apparent increase in the disease occurred. A fall of temperature through 1 to 1½° C. occurred with sweating in those cases influenced by the treatment, whereas, where no effect was visible, no fall of temperature occurred. Six to 10 grammes of the serum was used on an average, 18 to 20 grammes being employed in 2 cases. In 1 case, in which an exacerbation of the disease occurred after the injection, a subacute attack developed into an acute polyarthritis. With so few cases no conclusions can be drawn, but even in cases where a beneficial effect was obtained the inflammatory symptoms reappeared later. In 2 cases the author injected albumoses, three injections of somatose being given in one case, and two in another, with positive results, but here again the effect was a passing one. In these injections two results may be obtained: (1) A specific one, and (2) a general action upon the whole individual. The author thinks that the latter occurred in his cases; naturally, the joints being a place of least resistance were most affected.

(390) Hydrotherapy in Pulmonary Phthisis.

WINTERNITZ (*Deut. med. Woch.*, April 16th, 1896) mentions that phthisical patients may obtain much benefit from hydrotherapeutical measures, other treatment not being neglected. After referring to the curability of phthisis, the author speaks of the value of hydrotherapy in the prevention of this disease. Much attention should be paid to the onset of pulmonary phthisis, which is practically always gradual. Hydrotherapeutic treatment may so increase the strength of the patient as greatly to enable him to resist the disease. In well-developed florid phthisis with hectic the good results of this treatment are often striking. The author says that in his experience desperate cases have derived much benefit as regards their symptoms. In less severe cases the fever may disappear. the body weight increase, the cough lessen, and even the physical signs become less marked. Aberg's method of hydrotherapy is the best. This writer distinguishes three grades in the water treatment: (1) Bathing the neck, back, face, and chest at first rapidly with a sponge squeezed out, and subsequent rubbing of these parts until dry. Later this may be done morning and evening. Reaction is obtained in the open air or in bed. (2) Pouring water over the head, neck, back, face, and chest, with subsequent drying. (3) Using the full bath, which only lasts a moment. Aberg recommends water at 0° C. for the washing and douching, and from 17° to 18° C. for the full bath. Winternitz prefers water at rather a higher temperature. Instead of Aberg's douche, in the second grade the author employs friction with water at 7° or 8°, and he uses a cold shower instead of the full bath. This apparently heroic treatment is well borne and liked by the patient.

(391) Enteroclysis in Chronic Mucous Diarrhœa.

DAUCHEZ (*Rev. des Mal. de l'Enf.*, May, 1896) states that large injections of weak antiseptic solutions may bring about recovery in obstinate cases of chronic mucous diarrhœa in children. He uses sodium hyposulphite 5 per cent., tincture of benzoin 15 per cent., or boric acid 3 or 4 per cent., but he considers that the success of the treatment depends on the thorough irrigation which washes away accumulated *débris*. The child should be in the horizontal position, with the left hip a little raised, so that the cæcum is in a dependent position. A large catheter or œsophageal sound is introduced as far as possible, connected with a reservoir about 7 or 8 inches above the level of the patient. The fluid (T. about 100° F.) flows very slowly, but Ojss to Oij may be introduced in a quarter of an hour. The injections may be repeated every other day.

PATHOLOGY.

(392) The Typhoid Bacillus.

ROUX (*Indépendance Méd.*, February 5th, 1896) summarises in a clinical lecture our present knowledge as regards the bacillus discovered by Eberth. Pure colonies are best obtained by inoculating gelatine from the spleen; those on the surface are alone characteristic; they form a thin bluish layer, and do not liquefy the gelatine. The bacillus is a short rod with rounded ends, and varies in dimensions according to its age, young forms being short and very active, older ones longer and less mobile; the cilia are also more abundant in the former. The bacillus stains readily by any method except that of Gram; in old potato cultures it shows in its centre a clear space which does not take the stain. It does not form spores. It is killed at 70°, but has a considerable power of resistance to acids; its property of withstanding the action of fairly strong carbolic acid is employed in separating it from those microbes which are killed thereby. The bacillus has never been demonstrated in the blood of typhoid patients, but is always found in the spleen. Roux considers that it is pathogenic for animals, mice being particularly susceptible; a fresh culture inoculated under the skin or into the peritoneal cavity causes death. The bacillus is only found at the point of inoculation, and disappears even from there after a short time. The question as to whether the action of the bacillus is an intoxication or an infection Roux decides in favour of the latter view. If a guinea-pig be inoculated with a culture, it dies in three to seven days, and the bacillus is found in the spleen, Peyer's patches, and other organs. Furthermore, Chantemesse and Widal have shown that a living culture is much more virulent than one which has been heated to 100° C., and the bacillus has also been found in the fœtus of an inoculated female guinea-pig. The virulence of the bacillus can be increased by injecting it into an animal together with some toxin from cultures of the erysipelas or colon bacillus; the animal soon dies, and the typhoid bacilli obtained from it kills a guinea-pig within twenty-four hours. If the animal should survive, a long-persisting local abscess remains; injection of the toxin of the colon bacillus now causes a fatal relapse, and the typhoid bacillus is found in large quantities in the spleen and peritoneum, while the intestines exhibit characteristic ulcerations. Toxins have been prepared from cultures of the typhoid bacillus; these have various degrees of virulence. That obtained by Sanarelli, if injected into a guinea-pig to the extent of 1 per cent. of its body weight, kills it in ten hours, producing lesions analogous to those of typhoid fever. The same observer has succeeded in immunising animals by the injection of slowly-increasing doses of the toxin, and finds that 0.5 c.cm. of the serum of an animal so immunised has the power of curing or preventing the development of the disease in an animal inoculated with an otherwise fatal dose of a virulent culture. This immunity is not yet fully explained, but it is noteworthy that in an animal so "vaccinated" the secondary infections do not appear, and the bacterium coli is either absent or attenuated. The principal, if not the sole, agent in the dissemination of typhoid is water, but it is very hard to demonstrate the bacillus in this medium. The best method is that of Perré, who largely dilutes the culture, and adds peptone and carbolic acid, thus forming a medium in which the typhoid bacillus alone will grow.

vaccine lymph which could be regarded as specific to vaccinia, several observers have sought to prove that organisms of a somewhat higher order than bacteria might be concerned in the production of this malady and also of variola. In this connection it may be mentioned that bodies believed to be of the nature of psorosperms or sporozoa have been described by Pfeiffer,[22] Guarnieri,[23] Monti,[24] Van der Loeff, Doehle,[25] and Sicherer[26] on the Continent, and by Ruffer[27] and Jackson Clarke[28] in this country, as capable of demonstration in and among the epithelial cells of an inoculated area.

Ruffer and Plimmer describe the parasite in question as a small round body, which sometimes appears to have a more darkly-staining centre. It is, they say, about four times the size of an ordinary staphylococcus, and generally lies in a clear vacuole in the protoplasm of the epithelial cells of the stratum Malpighii, and occasionally indents the nucleus, though it has not been found enclosed in the latter structure. These observers state that they have found the same organisms in sections of skin from small-pox patients and in pustules of the larynx and trachea.

Pfeiffer describes similar bodies as to be found, not only in the epithelial cells of the vaccine vesicle, but equally in all other vesicular eruptions of man and the lower animals. Pfeiffer, Guarnieri, Ruffer, and Plimmer all assert that these parasites exhibit very slow amœboid movements.

There can, of course, be no doubt as to the occurrence of the appearances described, although one may not be prepared to accept the interpretation put upon them, and in this connection it is well to bear in mind, not only that the cell enclosures described by Guarnieri, Monti, and Ruffer are said by them to differ essentially in their staining reaction and in their appearance from those of Pfeiffer, Van der Loeff, and others, but also the fact that the most recent experimental work in this direction has been carried out on the cornea of the rabbit—an animal which there is reason for believing to be insusceptible to vaccinia. It may be added also that no such bodies have been satisfactorily demonstrated in vaccine lymph itself. It is therefore conceivable that the "parasites" in question may represent merely the result of epithelial irritation caused by the scarification, together with that —of a non-specific nature, however—set up by the vaccine lymph employed.

The Virus of Small-pox and Vaccinia.

On the other hand there appears good reason for believing that the bacillus demonstrated by Klein and myself in reality constitutes the specific virus of small-pox and vaccinia respectively.

It is consequently of interest to note that the operation of vaccination is probably one of the earliest instances on record of the employment of a bacterial inoculation, although of course its true nature was not recognised at the time of its introduction.

A Small-pox Antitoxin.

Inspired by the investigations of Tizzoni and Cantani on tetanus, early in the course of my work on the pathology of vaccinia and variola, my attention was directed to the question of the production, if possible, of an antitoxic serum,[29] which might be of use in the treatment of small-pox, it being well known that vaccination is of practically no avail when once the disease has become developed.

The results of my first experiments in this direction, which were carried out on the monkey, were not very encouraging however, as owing to the fact that at that time I had not succeeded in isolating what I now believe to be the specific organisms of variola and vaccinia, I was only able to employ for my injections the blood serum of a monkey which had been vaccinated on several occasions.

Since my work was carried out a number of other observers have experimented in a similar direction, the results recorded by them being, however, of a somewhat conflicting nature. Thus Kramer and Boyce[30] were unable to produce any immunity even with large doses of serum from vaccinated calves, and recently Beumer and Peiper[31] have arrived at a similar conclusion. On the other hand Kenyon,[32] and also Hlava and Houl,[33] claim to have obtained successful results, but as far as can be judged from their publications, such claim would appear to rest on somewhat slender foundation, although Hlava and Houl state that in one instance the injection of their serum to the extent of 0.6 to 1.0 c.cm. per kilo of bodyweight entirely prevented the action of vaccine lymph inoculated four days later. They have not put on record any experiment with variola as yet.

The fullest and most recent contribution to this subject is a long paper by Béclère, Chambon, and Ménard.[34] The conclusion at which the authors arrive is that the serum of a vaccinated heifer, gathered after the drying of the pustules, immunised to a certain extent against the effects of subsequent vaccination, but the diagrams with which the paper is illustrated show that the antagonism is by no means complete.

It would seem, therefore, that in default of having at command considerable quantities of a pure cultivation of the specific organism concerned, better results might probably be obtained by employing colts instead of calves for production of the serum, since, as Chauveau has shown, inoculation of colts not infrequently gives rise to a generalised eruption, the effect of which on the system is likely to be more potent than when the reaction, as is the case in calves, is limited to the area of inoculation. The writer hopes shortly to be in a position to publish the results of experiments carried out on the lines thus indicated.

If, as appears not improbable, further investigations should be attended by a greater measure of success than has at present been attained, we may hope before long to be in possession of an effectual method for the treatment of those cases in which the system has already become invaded by small-pox, which would form a fitting complement to the Jennerian process of preventive vaccination.

[22] *Die Protozoen als Krankheitserreger*, Jena, 1890.
[23] *Centralb. f. Bakt.*, August 25th, 1894.
[24] *Loc. cit.*
[25] *Centralb. f. Bakt.*, Band xii, No. 25.
[26] *Münch. med. Woch.*, August 20th, 1895.
[27] British Medical Journal, June 30th, 1894.
[28] *Med. Press and Circular*, July 25th, 1894.
[29] *Trans. Epidemiological Society*, vol. xii, 1893.
[30] British Medical Journal, 1893, vol. ii, p. 989.
[31] *Berl. klin. Woch.*, August 26th, 1895.
[32] *Philadelphia Medical News*, February 2nd, 1895.
[33] *Wein klin. Rundschau*, October 6th and 13th, 1895.
[34] *Annales de l'Institut Pasteur*, January, 1896.

ANIMAL VACCINATION.[1]

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Introductory.

It is no uncommon error which leads people to suppose that the recent general recourse to the employment of vaccine taken direct from the calf (animal vaccine), as a

[1] By "animal vaccination" is meant in this paper the vaccination of human beings with animal (bovine) vaccine—that is, with vaccine from genuine cow-pox, and by "animal vaccine" is meant vaccine obtained from bovines (the calf). The nomenclature of vaccinia is very defective and misleading. Unfortunately, too, matters have been made still worse of late years by the employment of the terms "vaccine" and "vaccinate" to indicate the agent and the operation of protective inoculation against other diseases than small-pox. This was done by Pasteur with the generous and laudable object of keeping Jenner's great discovery for ever before men's minds. The result is none the less perplexing. Jenner employed the term "vaccine" as specifically referring to the cow (Lat. *vacca*=a cow). Nowadays it is high science to speak of the vaccine of diphtheria, or cholera, etc., when cow-pox and cows are in no ways concerned. The expression "pustule" as applied to the eruption of vaccinia is also entirely inaccurate and misleading, but no more so than the equally common term "vesicle." The specific Jennerian product of vaccination, from which vaccine is taken for vaccinating, is not a pustule nor does it contain pus, either in the human being or in animals. When it has ceased to be specific in character, and is undergoing some form of degeneration, it may or it may not become purulent. To call the "pock" a "pustule" suggests the untruth that pus is used for vaccinating. Neither is the Jenneriau vaccine-pock a true "vesicle," though the vaccine may be partially contained in component vesicles; the pock of sheep-pox is a true unicellular vesicle. The term "lymph," too, is quite irrational as applied to the liquid exuded from the pock. It is not "lymph," and does not come from the lymphatics. It is serum mixed with a proportion —greater or less under varying circumstances—of the specific products of the morbid action going on in the successfully inoculated (or spontaneous?) pock. In the existing chaos of nomenclature "vaccination" is thoughtlessly used to signify both the operation of vaccinating and the disease which results from it. I would suggest that "pock" is the most suitable word for the local sore; that "vaccinia" (=cow-pox) should be employed to indicate the disease; and that "vaccine" should be used instead of the very inappropriate term "lymph" to indicate the specific virus of the Jennerian pock.

substitute for that taken from the arm (humanised vaccine), is a new and modern discovery, and that the discovery which has immortalised Jenner's name is diminished in value, or its true nature, as described by himself, is modified by the more recent practice. Nothing could be more erroneous. Jenner is not only the discoverer of the most pregnant and fruitful fact in pathology—namely, that the virus of a disease occurring in bovines and some other animals may be transmitted to man, and afterwards from man to man in uninterrupted series, without undergoing any essential change in character; he is also the originator of the modern systematised animal vaccination, now so largely used and often spoken of as if it were something quite novel. All Jenner's early experiments were made with virus taken direct from the animal—that is, with what to-day is called animal vaccine, employed by him in what to-day is commonly called animal vaccination—that is, the vaccination of human beings from bovines infected with vaccinia or cow-pox.[2] He had worked carefully and diligently at the nature and results of this direct vaccination from the animal before he attempted the epoch-making experiment[3] of inoculating a human being with matter taken from a pock on the arm of another human being who had been successfully inoculated direct from the animal.

Jenner had abundant opportunity of making himself familiar with the characters of true cow-pox, and with his characteristic love for accurate knowledge, abundantly shown in his prolonged investigations concerning this disease, he fully availed himself of his advantages in this respect. Cow-pox was in his time of common occurrence in the country, and particularly so in Gloucestershire, where he carried on his medical practice, the district being largely devoted to dairy work. That there are various eruptions which affect the teats and udders of cows,[4] the exact nature of many of which even to-day is not understood, he was well aware. In his *Inquiry* he drew attention to this important subject, and described one spurious form of "pustulous sores" which frequently appear spontaneously on the nipples of cows. Milkers sometimes, he says, become affected with sores on the hands, accompanied, it may be, with a feeling of indisposition. The symptoms, local and general, are however much less severe than those "which arise from that contagion which constitutes true cow-pox," and "specific effects on the human constitution" are not produced by it.

Jenner drew attention to the extreme importance of being able to distinguish true cow-pox from other similar diseases. Nothing could show more plainly the importance he attached to this point than the following words from the *Inquiry*:[5] "It is," he writes, "of the utmost consequence to point it out here, lest the want of discrimination should occasion an idea of security[6] from the infection of the small-pox which might prove delusive."

In a letter to a friend dated Cheltenham, September 29th,[7] he recurs to this all-important subject: "I am fearful that before we thoroughly understand what is cow-pox matter and what is not, some confusion may arise, for which I shall unjustly be made answerable."

Cow-pox and Small-pox: Jenner's View.

The special and altogether remarkable characteristic of cow-pox in his eyes was that it protected against small-pox. "He always," writes Baron, "considered small-pox and cow-pox as modifications of the same distemper, and that in employing vaccine lymph, we only made use of means to impregnate the constitution with the disease in its mildest, instead of propagating it in its virulent and contagious form, as is done when small-pox is inoculated."[8] As Sömmering expresses it, "Variola et vaccinia sunt morbi, non suâ naturâ, sed gradu, diversi."

Baron, whose learning and painstaking industry are well illustrated by his researches as to epizootics, with a view to collecting information on the history of cow-pox, quotes, among many other authorities, a paper by Dr. Lazard,[9] in which he describes an eruptive disease affecting black cattle in England:

"The disease among horned cattle is an eruptive fever of the variolous kind; it has all the characteristic symptoms, crisis, and event of the small-pox; and whether received by contagion, or by inoculation, has the same appearances, stages, and determination, except more favourable by inoculation, and with this distinctive and decisive property, that a beast having once had the sickness naturally or artificially, never has it a second time."

Many other quotations might be given showing that Jenner was not alone in regarding cow-pox as being variolous in its nature, and that the adoption of the name, variolæ vaccinæ (= cow variola = cow-pox) was one which would seem in his own time, as in ours, appropriate.

The similarity of the appearances of the eruption in cow-pox and human variola has been dwelt on by innumerable writers of various dates, and no more eminent authority on the subject can be quoted than Chauveau. In explaining why he failed to test the nature of certain "lymph" by inoculating children with it, instead of limiting his experiments to animals, he says: "The first reason arises from the difficulty—let us say, rather, the impossibility—of distinguishing the primary eruption of variola from that produced by vaccinia."[10] Though the likeness here insisted upon seems to be regarded as rather more confusing than is warranted, still it is interesting to note how one of the most acute observers and dialecticians of to-day agrees with Jenner and older writers as to the similarity of the diseases.

Cow-pox and "Grease."

Jenner regarded cow-pox as being derived from "the grease," a disease affecting the hoofs of horses. "Thus," he says, "the disease makes its progress from the horse to the nipple of the cow, and from the cow to the human subject."[11] But though the equine disease, *after passage through the cow*, was in his opinion able to protect a person who had suffered from it against small-pox, so "that the person who had been thus affected is for ever after secure from the infection of the small-pox,"[12] he regarded the original equine disease which has not passed through the cow as not being equally protective. "Although," he says,[13] "in the two former instances the system seemed to be secured, or nearly so, from variolous infection, by the absorption of matter from sores produced by the diseased heels of horses, yet the following case [that is No. xv in the *Inquiry*] decisively proves that this cannot be entirely relied upon, until a disease has been generated by the morbid matter from the horse on the nipple of the cow, and passed

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[2] This term is commonly employed in a vague manner to express the vaccination of the animal as well as of human beings with vaccine taken from the animal.

[3] See Inquiry into the Causes and Effects of the Variolæ Vaccinæ (1798), Case xvii.

[4] Any reader of the Report on Eruptive Diseases of the Teats and Udders of Cows in Relation to Scarlet Fever in Man, by Professor Brown, C.B., of the Agricultural Department of the Privy Council, presented to Parliament in 1888, will be struck with the obscurity and complexity of this subject.

[5] *Inquiry*, end of his introductory remarks preceding Case 1.

[6] That is, the person who had suffered from inoculation with the spurious disease might entertain the delusive idea that he was protected against small-pox, and learn to his cost that he was mistaken.

[7] Baron's *Life of Edward Jenner*, vol. i, p. 155. There is no year assigned to the letter, but it is placed between one dated August 18th, 1798, and one dated November 20th, 1798, so one may assume Jenner's biographer regarded it as having been written in the interval. It would thus be later than the publication of the *Inquiry*, the dedicatory epistle to which is dated June 21st, 1798.

[8] *Life of Jenner*, vol. i, p. 162.

[9] *Philosophical Transactions* for the year 1780, part 1, quoted in Baron, *loc. cit.*

[10] "La première raison est tirée de la difficulté, disons plus, de l'impossibilité qu'il y a à distinguer l'éruption primitive de la variole de celle de la vaccine." Chauveau, Sur la Transformation des Virus, *Bulletin de l'Académie de Médecine, Paris*, October 20, 1891.

[11] *Inquiry*, introductory remarks, preceding Case 1.

[12] *Inquiry, loc. cit.*

[13] *Inquiry*, Case xv. One of the "two former instances" referred to above by Jenner (Case xiii) was that of a man who had never had cow-pox, but had suffered from sores on his fingers, with "pretty severe indisposition," due to accidental inoculation from the "sore heels" of infected horses. Six years afterwards Jenner inoculated him experimentally with variolous matter, without producing anything more than "slight inflammation" (presumably at the point of inoculation). Subsequent exposure to the contagion of small-pox had "as little effect." The second case (No. xiv) was that of a farmer, infected from the same source as No. xiii, and subsequently inoculated with variola. The result was merely "a little pain in the axilla," and "a slight indisposition" for three or four hours. "A few eruptions showed themselves on the forehead, but they very soon disappeared without advancing to maturation." The reader will, no doubt, recognise in these cases the history of persons "secured or nearly so," against variola as Jenner describes them. They probably had "varioloid" or modified small-pox.

through that medium to the human subject." Again, he writes, "We have seen that the virus from the horse, when it proves infectious to the human subject, is not to be relied upon as rendering the system secure from variolous infection, but that the matter produced by it upon the nipple of the cow is perfectly so."[14]

Jenner's View as to the Permanent Effect of Vaccination.

That Jenner should expect that the protection against small-pox afforded by vaccination would be lifelong, as is usually (not always) the case with one attack of small-pox, was natural. It was common knowledge that one attack of small-pox is protective (as a rule but with exceptions) against a second. The general belief prevailed in Gloucestershire, confirmed by his own observations and experiments, that vaccination protected against small-pox; therefore, he would expect that vaccination would be as protective as an attack of small-pox, and in this he was not mistaken. But it must never be forgotten that a person may be thoroughly vaccinated or may be very imperfectly done. The protection afforded by one small ill-developed pock is very different from that given by several large, typical pocks. There can be little doubt that degree of protection provided by vaccination may vary in accordance with the mode in which it is done, from a very slight, fleeting protection to complete and permanent immunity.

Variolation of Bovines.

It does not appear that Jenner, though he considered small-pox and cow-pox to be "modifications of the same distemper," ever attempted to inoculate bovines with variola. Baron is silent on the point. He does say, that at the time Lazard wrote, less importance was attached to the question of the connection between diseases of men and animals; "no trials, therefore, were made to ascertain whether the variola of man could be communicated to the brute, or *vice versâ*. The discovery of the variolæ vaccinæ has fully established the latter point; and although attempts to demonstrate the former have failed in the hands of some, other investigators have been more successful."[15]

The identity of origin of variola and cow-pox may be regarded as established by the successful variolation of bovines (adults and calves by the following:[16] Guillon (London), 1827; Sonderland (Barmen), 1830; Thiele (Kasan), 1839; Ceely (Aylesbury), 1839; Reiter (Munich), 1839; Badcock (Brighton), 1840; Gassner, 1840; at the Berlin Veterinary College, 1840; Senfft (Bierstadt), 1872; Voigt (Hamburg), 1882; Haccius (Geneva), 1889; Fischer (Carlsruhe), 1890; Hime[17] (Bradford), 1892; Freyer, 1896.

Vaccine, resulting from the variolation of the calf (or beast) by the above experimenters, has been tested in every way, and its nature established beyond a doubt. The procedure of some of those mentioned, who simultaneously inoculated the animal with humanised vaccine on one side and with variola on the other (Ceely, Voigt) has been objected to as unscientific, and not convincing. But my own experiments are free from this defect, as I inoculated the calf with variola only.

I inoculated vaccine from this variolated calf (*a*) on a second calf, producing a superb eruption of cow-pox, and (*b*) on myself with only a trifling local effect (I have been very frequently revaccinated), and (*c*) on another medical man (revaccinated at the age of 32), on whom typical vaccine pocks were produced. Calves 1 and 2 proved refractory to a second inoculation with active calf vaccine. From calf 2 I vaccinated a child, producing typical Jennerian pocks, and a third calf, which had fine typical pocks. Both the child and calf 3 proved refractory to revaccination with active vaccine. Retrovaccination of a calf was performed from the child with similar positive results, and the vaccine was passed through several generations of children, always producing the same typical results. There is no possibility of doubt as to the fact that true cow-pox was produced by variolation of my first calf.

[14] *Inquiry*, Case XVIII.

[15] Baron's *Life of Jenner*, vol i, p. 216.

[16] *Handbuch der sp. Therapie inn. Krankheiten*, Jena, 1894, B. 1, S. 249.

[17] My experiments are described in the British Medical Journal for 1892; also in my evidence before the Royal Commission on Vaccination in the last (forthcoming) volume, of whose proceedings later details will appear than those given in the Journal.

Efficacy of Variola-Vaccine.

Chauveau insists that variola-vaccine speedily becomes inert, and ceases to produce active virus when inoculated. This assertion is, however, contrary to facts established by myself, Voigt, and others. Voigt[18] has used no other vaccine at Hamburg from January 1st, 1882, up to the present. In 1895, he had the opportunity of testing the efficacy of the primary vaccinations done with his variola-vaccine in 1882, by the regular compulsory revaccination of the children done that year, which fell due in 1895. The result showed that the success of the revaccinations was extraordinarily low, only 69.2 being successful, evidently in consequence of the excellent effect of the primary vaccination with Voigt's variola-vaccine. In no other town in Germany were such good results obtained.

Crookshank[19] maintains that the matter taken from the animals variolated by Ceely produced small-pox and not vaccinia in the person inoculated by him with it. But this objection will hardly be regarded as worthy of consideration when we consider that those who witnessed the experiments were competent to judge, and were more familiar with small-pox than most people are nowadays. Besides, not one case is recorded of the disease spreading by infection from the persons inoculated from these animals, and there was certainly nothing which suggested to those who watched the cases at the time that the patients had small-pox, and not vaccinia.

Chauveau[20] failed to variolate adult bovines, and did undoubtedly inoculate small-pox on a child by means of matter taken from an animal which he had experimentally inoculated with variola. But his failure cannot invalidate my experiments and those of others. I and several others have used the calf in preference to the adult animal. Chauveau, though professing to repeat our experiments, has persistently refused to use the calf, or to inoculate in the same way we did. Had he really repeated our experiments, instead of omitting important conditions, he might, and no doubt would, have got the same results we did. He protests that variola inoculated in bovines produces a disease which is genuine, though attenuated, variola, and not cow-pox; and he asserts, in the face of indisputable facts, that the virus of variola, after a few passages through bovines, dies out. There are some who will not be convinced, even though one should rise from the grave. The variola-vaccine of Ceely, Badcock, Voigt, Fisher, and others has been employed to vaccinate hundreds of thousands of persons with the best results, and has never yet caused small-pox, though Chauveau says the vaccine used is variolous and not bovine pox at all.

Nature of "Grease."

The intimate connection between "the grease" of the horse and the cow-pox of bovines was deeply impressed on Jenner's mind, and, as we have seen, he regarded the latter as the result of the passage of the virus of "the grease" through the system of a bovine animal. To-day the conviction exists in the minds of most authorities that cow-pox is not primarily a disease of bovines.

The true nature of the grease has been definitely established, mainly through the masterly analysis of the eminent veterinarian, Professor H. Bouley,[21] of Alfort. He established, beyond any room for doubt, the fact that the grease is a specific disease of the horse, strictly analogous to cow-pox, interchangeable with it, in the sense that the grease inoculated on bovines produces cow-pox, and cow-pox inoculated in equines produces all the symptoms of the grease, and each disease protects the animal which has suffered from it against the other. Both are communicable to man by inoculation, and protect him against a second attack and against variola. Further, each disease can be produced in the respective animals by inoculation with the virus of small-pox. Both diseases, therefore, have a common nature and common origin, and therefore Bouley was justified in giving to the grease the name now by common assent assigned to it, of horse-pox.

[18] *Deutsch. Vierteljahrschrift f. öf. Gesundheitspflege*, 1896.

[19] *History and Pathology of Vaccination*, 2 vols, London, 1889.

[20] *Bulletin de l'Académie de Médecine*, Paris, No. 41, 1891.

[21] De l'origine de la Vaccine sur le Cheval, Discours à l'Académie de Médécine, in the *Recueil de Médecine Véterinaire*, 1862. See also *Leçons de Pathologie Comparée: Le Progrès en Médecine par l'Experimentation*, Paris, 1882, by the same auther.

COW-POX IN NON-BOVINE ANIMALS.

Cow-pox is also transmissible to the goat, the dog, the ass, the camel, the rabbit, the guinea-pig, the monkey, and the sheep. The last-named animal, however, offers a less favourable soil for the culture of the disease than some of the others. The horse is particularly susceptible. While human beings and bovines may be regarded as possessing about equal receptivity to the virus, the horse must be recognised as being more susceptible than either.

"SPONTANEOUS" COW-POX.

Although the occurrence of so-called "spontaneous" cow-pox (meaning thereby cases of the disease the source of which cannot be satisfactorily traced) has become very rare, as compared with what it was in Jenner's time, still cases are met with from time to time, and have been seen within quite recent years in England, France, Belgium, and other countries.

A few years ago vaccine from such a "spontaneous" case occurring at Bouge, near Namur, was adopted at the Government calf vaccine-station in Brussels, from which to maintain the regular vaccinations instead of the old Beaugency stock, which had previously been in use.

IDENTITY OF COW-POX AND HORSE-POX.

The two animal diseases, cow-pox and horse-pox, therefore, are in essence but one. They are characterised by a specific eruption on the integument, at the same time being constitutional diseases, one attack of which protects against a second for a period the exact length of which is not determined. In bovines the eruption is almost exclusively observed on the udder or teats. The number of pocks is always small, not exceeding some 20 to 30, even in severe cases.

The integument is the seat of election of the vaccine virus. The special seat of the vaccine pock is the upper and middle layers of the stratum lucidum. The pock of variola occupies the same site, but extends to the "prickle cells." It is exclusively in the mucous or cutaneous surfaces that the virus of vaccinia is cultivated. This may be demonstrated in various ways, for example:

1. Inoculation of vaccine in the anterior chamber of the eye produces immunity without any eruption.
2. Intravenous injection of vaccine produces immunity without eruption.
3. Transfusion of the blood of an animal during the stage of active eruption into the calf[22] and the horse produces immunity without eruption. The quantity of blood to be transfused must be very considerable, 4 to 6 kilos. (= 8.8 to 13.2 lbs.)
4. Blood or serum of an animal suffering from cow-pox used for a surface inoculation does not produce an eruption of vaccine-pocks.

Hence it is evident that the virus is not cultivated in the blood. The unknown organism which produces the disease can only be present in the blood in extremely small quantity, although experiment proves that other soluble substances exist in the blood of the infected animal which render it both immunising and curative against cow-pox, and there is some reason to hope, against small-pox also.[23]

IMMUNITY PRODUCED BY VACCINATION.

The immunity resulting from successful vaccination is the result of the local culture during the evolution of the pock, of an organism (unknown), which causes the production of an immunising substance. The absorption of this substance causes the subsequent immunity. A different explanation has been suggested, founded on the fact that pocks only occur at the site of the dermal inoculation, and that such inoculation does not produce a generalised eruption. It has been suggested that this is due to the absorption of a portion of the inoculated vaccine into the general circulation, this absorbed portion being subsequently conveyed to the cutaneous tissues, and producing immunity there, too early to allow of a generalised eruption being caused. The skin of the calf has certainly not been rendered immune to inoculation with vaccine before the fifth or sixth day, as a rule. A calf may be inoculated daily for five days, and the pocks of each day will mature in succession at the proper time, and not simultaneously. In fact, this method is sometimes employed when there is a desire to utilise fully the vaccinogenic ability of one calf, and when, owing to the heat of the weather, a cause, it is desired to produce a small quantity of vaccine on several successive days rather than the whole quantity on one day. The human subject is affected in a strictly analogous manner. Vaccinations made daily after the primary inoculation succeed up to the fifth or sixth day, as a rule; after the seventh day failures become more frequent, and they are the rule after the ninth day, so that complete immunity against the action of the vaccine virus (so far as failure to produce a typical vaccine pock) is not attained in the human being until about the tenth day succeeding vaccination. This is true whether animal or human vaccine be employed.

ANIMAL VACCINATION.

As vaccinia is the same disease as cow-pox in the cow and horse-pox in the horse, the course of human vaccinia is uniform, whether it be developed from humanised vaccine (that is, animal vaccine which has passed through one or more human beings) or from bovine or equine pox.[24]

As stated by Mr. Shirley Murphy:[25] "Judged by the experience gained during the first year's operation at the Animal Vaccine Establishment, animal lymph 'takes' with as much certainty as humanised lymph, and produces similar local and constitutional effects."

One of the earliest, if not the first, to practise animal vaccination as a source of supply for vaccinating human beings was Duquemelle, who employed the method at Rheims so early as 1800. In 1805 Troia was employing it at Naples, where in 1810 Galbiati[26] continued the practice. In 1840 Negri established a still more important institution at Naples for the carrying on of bovine vaccination as a substitute for humanised.

Italy was the country where this great question was earliest and most extensively worked, and it was from Italy that France first obtained a knowledge of the method and a supply of the vaccine virus. It was in 1864, after hearing addresses by Dr. Viennois and Professor Palasciano on the subject at the Congrès Médical at Lyon, that Drs. Lanoix and Chambon were stimulated to investigate the subject. They obtained a calf, which was incubating vaccinia after inoculation at the Neapolitan Institute, and brought it to Paris. From this dates the gradual large extension of the use of calf vaccine in France. Dr. Warlomont's establishment was started in Brussels in 1865, and subsequently became the Government station for animal vaccine.

In Germany the use of calf vaccine for public vaccination has become general, and all public vaccinations, as well as almost the whole of private vaccinations, are done from this source. The German Royal Commission on Vaccination, 1884, of which Koch was "reporter," recommended that as "vaccination with animal lymph has been recently so perfected as almost to equal vaccination with human lymph, the latter is to be superseded by animal lymph."[27]

The little kingdom of Holland provides calf vaccine for public vaccination, and so do many of the American States. England, where vaccination originated, was the last country to utilise this most beneficent discovery by making general vaccination obligatory by legal enactment. It was not until 1871[28] that vaccination of all children was made compulsory. England, true to her conservative principles, has been one of

[22] Strauss, Chambon et Menard, *Comptes Rendus de l'Académie des Sciences*, Paris, 1890.

[23] Bernheim, *Immunisation et Sérothérapie*, 1895, p. 276; also Etude sur l'Immunité Vaccinale, etc., by MM. Béclère, Chambon et Menard, *Annales de l'Institut Pasteur*, T. x, No. 1, 1896.

[24] Sheep-pox seems to have no distinct pathological relationship to variola or to equine or bovine pox. Human beings do not acquire true sheep-pox, nor is true variolation of the sheep possible. I experimented on the subject after successfully variolating the calf, but my results were not more satisfactory than those of others. I obtained only bastard pocks of an unsatisfactory character.

[25] Twelfth Annual Report of the Local Government Board; Report of the Medical Officer, p. 39. Mr. Murphy is now the distinguished Medical Officer of the London County Council.

[26] *Memoria sulla Inoculazione coll' Umore ricavato immediatamente dalla Vacca precedentemente inoculata*, Napoli, 1810. This is the earliest memoir on animal vaccination with which I am acquainted. See also *Il Vaccino Animale e il Vaccino Umanizzato, dei Dottori Dell' Acqua, e Grancini*, Milano, 1879.

[27] *Beschluss des Bundesrates* vom 18 Juni, 1895; II, Beschlüsse betreffend die allgemeine Einführung der Impfung mit Tier-Lymphe.

[28] By the Vaccination Act, 34 and 35 Vict., cap. 98.

the very last countries to introduce calf vaccine, and what the Government has done has been on the smallest scale and very tentative, and without any real effort to supply the demands of the public for vaccine from the calf. The Local Government Board established its first and only station in London in 1881.

Objections to Human Vaccine.

The great impetus given to the use of animal vaccine has been due mainly to two causes: (1) The general belief in the existence of a tendency to degeneration and weakening of vaccine which has passed through many generations of human beings; and (2) the great alarm caused by the occurrence of cases, and even epidemics (Rivalta, etc.), of syphilis, due to vaccination from children who were suffering from infective syphilis at the time vaccine was taken from their vaccine pocks and inoculated on other children. In some cases these latter were syphilised, and gave it to their mothers, who infected their husbands. In other cases wet nurses have also been infected by suckling children syphilised when they were vaccinated, by the use of infected vaccine.[29] No doubt, too, (3) the great facility which the vaccination of calves offers for the rapid production of large quantities of fresh vaccine, in cases of emergency; and (4) the universal unwillingness of parents to the taking of vaccine from the arms of their children, which is no longer necessary when calf vaccine is used, have tended to encourage the use of calf vaccine.

Degeneration of Vaccine.

With regard to degeneration, the question has been debated from the days of Jenner. There can be no doubt that a series of human vaccinations done one from the other would die out unless care were taken to select the best typical pocks from which to vaccinate each succeeding series. Anyone with much experience in vaccination can convince himself of this. Comparison of the drawings and descriptions of the vaccine pocks as known to Jenner and to his early followers with the average pock seen, say, at public vaccination stations to-day, certainly suggests that there is considerably less activity in the virus now than formerly. The small, pale, flabby, rather flat pocks one so often sees to-day, with little or no areola (which official authority now regards as non-essential) and containing but little vaccine, and causing little constitutional disturbance, offer a strong contrast to the large, full, plump pocks, with rosy areola and decided constitutional symptoms of the Jennerian times. Although the more inflammatory results and "erysipelatous" appearance often mentioned by Jenner and the older writers were no doubt partly due to accidental impurities in the vaccine, and want of cleanliness and other precautions in the operation, and subsequent management of the arms, still, allowing due weight to this source of difference, there seem grounds for believing that much of the vaccination of to-day is degenerate in the sense of being done with weaker, attenuated, and less active virus. But similar difficulty exists in preserving a strain of animal vaccine (cow-pox) through many successive generations. It is essential that great care and judgment be exercised in selecting good typical pocks with which to continue the inoculations from series to series, otherwise the vaccine will degenerate and ultimately die out. But with the exercise of due care, the propagation from calf to calf may be continued, practically, indefinitely.

It is no uncommon thing to see on the vaccinated calf pocks which present very various appearances. Some will be perfect, typical, and mature; while others may be retarded or offer various indications of degeneration, just as we see in the infant. Calves do not all exhibit equal receptivity, nor even do all parts of the same calf serve equally well as culture grounds for the virus.

As to Other Diseases of Calves.

With regard to the second cause which has stimulated the general adoption of calf vaccine instead of human, namely, the fear of the simultaneous inoculation of other diseases, especially syphilis, along with the vaccine, the use of calf vaccine is absolutely free from any danger as to syphilis, as the calf cannot be infected with that disease.

[29] See Fournier, *Syphilis et Vaccination*; also Simon, Papers relating to the History of Vaccination.

Efforts to prevent the apprehended degeneration of the humanised vaccine have been made many times by what is termed retrovaccination, that is by the passage of humanised vaccine through bovines. In 1837 the Government of Bavaria issued an order that this process should be regularly carried out. Retrovaccination has considerable effect in thus reviving the activity of humanised vaccine, which has begun to produce poor pocks. Where the regular employment of animal vaccine is, for any reason, not feasible, the practice of retrovaccination is to be strongly recommended. A calf should be vaccinated with the human vaccine in question, and the very best pocks on the calf should be utilised for further vaccinations of human beings.

Variolation of the calf is a still more effective means of rekindling the waning activity of vaccine, as demonstrated by the great success of Voigt's variola-vaccine referred to further on.

There has been much discussion as to whether humanised vaccine, when inoculated on the calf (retrovaccination), can be continued successfully through many passages; but success in this, like all other modes of propagating vaccine in series, depends on selecting only good typical pocks from which to continue the vaccinations, and its inoculation on healthy well-fed calves, which are not too young. Schulz has continued to propagate humanised vaccine from calf to calf in uninterrupted series for over two years.[30]

Efficiency of Animal Vaccine.

Judged by every test calf vaccine must be declared to be as active and as efficient as humanised vaccine. This is true whether we take as our standard (1) the character of the pocks, (2) the insertion success, (3) case success, or (4) the most important test of all, the protection against small-pox.

It is true that so esteemed an authority as the late Dr. E. C. Seaton held a very different opinion. He states that "Vaccination thus performed" (that is, with vaccine taken direct from bovines) "is much less successful than vaccination with humanised lymph."[31] In another passage[32] he writes as follows: "The difficulties in applying such a plan to the vaccination of the general population are, I apprehend, quite insuperable;" and again,[33] in urging that the great protection against small-pox consists "in taking care that when parents bring their children to be vaccinated, these shall be infected at once and infected completely," he adds; "and this is just what animal vaccination does not do."

These objections can no longer be alleged. Time and experience, which dissolve so many dogmatic assertions, have proved that every one of these objections can no longer be regarded as of the least weight.

Whole nations have been for many years regularly vaccinated and revaccinated with calf vaccine with success, judged by every standard. In Germany not only are all children vaccinated with calf vaccine in infancy, and revaccinated in their 12th year, but all recruits (some 300,000 yearly) are vaccinated for the third time on joining the army. The same is true of other countries, as already mentioned; so that this "insuperable" difficulty has been demonstrated, on the largest scale, not to exist.

The allegation, that by the use of calf vaccine infants are not "at once" and "completely" infected and protected, is known to-day, as the result of enormous experience, to be equally groundless.

In 1893 there were 1,518,793 infants legally liable to be vaccinated in the German empire. Of these 1,326,754, or 96.35 per cent., were vaccinated; 1,321,348 being done with animal vaccine (=87.37 per cent.), and only 5,406 with other vaccine. Of these primary vaccinations 96.35 per cent. were successful. Of 1,143,947 children who were liable to revaccination (in their 12th year), 1,107,025 were actually revaccinated, or 96.77 per cent. Of the total revaccinations, 91.71 were successful. Of the children revaccinated, 1,099,860 (=99.35 per cent.) were done with calf vaccine, and only 7,165 with other vaccine.[34]

[30] *Impfung, Impfgeschäft*, etc., von Dr. M. Schulz, 1891.

[31] *Handbook of Vaccination*, by Edward C. Seaton, M.D., Medical Inspector of (late Medical Officer to) the Privy Council. London: 1868.

[32] *Loc. cit.*, p. 336, note.

[33] *Loc. cit.*, p. 337, note.

[34] *Blattern und Schutzpockenimpfung, bearbeitet im Kaiser. Gesundheitsamte*, Berlin, 1896.

The Experience of Germany.

With such results already obtained, it is no longer possible to urge either that calf vaccine is not efficient, or that there is any serious difficulty in its general employment for vaccination. All the difficulties have been overcome in Germany and other countries; and the wonderful degree of immunity from small-pox enjoyed by Germany, where calf vaccine is most extensively used, demonstrates the efficiency of the vaccine. In many parts of the empire there were 100 per cent. successes with primary vaccination. Of 234,839 primary vaccinations in Posen, Lübeck, Lippe, Schaumburg-Lippe, Reuss, Waldeck, Schwarzb-Rudolstadt, Schwarzb-Sonderhausen, Anhalt, Sachsen Altenburg, Sachsen-Meiningen, Brunswick, Oldenburg, Mecklenburg-Strelitz, Baden, and Saxony, the whole (=100 per cent.) were successful.

It is to the strict enforcement of vaccination, for which calf vaccine is employed, that the German army enjoys such a remarkable immunity from small-pox. Every officer and soldier in the army has been at least three times vaccinated—in infancy, during school age, and on joining the army. From 1873 to 1896 only 2 deaths from small-pox had occurred in that well vaccinated body of men.[35] The immunity enjoyed by the German soldier during the war of 1870, when exposed to the infection of small-pox which ravaged the French troops, who are but poorly vaccinated, is most striking. There were not 300 deaths among the German troops, while the French lost 23,400 from small-pox alone. The French prisoners interned in Germany brought the infection of small-pox with them there, and great numbers fell victims to it. These captives would have done more damage to their conquerors than the weapons of their soldiers in the field, had the population, amongst which they were themselves dying of small-pox, not been well protected by vaccination.[36]

In Jenner's time, test inoculations of persons who had been accidentally and intentionally vaccinated with animal vaccine (cow-pox) were frequently made, and they were found absolutely immune.

The Experience of England.

During the epidemics of small-pox in Sheffield (1887-88), Bradford (1893), Halifax (1893), and Gloucester (1896) not fewer than 50,000 to 60,000 persons were successfully vaccinated and revaccinated with calf vaccine from the Bradford Calf Vaccine Institution, and not one of them took small-pox, even where they resided in poor, infected homes, in close contact with the variolous patients. Numerous cases could also be cited of nurses in small-pox hospitals who have attained complete immunity to variola by vaccination with calf vaccine.

There is no reason whatever to suppose that humanised vaccine (which is animal vaccine passed through a series of human beings) has acquired more protective properties than the original bovine virus from which it is descended. If one were to judge by the appearance of the pocks commonly seen to-day, as produced by humanised and by calf vaccine, one would unhesitatingly say the latter was the better of the two. The pocks produced by calf vaccine propagated skilfully to-day are identical with those of Jenner's time, while those produced by humanised vaccine are often very inferior.

With regard to the proportion of successful results among primary vaccinations with calf vaccine, there is no reason to suppose that it is not, in the hands of skilled vaccinators, quite equal to, if not superior to the average success of humanised vaccine.

At the animal vaccine station of the Local Government Board in London, the results with different vaccinators vary somewhat in different years. The lowest percentage of successes ever obtained since 1886 was 89.56 per 1,000; but Mr. Shirley Murphy during two consecutive years was successful in 100 per cent. This is proof enough that the success is not altogether dependent on the vaccine, as unsuccessful vaccinators like to assert. Here we have five capable vaccinators vaccinating from the same calves, at the same station, on the same days, yet while one attains 100 per cent. successes, others vary from 88.56 upwards.[37]

During 1893-4 Dr. Cory performed 6,569 primary vaccinations at this station, of which all but 37 were successful, or 99.43 per cent. There are not many stations where arm-to-arm vaccination is more successful than this.

Dr. Cory makes five insertions, and his insertion success was as follows:

Successful in	5	insertions,	5942
,,	,, 4	,,	312
,,	,, 3	,,	139
,,	,, 2	,,	74
,,	,, 1	,,	65

In the Grand Duchy of Baden there were 41,061 primary vaccinations performed in 1895,[38] all being done with calf vaccine; of these 40,248, or 98 per cent., were successful.

My personal experience is very limited as compared with these enormous numbers, but it is quite in accord with the results given above. It is not, as a rule, the calf vaccine which is in fault. The great difficulty, if great it can be called, lies in the recognition by the vaccinator that the physical characters of calf vaccine are not quite the same as those of human vaccine. The former is thick and glairy, the latter is thin and watery. Hence the minute scratches which suffice to allow the latter to penetrate into the tissues hardly permit the thicker material to enter the little wound, and infect. Thus it often happens that public vaccinators, accustomed for long years to be very successful with human vaccine, are disappointed when they first begin to use calf vaccine. A little experience teaches them the necessary modification of procedure in vaccination with calf vaccine, and then they get perfectly satisfactory results with it.

Vaccination of Calves.

The provision of a suitable, airy, well-ventilated, and well-drained stable is a primary necessity. They should be large enough to allow of a sufficiency of stalls for changing and evacuating from time to time. The whole must be so constructed, flagged, plastered, lighted, warmed, and drained as to provide the most healthy conditions possible for the animals. These must be very carefully selected, and all which present any appearance of ill-health, or of skin irritation, must be summarily rejected. The character of the stools must be particularly noted. If they are inclined to diarrhœa the calf must be rejected, and if the animal is constipated there is also good reason for rejection, because it arouses a suspicion, often too well founded, that the calf has been physicked in consequence of having had diarrhœa, and has thus become constipated.

The best age is about three to four months (the use of calves under three weeks is not allowed in Germany), and milk calves are more satisfactory than those which have been weaned early and fed on meal and other substitutes. Where calves are unattainable, adult animals can be used. But the younger animals are best, being more manageable, and almost certainly free from tuberculosis.

The best food is new milk, unskimmed, of body-heat, with two to four eggs daily. Calves vary in the quantity they take, but an average calf of three to four months old, if taking only very little hay, will consume 2 to 2½ gallons of milk daily, or even more. It is better to give the milk ration in three rather than in two parts. It is essential that the milk be fresh.

The milk should be sterilised by boiling, and be kept so protected that, while cooling, it will not again become polluted. This is a great preservative from diarrhœa. The addition of a little lime water and salt to the milk is very desirable. Some thoroughly well-boiled gruel or a little broken bread which has been scalded is sometimes permissible, well mixed with the milk. Between meals a few handfuls of hay may be left for the calves to amuse themselves with.

Mr. Murphy, in the report referred to, seems disposed to regard female calves as more successful vaccinifers than males. I do not think there is any merit in this respect attached to the sex, but undoubtedly females are preferable from the point of cleanliness, especially if the calves are kept in small stalls, as their litter is much more likely to be kept dry and clean.

Light-coloured, if possible white, calves are preferable to others, as their skin is more delicate, and is a more kindly

[35] The peace establishment is nearly 600,000 men.

[36] British Medical Journal, February 29th, 1896. p. 561.

[37] *Reports of the Medical Officer of the Local Government Board.*

[38] I am indebted to Sanitäts-Rath Dr. Fischer, Director of the State Calf-Vaccine Institution, Carlsruhe, for these figures.

culture medium than that of dark calves, which is always coarser, and usually does not "take" so well. Of several calves inoculated the same day and with the same vaccine a considerable variation in the relative success may be found, owing to the relatively greater susceptibility of some. Some parts of the surface, selected for inoculation, habitually are more successful than others. The buttock is very generally a bad site, while the scrotum is one of the best.

Method of Procedure.

The modes of insertion are various, and each person comes to prefer the method he has been longest accustomed to. Some make single incisions about 1 inch long, arranged in quincunx; some make the incision several inches long; others make a double incision; some prefer insertion by puncture; some scarify a considerable area. The last method has the disadvantage that it is not easy to recognise the typical characteristics about the pock when it is seen covered with a large scab. Further, the large surface of such a scarified area is more likely to attract dirt, causing both a loss of valuable material and a risk of increased pollution of the vaccine.

As to the extent of surface to be inoculated decisive facts are not yet forthcoming, but there seems to be a limit to the number of insertions which can be made with success. It cannot be yet stated with certainty whether the quantity inserted affects the quality of the harvest injuriously, or if the unsatisfactory result be due to the depressing effect on the calf of being kept too long in the constrained position required in order to carry out the large number of insertions.

Both Jenner and his contemporary Pearson (Physician to St. George's Hospital) devoted some attention to this most important though neglected question of the influence of the quantity of material inoculated on the protection afforded. Jenner was undecided on the subject, Pearson thought that in the case of variola the quantity of virus inoculated had no influence on the severity of the disease.

It is a widely spread theory among practitioners that the quantity of vaccine inserted is immaterial, and tubes of vaccine are often appraised according to the quantity rather than the quality of their contents. The vicious argument is commonly stated thus: "Vaccinia is a microbic disease; as the microbes multiply in the body until it is infected there can be no difference in the result, whether much or little vaccine is used." Nothing could be more illogical in theory or worse in practice than to adopt this very prevalent line of argument as a guide. To mention only a few capital errors: it disregards the struggle for existence between the inoculated microbes and the organised elements of the body; it ignores the fact that a feeble army of invasion may be annihilated, or it may be rendered so debilitated and attenuated that its protective operations may be reduced to nothing, or next to nothing. But, above all, this theory is at variance with the established fact that the degree of protection varies directly with the number of insertions, and there can be no doubt that more vaccine is invariably inoculated with several insertions than with one. One large insertion would no doubt give as effective protection as several smaller ones of exactly the same area: but there is a distinct advantage in not making one area of insertion too large, in the avoidance of the risk of inflammation. For the same reason it is most desirable that the insertions should be made far apart. By doing so the risk of any inflammatory action extending from one area to another is minimised. Four pocks which have become inflamed and included in one area of irritation are a source of much more serious constitutional and local disturbance than four detached pocks, each of which is inflamed. On the Continent the insertions are usually divided between both arms in order to minimise this risk. A single large insertion advances rather more slowly from the commencement to the falling off of the scab. The stage of incubation is shortened when several insertions are made.

The preliminary shaving of the parts to be inoculated and the subsequent washing and disinfecting should be done with the greatest care. Bad shaving may result in seriously damaging the harvest. Most of the so-called "supplementary or supernumerary pocks" referred to by writers are really due to scratches and abrasions of the skin, leading to the unintentional inoculation of various points. A general eruption never results from cutaneous inoculation. Pocks only appear at the points of insertion. The skin being the culture medium of the virus, it is a general law that in order to procure a general eruption, the virus must be introduced into the system by some other medium than the skin.

The whole area to be vaccinated must be thoroughly (surgically) cleansed with soap, hot water, and nailbrush; all traces of soap must be carefully removed, and the parts be subsequently disinfected before the vaccination. As disinfectants, carbolic acid, boracic acid, and perchloride of mercury all have their champions, I generally use lysol, which is excellent, both as a detergent and disinfectant. It is necessary that the skin should be free from any absorbed disinfectant before the vaccination is done, or the vaccine may be sterilised completely.

The evolution of the inoculated pock is more rapid in the calf than in the human being, possibly owing to the higher and more favourable temperature of the body, which averages 101° to 101.5° F. There are slight unessential variations in the details of the evolution of the pocks when they result from incision as compared with punctures, and usually the former advance more rapidly than the latter.

Evolution of Insertions by Puncture.

Even within a few hours a puncture which is going to "take" may be noticed to be slightly elevated from infiltration of the tissues. The orifice of the puncture is filled by a minute blood clot.

On the second day a slight reddishness may be seen around the puncture, and palpation detects a little elevation of the spot.

On the third day the elevation of the spot can be both felt and seen, its centre being occupied by tiny cicatrix, around which may be already detected slight indications of a greyish ring, outside which there is a peripheral faint pink areola.

On the fourth day the specific characters of the cow-pock are distinctly noticeable. The vaccinogenic zone is of a dull, whitish colour, its borders being well elevated and distinctly outlined. The characteristic central depression (umbilication) is well marked, the areola is more pronounced, and the induration of the skin is much increased.

By the sixth day the pocks have increased greatly in size, and apparently at a much more rapid rate during the last twenty-four hours than during any similar period; the greyish, vaccinogenic zone is much more marked; the areola is of a darker colour, while the peripheral induration is diminished, and the skin feels softer.

On the seventh day the plump, full appearance is altered, and the pocks look flatter, though wider in diameter. The central depression looks less distinct, and is occupied by a crust or scab; the grey zone is duller and more yellowish in appearance. The areola and the peripheral induration are distinctly less.

During the following days the pocks grow flatter, the crusts darker and harder, and the induration and the colour of the surrounding areola become much less marked. About the fifteenth to the seventeenth day the scabs fall off, usually displaying a completely healed surface, pinkish and glistening, below.

When the insertions are made by incision, the phenomena are slightly different in some details, but are essentially the same in character. In general the process is rather accelerated.

On the second day the grey vaccinogenic zone is fairly well marked, with its reddish areola and surrounding indurated tissue.

On the third day the central linear depression is distinct, and the grey pearly margin is broader, as well as more prominent, and the areola and peripheral induration are more noticeable.

By the end of the fourth day the grey vaccinogenic zone is distinctly clear and transparent-looking, its internal margin having become irregular in outline. The central linear depression is more marked, the peripheral areola is of a bright pink colour, and the subjacent and surrounding tissues are more distinctly indurated.

The evolution proceeds rapidly during the ensuing twenty-four hours; the clear, transparent appearance of the pearly-grey zone is altered to a dull whitish colour, its internal

border being uneven and jagged, and the external contour more wavy and irregular; the central depression looks less marked, being more filled with yellowish crust; the areola is commencing to be of less lively colour, and the induration more diffuse.

The fifth day may be in general regarded as the point of maximum growth and vigour of the pock, whether resulting from puncture or incision, and after this date it begins to show decadence, becoming less plump, flatter and drier every day, though the total quantity of material which may be collected is greater on the sixth than on the fifth day.

Causes of Failure.

The evolution of the pock may be accelerated or retarded by various agencies, not all, unfortunately, well understood. In general the growth is more rapid in hot than in cold weather, but the excessive heat of summer easily leads to the complete degeneration of the culture. On the Continent stations have sometimes to be closed during the heat of summer, owing to this cause. In this climate it is necessary to heat the stables artificially during many months of the year.

The success of the inoculations may be unfavourably affected by the age and health of the animal, and by the condition of the skin (harsh, inflamed, scurfy, etc.). Diarrhœa is a serious cause of failure. The sanitary condition of the stables, want of cleanliness, defective supply of fresh air, emanations from drains, bad dietary—all these things may spoil and finally destroy the finest strain of vaccine. Indeed, the calf is a delicate creature, and the successful propagation of cow-pox calls for continuous care and observation.

Should a culture, from whatever cause, begin to decline in activity in its passage through any particular calf, it is always possible to restore it to its primitive excellence if it be at once passed through a good calf before it is too late. But it is only by constant watchfulness and care as to the selection and condition of the calves; by careful attention to their dietary and hygiene, and by the judicious selection of the best typical pocks for further progagation, the vaccine being taken on the day of maximum virulence, that successful propagation in continuous series can be attained.

The fifth day is undoubtedly, as a rule, the day of maximum virulence (Pfeiffer says $3\frac{1}{2}$ to $4\frac{1}{2} \times 24$ hours), and it is on this day that the vaccine should be collected for further propagation in other calves if, as is usually the cases, the pocks are seen to be in their best condition then. On the sixth day the quantity of vaccine is larger, but the quality is not quite so good, so far as activity.

At some stations the vaccine is collected habitually on the fourth, and even on the third day. It would seem to be possible to evolve a strain of vaccine which matures quicker than the fifth day.

When the pocks have undergone a decided degeneration in appearance; if small and dry, with little or no areola; if they become crusted over too early; or if, on the other hand, they become purulent on the fourth day, instead of plump, elevated, and vigorous, then no material must be taken from such pocks for further use, either on man or beast.

For the purpose of vaccinating and of collecting the vaccine the calf must be securely attached to a specially-constructed table, so that it cannot by violent movements injure itself or the pocks. Such pocks as are on the sides may, indeed, be dealt with while the animal is on its feet, but not so those on the belly and other parts out of easy reach. The original Dutch (Rotterdam) table is still the best for the purpose, though I have found it desirable to effect some changes in its construction.

The Vaccine.

Before the vaccine is collected the whole surface must be carefully cleansed, and the whole surface wiped with disinfectant. As already mentioned, the specific seat of the culture of the unknown organism, to which vaccine is undoubtedly due, is not the blood, or the lymph, but the dermal integument. The so-called "vaccine-lymph" (which is not lymph at all) is therefore not the primary or special seat of the virus, but is only a secondary receptacle of serum, with which some of the virus has become absorbed. The quantity of virus contained in this serum may vary enormously, from none or very little, up to sufficient to render it very virulent and active.

From the structure of the pock, and the thick, glairy character of the liquid in it, the latter will not flow freely when the pock is punctured, as is the case with human vaccine, which is, as compared with bovine, thin and watery in physical character. Therefore, in order to cause the exudation to flow, it is usual to employ special compression forceps, of which there are several forms in use.

Some persons collect this liquid as it exudes, direct into capillary tubes, either straight, or furnished with a central dilated chamber. In any case tubes for this purpose must be two or three times the size of those used for human vaccine, otherwise coagulation of the serum in the tube is pretty certain to occur, and it is almost impossible to extract such coagulated material from very fine tubes. Coagulation does not affect the quality of the vaccine. Others, again, collect the vaccine from several pocks in a suitable receptacle, and when flocculi of fibrin have formed in it, carefully remove each particle, and then fill the tubes with the defibrinated liquid. Thus the annoyance and loss caused by coagulation in the tubes is avoided.

Having obtained all the liquid which can be expressed in this way, some persons are content to leave the pocks undisturbed. But they still contain the great bulk of the most active virus in their tissue, probably deposited within the cells of the surface layer.

The best procedure, therefore, is to collect this infective tissue by removing the surface of the pock by scraping. The expressed liquid contains some virus, the pock contains it all. Therefore, by dealing in this way with the surface of the pock, the most active material is obtained. By means of suitable appliances the abraded material should be reduced to a perfectly homogeneous creamy consistence. It may be ground in a mortar, or, better still, in one of the machines specially constructed for the purpose.

Glycerised Vaccine.

To prevent this finely-ground pulp from drying quickly, it is necessary to add some liquid. As the result of large experience, and on the recommendation of no less an authority than Koch, pure sterilised glycerine, free from acid, is universally employed for this purpose. Though Koch's high authority has led to the use of glycerine for this purpose being sanctioned by law in Germany, it has been used in Italy for sixty years. My experience is that the best form is sterilised glycerine which has been three times redistilled. Some persons dilute it with more or less water. Obviously if any water is used it should be distilled and sterilised. Vaseline has been proposed as a substitute for glycerine, and Surgeon-Major King employed lanolin in India; but these substances have found few to favour them besides those who originally suggested them, and pure sterilised glycerine is still at the present time the best medium known.

Glycerine acts not only as an extractive, and as a means of keeping the vaccine moist, but it is an excellent disinfectant for the purpose, destroying the ordinary moulds and fungi, and also the three microbes which are commonly found in fresh vaccine as collected; these are the staphylococcus aureus, a greyish micrococcus, and a white one, to which Antony has given the name of the "porcelain micrococcus."[39] At the same time the glycerine in proper proportion does not attenuate the vaccine virus; on the contrary, by its destructive action on the extraneous organisms accidentally present, it prevents their injurious interference with the specific virus. The glycerised compound therefore, when properly prepared, is much purer, and less likely to produce any inflammatory results than vaccine taken from the calf and inoculated direct on the child. I have never seen severe inflammation follow its use, though I have frequently seen such where the child was done directly and immediately from the calf. The result of the great experience now acquired on this subject is that the direct use of vaccine from calf to arm is almost entirely abandoned. So beneficial is the action of the glycerine, that two large institutions in France for the propagation of calf vaccine, habitually send out no vaccine for use which has not

[39] *Rapport sur le Fonctionnement du Centre Vaccinogène au Val-de-Grâce.* Par M. le Prof. Dr. Antony.

been kept for four to six weeks. During this interval, their proprietors assert, all extraneous organisms from the air, etc., which may have got into the vaccine while it was being collected, are killed, and the vaccine thus sterilised they consider gives the best results when used on either human beings or calves.

This glycerised pulp is the best form of calf vaccine, and the one which is in almost universal use. It is what is exclusively employed, and with the best possible results, in Germany. It is what is used for our own army and navy, it is also what is recommended and chiefly sent out from the Bradford Calf Vaccine Station. This form, like the liquid vaccine, should of course be put up in sterilised, airtight tubes, vials, or other receptacles.

Calf vaccine is also used dried on ivory points by a few persons. But it is not by any means the best mode of preservation. It cannot be as pure, and if not kept thoroughly desiccated, decomposition may readily occur. The pulp (unglycerised) is also sometimes dried rapidly and ground to a fine powder and kept for use. It must, like points, be moistened before being employed.

Blood in Vaccine.

It will be evident that during the process of collecting calf vaccine, whether by scraping or by expressing the fluid from the pock by means of special forceps, some blood must get into it. But no matter how limpid the clearest human vaccine may appear, it always contains blood corpuscles. Persons who are not familiar with the use of calf vaccine and the conditions under which it is prepared, are sometimes astonished and alarmed if they see a minute flocculus of fibrin or blood clot in it, and reject the vaccine on that account. It seems, however, rather refined criticism to use without hesitation vaccine which contains blood cells, if only it be colourless, but to feel alarmed if a little colouring matter be present. Indeed, to employ the serum which has exuded from the pock on the child or calf, and object to a particle of the colouring matter of the blood in it seems like straining at a gnat and swallowing a camel. If the vaccine exuded from the living tissues be fit for use, if the particles of tissue which must adhere to the vaccine and get carried into the tubes, or conveyed by the lancet from arm to arm, as well as the pulverised pulp, are free from danger, then the blood cannot be dangerous. Anyhow, it is always present, as represented by some of its elements, in the most translucent and transparent vaccine, whether human or animal.

The following statements on the subject by two of the officials of the Local Government Board are taken from the Report (1890) of the Royal Commission on Vaccination, now sitting. Dr. Cory, Director of the Government Animal Vaccine Station, was examined as follows:

Q 4423.—Did you get clear lymph in that way (from the calf) free from blood? No, it is always mixed with blood more or less.

A 4652.—You cannot obtain the calf lymph without taking also a certain quantity of blood.

Q 4483.—You told us that you were obliged to use the clamp to get lymph from the calf? Yes.

Q 4484.—And that very frequently blood comes with it? Yes.

Q 4485.—In what proportion of cases, roughly speaking, does blood come with the lymph? I think in the majority of cases.

Q 4486.—Do you use that? *Yes; we must use lymph with a certain mixture of blood.*

Q 4487.—You have no hesitation in using lymph from the calf, though it contains blood? No; none whatever.

Q 4488.—The rule as to the examination for blood before it is issued does not apply to the calf lymph? No.

Extract from the evidence of Mr. Farn,[40] Examiner of Vaccine for our Government (*loc. cit.*).

Q 4119.—Is blood in calf lymph recognised as an objection? I believe not. My instructions are not to that effect.

Cultivation of Virus on Artificial Media.

Many attempts have been made to cultivate the virus on artificial media; and many men, like myself, have felt confident they had attained that glory which "*miscet diis immortalibus*" by successful culture on agar, gelatine, broth, egg, etc., I once produced perfect Jennerian pocks on a child with a culture of calf vaccine on agar. But as I had simultaneously inoculated the child with humanised vaccine (compare Ceely's and Voigt's combined inoculations in variolating bovines), I was not satisfied that the result was certainly due to the culture. Up to the present no satisfactory success has been attained. It probably is entirely erroneous to assume that the specific organism belongs to the schizomycetes or can be cultivated in the familiar manner employed for propagating such organisms.

Le Dantec[41] claims to have discovered and isolated the "variola coccus," which, he says, is to be found in the pock, blood, bones, viscera, muscles, spinal cord; indeed, it is ubiquitous. There are serious difficulties in accepting the conclusions of the author of this supposed discovery, namely, the abundance and ubiquity of the organism and the extreme facility with which, amidst so many unsuccessful searchers, Le Dantec solved the whole difficulty. Copeman[42] claims also to have discovered the bacillus, not only of vaccinia, but of variola. His organism, however, is not the same as Le Dantec's, and is utterly different from the sporozoa of Pfeiffer[43] and the cytoryctes variolæ of Guarnieri.[44]

Employment of Animal Vaccine for Human Vaccination.

As animal and human vaccine contain the same virus, and only differ slightly in their physical properties, the modes of using them present no essential differences. Little differences of detail of the operation, corresponding to the differences in character of the two, will make the use of calf vaccine as successful as arm-to-arm vaccination. Only a little more trouble is required to get a good result, but with that little full satisfaction can be attained.

Human vaccine may possibly take, on the human subject, with somewhat greater readiness. But if so just a little additional trouble will cause the difference to disappear. Calf vaccine, which has become somewhat attenuated in reference to the human subject, may often be inoculated on the calf with perfect success. It is possible that, in an analogous way, human vaccine may have a greater affinity for the human subject, and take with somewhat less trouble and greater facility than calf vaccine. But evidence is wanting to prove this. The practical results show that good vaccinators get as satisfactory results with calf as with humanised vaccine.

It has been my experience to witness the initial attempts of many men to use calf vaccine instead of human, which latter they had long been familiar with. It is almost a rule that men become more and more skilful after their first attempts, which may have been unsatisfactory. With increased experience increased success has come, until the results have been perfect. The results attained by the individual men at the Government Animal Vaccine Station in London, during a series of years, prove the influence of the "personal equation" in vaccination, as in other things. Why should one man never get more than 96 per cent. success, while another gets 98 per cent., and a third gets 100 per cent., year after year, with thousands of cases, though all three are using the same vaccine direct from the calf to child? Year in and year out some men cannot get beyond a certain proportion of success, perhaps just below perfection, while others attain perfection apparently without any special effort. But obviously it is not the vaccine which is in fault.

It is not a little remarkable how readily men blame the vaccine they have bought, if they should fail with it, while they never blame the vaccine they take direct from the arm if it should fail. Yet 100 per cent. successes are by no means the rule even with arm-to-arm vaccination.

I am constantly consulted as to the keeping property of the various forms of calf vaccine. I invariably answer that to keep it long in stock without necessity is to sacrifice needlessly one of the great advantages of the supply of calf vaccine, which is, that within a few hours it can be procured in practically any quantity required, and fresh and active? Why, then, use part of the contents of a tube to-day and store up the remainder for use after a lapse of months? Calf vaccine will, however, keep apparently as long as human.

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[40] This gentleman is employed by the Government to examine the vaccine procured from various sources, including that from the Animal Vaccine Station, in search of blood, microbes, etc.!

[41] *Archives de Médecine Navale*, No. 6, 1895.

[42] British Medical Journal, i, 1896.

[43] *Centralbl. f. Bakt.*, No. 25, 1895; *Die Protozoa als Krankheitserreger*, Jena, 1890, and various other writings of this eminent authority on vaccinia.

[44] *Archivio per le Scienze Med.*, No. 22, 1892.

I have used it with perfect success after a year. I have sent it to Algiers, Egypt, India, tropical South America, and it has given perfect results under most unfavourable conditions of time and climate.

Where storing is unavoidable, the vaccine should be kept in the coolest available place and in the dark. Points and the dry powder should be kept perfectly desiccated. The glycerised form, which I term "conserve," may be opened and used, and the vials may be resealed and re-used many times without diminishing the activity of the vaccine.

Attempts have been made to employ other aseptic and disinfectant substances—for example, small quantities of salicylic acid and of boracic acid have been added to the vaccine—but these methods have not been generally approved by experienced men.

It is impossible to state what is either the case or the insertion success of public vaccinators generally with arm-to-arm vaccination, much less to give the average for the whole country, which would be a good deal lower than that of public vaccinators. The general standard must be very far below that attained at the Animal Vaccine Station in London, where, as stated already, some of the vaccinators attained to 100 per cent. successes. Seaton gives it as his opinion[45] that, "while one practitioner is disappointed if one case out of ten exhibits a number of vesicles short of the number of insertions of lymph which have been made, another is very well content if he get the full number of vesicles in only half his cases." I could name many men who during several years have systematically never failed in one case with calf vaccine conserve.

Seaton mentions several stations as being particularly successful, and yet he adds that the insertion success was only "considerably more that 90 per cent.!" He mentions that at Lincoln, of 150 persons who caught small-pox, 18 said they had been vaccinated [with human vaccine], but that the vaccination had not taken, that is, only 88 per cent. had been successful!

The following suggestions for successful vaccination with animal vaccine are offered as the result of my own experience, and as approved, after considerable experience, by large numbers of medical men who have asked my advice:

Practical Hints for Vaccinators.

1. Satisfy yourself the child is in thoroughly good health; always examine the body and buttocks before vaccinating.
2. Vaccinate only with lancets kept for that special purpose. Disinfect them thoroughly before and after use. The lancet blade, without any handle, is most convenient. Have a separate lancet for each child (they cost about 6d. each, and last a lifetime).
3. Disinfect the arm before vaccinating.
4. Use soft tissue paper, which may be kept cut in packets of a suitable size, about 4 square inches, for washing and drying the arm, lancets, etc. Such paper "napkins" cannot be used more than once; whereas people become so attached to bits of rag that they are loth to part with them. The packets should be sterilised by baking from time to time, and be kept in a well-closed vessel.
5. Use blunt lancets rather than very sharp ones.
6. Have the child's arm completely uncovered.
7. As the evolution of the pock takes place, mainly in the rete Malpighii and upper portion of the papillary bodies, the surface tissue must be removed so as to enable the vaccine virus to be deposited there; it is useless and disadvantageous to go deeper. By making too deep a wound some of the vaccine is deposited where it will not infect (in the deeper layers), and some is swept away by the hæmorrhage which is needlessly caused.
8. It is disadvantageous and unnecessary to cause blood to flow.
9. As animal vaccine is so thick and tenacious, it will not penetrate readily into such minute scratches as suffice for the thinner and more watery human vaccine, therefore a slightly larger raw surface is necessary.
10. The best method is to rub off the surface of the skin by frequently passing the edge of the lancet rapidly over it. The spot should be about this size **O**. Do not make clean cuts or incisions.
11. Allow a few minutes for absorption, before the child is dressed.
12. Instruct the mother carefully (a few printed rules are a great assistance) to avoid irritating the pock, breaking it, poulticing, applying wet cloths, etc., and as to keeping the pocks scrupulously clean. About the seventh day it is advisable to have the sleeve ripped up to the shoulder, or taken off entirely to prevent rubbing the pock.
13. As the scab is a natural protector for the raw surface below, the mother should be instructed to take every care to avoid knocking it off.
14. Avoid "shields." The dry clean scab is the best protector.
15. Do not be too economical in the quantity of vaccine used.
16. Make at least four insertions well apart.

Alleged Disadvantages of Animal Vaccination.

We may dismiss the older allegations that persons vaccinated direct from animals, acquired physical and other characteristics of the vaccinifer, gradually developing the voice of the bull, bovine stupidity, or good promise of a tail![46]

The only alleged danger which it is worth considering is that of the possibility of tuberculosis being inoculated. It is inconceivable that an animal suffering from anthrax, or any other disease offering obvious symptoms, could by any accident be used as a vaccinifer. That such a thing should happen means that the animal must pass muster when first obtained; that it should undergo the handling and observation unavoidable during the preliminary days it is under observation, while it is being shaved and vaccinated; that during five to six days after vaccination it could be fed and tended and no one know it was ill, and that ultimately it should be again placed on the table, and the vaccine collected, without anyone knowing it had a serious disease such as anthrax! To assume all this is, of course, to assume what is absurd. That apparently normal pocks would rise on such an animal is improbable; but that any medical man could be found to collect vaccine from pocks on such an animal, knowing it to be diseased, is incredible.

Transmission of Tuberculosis a Groundless Fear.

As to the possibility of tuberculosis being acquired, supposing it to exist in the animal: (1) Such a case has never been known, although millions have been vaccinated for some years past with animal vaccine, and there are suspicious persons on the watch who would be only too glad to proclaim the discovery of such a misfortune; (2) tuberculosis in the young calf is so rare as to be a curiosity; (3) the existence of tuberculosis can be diagnosed now with great certainty by means of tuberculin, and its presence has never been detected in this way in calves; (4) the calves can be slaughtered, and a *post-mortem* examination made before the vaccine is used; this practice is in force in some places; (5) all attempts to produce tuberculosis by experimentally inoculating susceptible animals with vaccine taken from human beings in the last stage of general (not merely local) tuberculosis have failed; the tubercle bacillus does not exist in the vaccine even in such advanced cases as these, which were selected because they were of the most marked and general form of tuberculosis.

The immunising power of vaccine shows itself earlier and is more powerful than that of the inoculated virus of variola. The primary fever in variola discreta begins on the twelfth day of inoculation; after inoculation with the virus of variola on the eighth day; after vaccination on the fifth day. Active virus can be obtained from the pock of inoculated variola on the fifth day, from the vaccine pock of the child on the third or fourth day. There is an interval of eight days from the commencement of the primary fever until the commencement of the secondary fever, in varioloid of six days, in inoculated variola of six days. From vaccination until the falling off of the crust about twenty-one or twenty-two days elapse. After vaccination there are but three days of febricula (sixth, seventh, and eighth), and the patient is saved not only the high fever of these days, which occurs in all three classes of variola (discreta, varioloid, and inocu-

[45] *Loc. cit.*, p. 160

[46] I possess an early print of 1802 in which all these sequelæ of vaccination are represented, pictorially and otherwise, as in process of evolution!

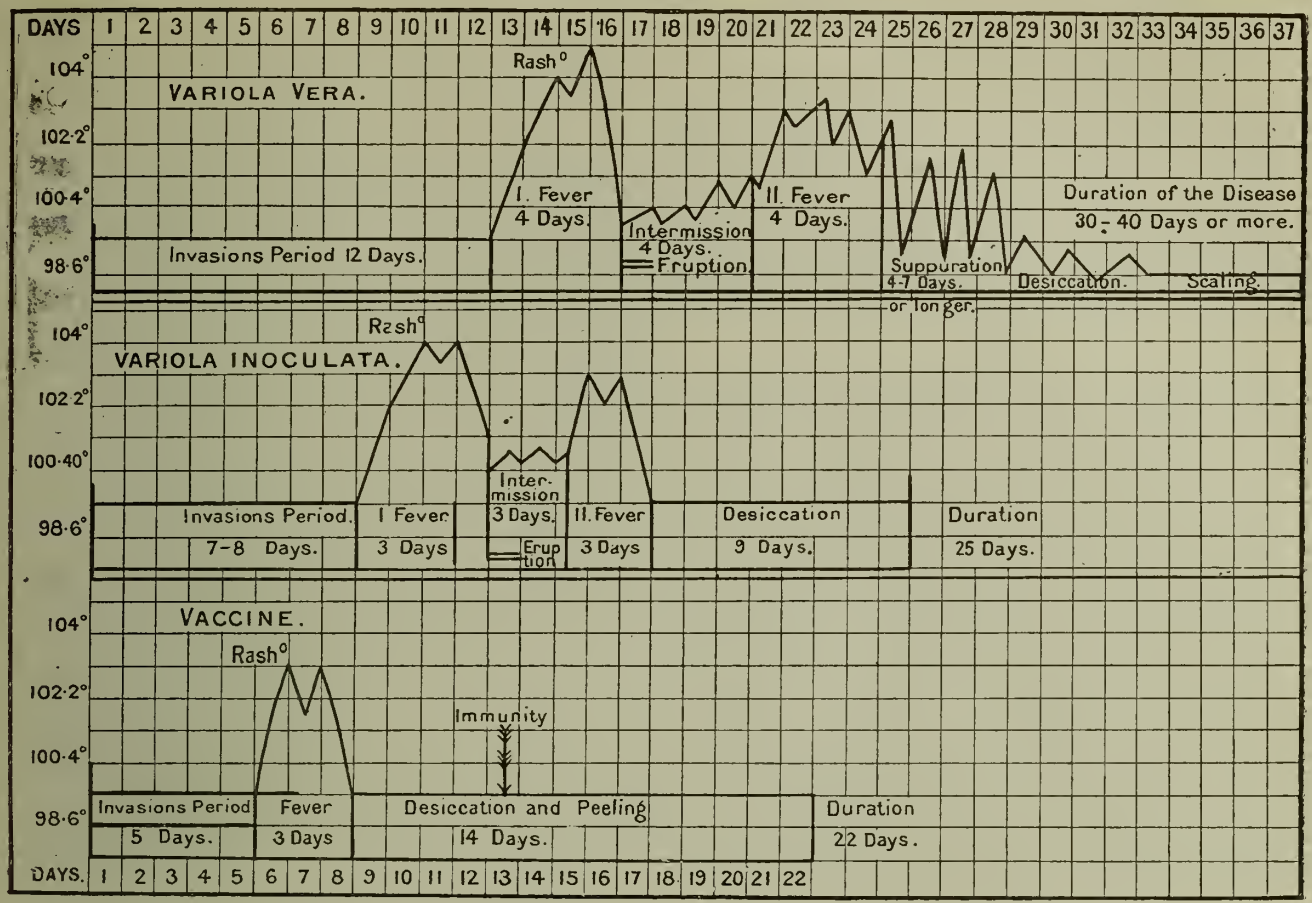

Chart showing the relative course of small-pox, spontaneous and inoculated, and vaccinia.

lated), but the whole of the secondary fever and the more or less intense fever which lasts during the stage of intermission.

But the fact that while the use of calf vaccine in Germany and some other Continental countries has increased yearly until it is practically universal, while tuberculosis has greatly diminished, shows how groundless the fears of infection by calf vaccine is.

Absence of Serious Sequelæ.

Serious sequelæ after vaccination with animal vaccine I have never seen. They are certainly not more common than after the use of humanised vaccine. Of course, if obvious precautions be neglected, if dirt be inoculated along with vaccine, if the wound be kept foul and be irritated by friction, if injurious dyes from the clothing be allowed to get into the open sore, then we must expect the necessary bad results to ensue; but such results are not due to the animal vaccine as such, but to the dirt and other preventable causes.

Popularity of Animal Vaccination.

It is quite certain that in this country the public is becoming every year more determined to use animal vaccine instead of humanised vaccine. The quantities consumed increase enormously every year. The country is flooded with cheap stuff, "made in Germany" and elsewhere, of unknown nature or origin. It is cheap, and therefore sells. That serious danger may arise from the reckless employment of material of such absolutely unknown origin is obvious. There are clamorous demands against the importation of beef or articles manufactured abroad, unless they bear the label of the place of origin. Surely such an important matter as the vaccine which is to be incorporated direct into the substance of the body should not be saleable without some guarantee as to its being at least harmless.

Public vaccinators begin to find that their stations, which had become deserted while they used humanised vaccine, soon are gladly visited by parents when they learn that calf vaccine is used. In Halifax the vaccination station had been closed for years, as no children were brought for vaccination. Small-pox came, still the station was deserted. Calf vaccine was then provided, and within a few weeks some 1,000 persons flocked to get vaccinated in this, one of the most antivaccinating towns in England. The same thing has been observed in many places, notably in Bradford, and more recently in Gloucestershire and the neighbourhood. The poor certainly have a legitimate grievance in the fact that they are prevented from enjoying the use of calf vaccine, which all the better-off persons use, and which abroad has been generally adopted in place of human vaccine. To add to the hardship, the poor man is obliged to pay for the humanised vaccine which he refuses to use, just as his rich neighbour does. The poor man pays for his "free vaccination" in his poor-rate, even though he does not make any use of it. If further irony could be imported into the case, it would be merely to mention that the poor man in London can get vaccinated with calf vaccine, which the poor man out of London has to help to pay for, while he cannot get it for himself or his child, as the Government station in London is paid for out of the taxes, and not out of the London rates. Our soldiers and sailors are vaccinated with calf vaccine by our Government. What good reason can then be urged why the respectable civilian should be forced to get done with humanised vaccine?

The great objection to vaccination which the general public has is to the use of humanised vaccine, and it would be a most wise step if the Government would take steps to remove it.

THE FEELING OF THE PUBLIC WITH REGARD TO VACCINATION.

WHAT opinion of vaccination has the "man in the street"—the average British householder and paterfamilias, who is not a professed antivaccinist on the one hand, and who, on the other hand, would not think it worth his while to champion the affirmative side in a set debate on the question, "Should vaccination be compulsorily enforced?" His opinion varies so considerably under different circumstances, that it is not easy to give even an approximate average of his views. In Keighley, for example, he may be apt to think one thing and in Gloucester he may think just the opposite. The Gloucester man's notions, indeed, may be entirely different according as they belong, say, to the year 1894 or to the year 1896.

WHAT THE "MAN IN THE STREET" THINKS.

As a rule, the "man in the street" thinks not very much about the subject. He believes vaguely that small-pox is a very horrible disease, but then the chances are a hundred to one that he has never seen a case of small-pox. In this respect his wife resembles him, for it has never fallen to her lot to meet small-pox face to face. When her babies come, however, she does not like them to have a sore arm, and in fear of this she asks the doctor to vaccinate them only in one place. But the doctor has a conscience, which, by the way, is often a most expensive luxury for a doctor to possess. He accordingly argues for vaccinating in three or four places, and, as a compromise, two or three places are agreed on, or, at any rate, if there are to be only one or two, the doctor, without any elaborate discussion on the point, is apt to make them of such a size that when the vesicles are in the acute stage the mother may ruminate for a day or two as to whether she would not have gained more by discussing the question of area rather than number. Then, however, the child's arm heals up quickly, and the question drops out of sight again till the next baby arrives. But if the doctor has been weak enough to yield to the maternal solicitations, and only a small vesicle results, then when small-pox begins to be heard of as prevalent, in Leicester or Gloucester or anywhere within moderate distance, a new anxiety arises as to whether Tommy would not have been better to have had bigger marks, and whether he ought not to be done over again.

WHERE IGNORANCE IS BLISS.

As a matter of fact it is this ignorance of what small-pox is that causes a great part of the trouble regarding vaccination. The "man in the street" does not read much history, and when he does start to it he tackles the French Revolution or the Battle of Waterloo, so that his knowledge of what small-pox used to be remains practically *nil*. The reason that he knows so little of small-pox is that vaccination has well-nigh abolished it. In presence of such outbreaks as have recently occurred in various parts of the country this may seem an exaggerated statement; but an examination of last century's statistics shows that there is no exaggeration. When we find that in Glasgow, just before the end of the century, small-pox not merely attacked but slew one person for every four persons slain by all other diseases combined, and when we find that these small-pox deaths were almost entirely among the young, it is impossible to avoid the conclusion that very few escaped attack by the disease.

In Kilmarnock in the years 1728-64 the share contributed by small-pox to the deaths from all causes was 16 per cent. In Edinburgh in the years 1744 to 1763 it was 10 per cent., and in London, taking the eighteenth century as a whole, it was 8.4 per cent. Relatively to such figures as these, the rates now experienced in this country are the merest trifles. But "the man in the street" knows nothing of such statistical comparisons, and his ignorance of small-pox is due to the prevalence of vaccination. If he lived in Germany, where not only primary vaccination but also revaccination is compulsory, his ignorance would be even greater. It is indeed a striking fact that the power of vaccination in preventing small-pox is about the only thing which is apt to make people forget the gratitude they owe to Jenner. Of course, with gradually increasing neglect of vaccination, small-pox will again begin to assert itself, and the popular knowledge of the disease will once more in some measure return, and with it there will return the intimate personal knowledge of the power of the vaccine prophylaxis. In Gloucester, for example, even allowing for the shortness of the public memory, it will take another generation or two to blot out the teaching which is at present being administered there. Not only will there be the individual knowledge that the families which rushed in time to the vaccination station were preserved from attack in the midst of the surrounding danger, but for many a year to come the other side of the picture will continue to be presented to public notice in the scarred and blinded visages which are being produced among those who are fortunate enough to escape with their lives from the clutches of the disease.

ILL-VACCINATED COMMUNITIES.

Since vaccination began to be more or less neglected in this country, it has been the habit of its opponents to point to individual instances of communities which had refused to vaccinate, and yet had not been overtaken by small-pox. Until two or three years ago Leicester was among the examples given, but we hear less of Leicester now; so in the future Gloucester will fall out of the list of examples of the needlessness of vaccination. But it is not to be expected that every place which ceases to protect itself shall forthwith be overtaken by a judgment. Natural laws work slowly, and it is not always the custom of the gods to cause the lightning to descend forthwith on the man who openly defies them. It would take a long time in this country before the protection afforded by the vaccinations which have been going on since the days of Jenner, could cease to be felt. The places in England where vaccination has fallen into desuetude are not yet very numerous, and even in these places it is only within quite recent years that the neglect has been anything like general. In this matter, too, the protection which vaccination gives is not wholly confined to the individual. By lessening the possible sources of infection, and by diminishing the number of persons susceptible to attack by small-pox, vaccination confers even on those who are themselves unprotected, a measure of benefit, in so far as they are much less frequently exposed to risk of infection. Situated as they are in the midst of a vaccinated kingdom, places like Leicester, and Gloucester, and Keighley, and Dewsbury, have for long been sheltered behind the Jennerian shield, but as protection becomes more and more incomplete by means of continued neglect, the risk to the unvaccinated becomes all the greater.

WHY JENNER IS FORGOTTEN.

In this way the "man in the street" may have his ignorance of history atoned for by latter-day knowledge, and his wife also may come to have some conception of the relative disadvantages of a pock on the arm and an attack of confluent small-pox. In a remarkable passage in his admirable volume on *English Sanitary Institutions*, Sir John Simon has almost predicted the kind of stampede which at present we see in progress in the West of England: "It is a favourite reflexion among philosophers that if departed great benefactors of our race could now and then look down on the harvest fields where mankind age after age is gladdened by the fruits of their labour, they would in general find themselves less remembered than perhaps their terrestrial ambitions had desired. Doubtless this is so; but let the noble compensation be noted, that often the thoroughness of a reformer's victory is that which most makes silence of the reformer's fame. For, how can men be adequately thankful for redemptions when they have no present easy standard, no contrast between yesterday and to-day, by which to measure the greatness of them? And to some readers that reflection may well occur at this present point as they say their *Benedicite* for our workers of the eighteenth century. Of the present generation who in summer holidays enjoy their draught of cider in Devonshire, not many know that Baker unpoisoned it for them. Of those who go down to the sea in ships, not many have reading and imagination enough to contrast the sea life which now is with the sea life which was suffered in Anson's days, and to be grateful for Lind and Blane who made the difference. And in some cases ignorance best tells its tale by swaggering against the truce which protects it. At the antivaccination meetings of which we now occasionally read, where some pragmatical quack pretends to be making mincemeat of Jenner, how small would become the voice

of the orator, and how abruptly would the meeting dissolve itself, if but for a moment the leash were away with which Jenner's genius holds back the pestilence, and small-pox could start into form before the meeting as our grandfathers saw it but a century ago?"

Prejudices and Delusions.

While, however, all such lessons as that of Gloucester are useful for the edification of the public, it is the duty both of the medical profession and of the Legislature to do everything possible to smooth away the prejudices against vaccination which the "man in the street" has acquired from an occasional perusal of some anti-vaccination tract, or of a letter contributed to the columns of the *Star* or the *Echo* by some member of the letter-writing ring of the Antivaccination Society. The prejudices have reference mainly to two points—the risks of humanised lymph, and the want of permanency of the vaccine protection. Every medical man knows how infinitesimal are the risks when vaccination is performed as it is in this country at the present day. But seeing that calf lymph is quite as efficacious as humanised lymph, and is now easily enough obtainable for private practice, and seeing, moreover, that even the most credulous "man in the street" could not easily be brought to believe that calf lymph could produce diseases to which the calf itself is not subject, and that he knows that calves are not subject to syphilis, it would be well if public vaccinators were now publicly provided with bovine lymph.

As regards the shortness of vaccinal protection, the "man in the street" has often been misled by the old old notion that the human body undergoes metamorphosis once in every seven years. Probably every medical man has experience of the patients or acquaintances who seriously ask him whether it is not the case that a septennial repetition of vaccination is necessary for complete safety against small-pox. Probably, too, the "man in the street" has been more or less misled by the rule, thoroughly good in itself, that the vaccine protection ought to be renewed about the time that the juvenile enters his teens, or even a little earlier. Every opportunity should be taken of informing both the man and his wife that even in the absence of revaccination at this period of life much of the original protective power remains, but that revaccination is a most important precaution, and that done at this age there is little likelihood of its ever being required again, unless, indeed, it were thought desirable, in the actual presence of small-pox, to make assurance trebly sure.

The Duty of the Medical Profession.

In all that the medical profession does in this matter it must recollect that its primary duty is to make every effort to protect every individual within its sphere of influence. The public must be protected against itself, even against the consequences of its own ignorance and folly. In particular, the little children must be protected against follies with which they have no concern. It may not always be easy for the family doctor to listen patiently to all the nonsense that is talked against vaccination, and there may sometimes be temptation to take the attitude of ceasing to try to educate one's *clientèle* and simply to let them have their own way. Nor is the talk against vaccination made any less irritating to the busy practitioner if he is told that his object is simply to obtain the vaccination fee, while all the time he knows that an epidemic of small-pox would yield more fees than a whole lifetime of vaccinations. And in particular, where parents are suspicious and ready to find fault—where the medical man knows beforehand that if a teething eruption, or diarrhœa, or disorder of any sort whatever, should chance to occur within the next two or three months after the vaccination, there is every risk of the operation and the operator being made the scapegoat for the subsequent ailment, and that the friends and neighbours of the parents and many of his own patients may give garbled stories of the sequence of events, and that the Anti-vaccination League may produce an edited narrative of the circumstances—in presence of all this, the medical man is no doubt tempted to let the parents have their own way and to let the child remain unprotected. May we appeal to him here to take a high view of his duty, and, in the spirit of the oath of Hippocrates, to do his best for the helpless baby, leaving his own reputation to take care of itself? Men in active practice have to contend with many difficulties; but in the end he will have been most successful who has done his best for all his patients, even where suspicion and innuendo take the place of gratitude, and even in spite of the worst word that can be said against him by the worst "man in the street."

THE JENNER CENTENARY ABROAD.

The memory of Edward Jenner and the hundredth anniversary of his great discovery have been honoured in several foreign countries with public celebrations of one kind or another. A brief account of the principal of these is given below.

France.

The Council of the Académie de Médecine, considering that so memorable a centenary as that of Jenner's first vaccination should not be allowed to pass without a formal expression of the admiration which it feels both for the discovery and its illustrious author, invited M. Hervieux to deliver an address on the occasion. This he did at a meeting on May 12th, taking as his subject "Jenner and Vaccine." He sketched the early history of vaccination, and the attacks made on it and on its discoverer while it was still in the embryonic stage. These attacks were Jenner's greatest glory: *On ne jette des pierres qu'aux arbres qui portent des fruits.* He vindicated Jenner's claim to be considered a scientific investigator altogether apart from the particular discovery with which his name must everlastingly be associated. The list of his scientific papers is long enough to make one believe that "one had under his eyes all the *titres scientifiques* of some present candidate for election to the Academy in the Section of Natural Sciences." M. Hervieux added: "And it is a worker of this spread of wing that his brethren have wronged, some by supposing that his discovery of vaccine was due to chance, others that the honour of the discovery did not belong to him!—suppositions as unjust as ill-founded, and to which nothing is wanting that can make them odious, not even bad faith." He described the early difficulties which vaccination had to encounter, and the disappointments which, in the course of years, came to temper the too sanguine hopes which Jenner had at first entertained as to the permanence of its protective effect. After pointing out that now animal vaccine had replaced human vaccine, and its advantages had been proved by an experience of thirty years, he went on to say: "But by the side of animal vaccine, and under the specious pretext of always having an unfailing source of vaccine in case animal vaccine should fail, a party has come into existence which, it is true, displays no hostility to Jenner's discovery, but which has already, it would appear, a considerable number of adherents. This is the party of modern variolisation." The new method, according to M. Hervieux, consists in cultivating successively on a certain number of bovine animals the variolous virus, which is supposed thus to lose its malignant character, and to become transformed, after some generations, into a virus having all the characters of cow-pox. The partisans of this doctrine appeal to Jenner, to whom they attribute the belief that variola and vaccinia are identical. M. Hervieux, however, contended that, although Jenner said that cow-pox was the small-pox of the cow, he did not say that it was the small-pox of man transported to the cow; he held that cow-pox was one disease and variola another. M. Hervieux argued against what he called "the practice of modern variolators;" the attenuated variolous vaccine which they produced would, he said, always have the disadvantages of attenuated viruses: too weak it loses its protective power, too strong it is too dangerous to use. "Vaccination," exclaimed M. Hervieux, "had triumphed over the old variolators; it will also triumph over the modern variolation. Antivaccinators and variolators will pass away, but vaccination will not pass away." After giving some striking proofs of the protective efficacy of vaccination from the experience of the French army, the orator concluded with the following peroration: "We are no longer in the time when doubt and anxiety had succeeded to the enthusiasm of the first years which followed the discovery of vaccination. We are no longer in the period when, not having learnt to know the power of re-

vaccination and having no suspicion of the great resources which we have in animal vaccine, we were not well enough armed to resist the attacks of the variolous scourge. But a new era has dawned, and the progress made in the latter part of this century has made of Jenner's discovery a power against which all the efforts of its enemies will never prevail. Resting on the triple base of animal vaccine, revaccination, and compulsion, this power is sufficient to defy all the assaults of small-pox, and may be proclaimed to be the grandest conquest of medical science."

M. Hervieux's discourse was warmly applauded. M. Tarnier afterwards proposed that the Academy should "testify by some emphatic manifestation in the form of a medal or memorial tablet, their admiration for and gratitude to the immortal benefactor of humanity," in praise of whom M. Hervieux had spoken so eloquently. The Perpetual Secretary said the matter would be laid before the Council of the Academy at its next meeting.

GERMANY.

Soirée at Berlin.—A brilliant *soirée* to commemorate the hundredth anniversary of Jenner's first vaccination was held on May 15th in the large room of the Berlin Town Hall. The invitations had been sent out by a committee numbering amongst its members Virchow, von Leyden, Robert Koch, Gerhardt, von Bergmann, von Coler, the Mayors of Berlin, Zelle, etc., and they were responded to by nearly all the members of the medical faculty of the University, by delegates from the various medical societies and corporations, by the Cultus-Minister, Dr. Bosse, by many military surgeons, by members of the Imperial Board of Health, and many others. A portrait of Jenner was hung in a conspicuous position. Virchow opened the proceedings with a few words of welcome to the guests, who, he said, had met that evening in admiring and grateful remembrance of one of the greatest benefactors of the human race. Then Gerhardt rose to deliver the address of the evening. He described Jenner's life, and the steps which led him from a simple observation to his wonderful discovery. He said that the most striking proof of the efficacy of vaccination had been given in the campaign of 1870-71, in the course of which only 459 out of one million and a half vaccinated German soldiers died from small-pox, whilst the French army, where vaccination had not been stringently enforced, lost 23,400 men from small-pox. He added that in our own time the disease had almost died out in Prussia. From 1890 to 1894 there had been only 35 to 36 deaths from small-pox per year, and these had been nearly all introduced cases. Turning to the anti-vaccinists, he said that in spite of themselves, they had helped to improve the methods of vaccination, by drawing attention to the possible dangers of human lymph, and thus giving an impetus to calf-lymph vaccination. On the conclusion of Gerhardt's address, Dr. Krüse, member of the German Reichstag, of the Prussian Diet, spoke on the undermining work carried on by the antivaccinists. He said, that as the danger from small-pox epidemics decreased, the anti-vaccinists grew bolder, and petitions from them came pouring into the Reichstag. Their chief supporters in the House were the Social Democrats and the Antisemites, and as the number of medical members of the House was but small, the position might have become awkward if it were not for the firmness of the Imperial Board of Health. He ended by appealing to the medical profession to take every opportunity of enlightening and instructing the masses on the benefits of vaccination. One of the town councillors, Dr. Strassmann, then gave an account of the lymph and vaccination institutes under the control of the city authorities, and with his speech the official proceedings terminated. Refreshments were then served, animated groups formed, and conversation was kept up till a late hour.

The Medical Press.—The *Deutsche medicinische Wochenscrift* has published a special number called "Festnummer zur 100 jährigen Feier der ersten Ausführung der Schutzpocken-Impfung am 14 Mai, 1796, durch Edward Jenner." It contains a biographical article, with portrait; papers on Variolation, on Vaccination in the German Army (by Oberstabsarzt Werner, referee to the Prussian Ministry of War), on the Arguments of the Antivaccinists, on Mortality from Small-pox in Prussia from 1872-1894, and on Vaccination with Sterilised Instruments. The *Münchener medicinische Wochenschrift* of May 12th presents its readers with an excellent reproduction of Vigneron's portrait of Jenner, with a special article on the man and his discovery by Dr. L. Stumpf.

The Antivaccinists.—But the antivaccinists have not been idle either; they have published a "Trauernummer" (funeral number) of their organ, *Der Natur und Volksarzt*, copies of which were distributed outside the town hall on the evening of the *soirée*. It is printed on black-edged paper, a wreath of thistles for Jenner embellishes its title page, and its articles, which are full of the old stock phrases and exploded arguments, are illustrated by sensational pictures calculated to frighten the ignorant. Another paper, *Die Neue Heilkunst*, has a leading article abusing Jenner and vaccination.

Address by Professor von Leyden.—At the Congress of Internal Medicine recently held at Wiesbaden, Professor Ernst von Leyden delivered an address on the Hundredth Anniversary of Edward Jenner's First Vaccination. He described it as not being a mere lucky hit; it had not come fully developed from Jenner's mind, as Pallas Athene sprang full armed from the head of Zeus, but was the result of long years of thought and labour. The speaker gave a sketch of Jenner's life, of the publication of his investigations, of the opposition which vaccination had to encounter, of its introduction into foreign countries, and of its final triumph. A vivid account of the ravages of small-pox in the seventeenth and eighteenth centuries was given, and the protective power of vaccination was illustrated by statistics, mainly relating to Germany. The two chief improvements that had been made since Jenner's time were the appreciation of the value of revaccination and the use of animal vaccine. For the latter improvement the antivaccinists had principally to be thanked. There were a good many of them in Germany. In 1877 the number of petitions against vaccination was only 21; in 1891 it was 2,951 with 90,661 signatures, mostly of uneducated or half-educated lay persons. There were few medical men in the antivaccinist camp in Germany. In the present session the agitators had been very active in the Reichstag. The array of facts set forth in recently published reports of the Imperial Health Bureau for 1896 would serve to convince any unprejudiced persons of the blessings of vaccination. The antivaccinists had painted in lurid colours the danger of transmitting tuberculosis, syphilis, erysipelas, and other diseases by means of human vaccine. The result of this has been that in Germany the use of humanised lymph has been almost replaced by animal vaccine. Since 1884 there had been a Commission in the Imperial Health Bureau and in the State Vaccine Institute charged with the supervision of the preparation of vaccine from the calf, its preservation, and its gratuitous distribution. Owing to this system and to compulsory revaccination Germany showed the best vaccination results of any country in the world. Professor von Leyden concluded by pointing out that the discoveries of Pasteur, Koch, and Behring were the development and outcome of Jenner's work.

Jenner Exhibition.—An interesting Jenner exhibition is being held in the rooms of the Berlin Medical Stores. Portraits and an autograph of Jenner form the central group, flanked by a large collection of medals, some of which were struck to commemorate successful vaccinations of sovereigns and princes, others to honour Jenner himself, and others again for bestowal on doctors who had distinguished themselves in the cause of vaccination. A large exhibit of books on vaccination gives some idea of the literature on the subject; to collect all would have been impossible. The little town of Bückeburg sends the insignia of a quaint annual *fête* held there for nearly 100 years. Its history is as follows: A contemporary and enthusiastic disciple of Jenner was one Dr. Faust, of Bückeburg. Not satisfied with vaccinating as many children as he could get hold of in his lifetime, he left a sum of money in his will to be used for a yearly Jenner holiday for children. And so, every year on the 14th of May, the children of Bückeburg sally forth into the country, to a tree on which Jenner's portrait, a portrait of Dr. Faust, and a waxen arm with vaccination pustules are hung up! Here they assemble, and one of the town worthies makes a speech explaining the importance of the day. And if, towards the end of the discourse,

the children's attention should wander a little, small blame to them, for they know what is to come after the speech—a grand distribution of sweets and cakes that taste none the worse for being baked in the shape of a vaccinated arm.

The First Berlin Vaccinator.—The Jenner centenary calls up memories of a fine old Berlin dector, Geheimrath Heim—"der alte Heim," as he was generally called. He was the first to perform a vaccination in Berlin—in February, 1800—and he was one of the founders of an annual medical festival in honour of Jenner, which he attended regularly, and which he described year by year in a diary that has been preserved. His remarks on the speeches, company, etc., though curious, are not of general interest. At the festival of 1817 a young lieutenant was present, who, says old Heim, was the first child he vaccinated in 1800, and also Prince and Princess Radziwill, to whose kindness he owed the first cow lymph, which they had received from London. After Heim's death in 1834 interest in the Jenner festival gradually declined, and it was given up soon after.

United States.

The Jenner centenary was celebrated by the American Medical Association, which held its forty-seventh general meeting at Atlanta, Georgia, on May 5th, 6th, 7th, and 8th, under the presidency of Dr. R. Beverly Cole. An address was delivered by Dr. N. S. Davis, who related the life of Jenner, and dwelt on the importance of his discovery. Dr. R. H. Storer gave an account of the Jenner medals, portraits, tablets, and other memorials. Dr. Francis E. Martin, of Massachusetts, delivered an address on the Propagation, Preservation, and Use of Vaccine Virus. Dr. Eugene Foster read a paper embodying the statistical evidence of the value of vaccination to the human race. Dr. George M. Sternberg, Surgeon-General, United States Army, delivered an address entitled, Scientific Researches relating to the Specific Infectious Agent of Small-pox, and the Production of Artificial Immunity from this Disease. The experimental evidence relating to the nature of the specific infectious agent of vaccine and of variola was reviewed; also that relating to the genetic relation of cow-pox, horse-pox, and small-pox; and that relating to the production of artificial immunity by subcutaneous inoculations with vaccine lymph and by subcutaneous or intravenous injections of blood serum from immune animals.

The following conclusions were stated:

I. Small-pox, cow-pox, and horse-pox are genetically related, being different manifestations of the same infectious disease in different genera of animals (*Man*, *Bos*, *Equus*).

II. The specific infectious agent of variola and of vaccinia has not been demonstrated. The extended experimental investigations which have been made indicate that it does not belong to the class of micro-organisms known as bacteria.

III. Various bacteria are commonly found in the lymph from vaccine vesicles, obtained either from bovine animals or from man. Among these are the well-known pus cocci, and these micrococci are probably largely responsible for the erysipelatous inflammation and other unpleasant complications which frequently result from vaccination with such lymph.

IV. Lymph preserved in glycerine after a time becomes sterile, so far as the presence of bacteria is concerned, without losing its specific virulence.

V. Immunity may be induced by subcutaneous inoculation of vaccine virus, without the development of a vaccine vesicle; and it is probable that the subcutaneous injection of lymph preserved in glycerine would give protection without any of the septic complications so common as a result of vaccination by the usual method.

IV. The blood serum of immune animals contains a substance in solution which destroys the specific virulence of vaccine virus when brought in contact with it.

VII. This substance is not present in sufficient amount to make the blood serum of immune animals available for the production of immunity in man (or for the treatment of variola). But it may perhaps be obtained in a concentrated form by chemical methods, and in that case would be likely to prove useful, and possibly specific, as a therapeutic agent in this disease.

VIII. The immunity resulting from the subcutaneous injection of vaccine lymph, like that resulting from vaccination in the usual manner, is gradually developed and is not complete until the eighth day, depending, no doubt, upon a multiplication of the infectious agent in the body of the susceptible animal. On the other hand, the immunity resulting from the transfusion of a large amount of blood serum from an immune animal to a susceptible animal is an immediate result of such transfusion.

Russia.

As already announced in the British Medical Journal, the Russian National Health Society has postponed the commemoration of Jenner's discovery of vaccination until October. The absence of the Court from St. Petersburg at the present moment would undoubtedly have militated against the success of the commemoration had it been held this week as at first proposed. The day chosen for the commemoration is October 12th (24th) which will be the 128th anniversary of the inoculation with small-pox of the Empress Catherine II.—the first preventive inoculation ever performed in Russia.

SHORT OUTLINE OF THE EVIDENCE GIVEN BEFORE THE ROYAL COMMISSION ON VACCINATION.

The Points to be Considered.

The evidence given before the Royal Commission on Vaccination has been of varying degrees of relevancy to the five points for the investigation of which the Commission was appointed. These points were as follows:—

1. The effect of vaccination in reducing the prevalence of, and mortality from, small-pox.
2. What means, other than vaccination, can be used for diminishing the prevalence of small-pox; and how far such means could be relied on in place of vaccination.
3. The objections made to vaccination on the ground of injurious effects alleged to result therefrom; and the nature and extent of any injurious effects which do, in fact, so result.
4. Whether any, and if so what, means should be adopted for preventing or lessening the ill-effects, if any, resulting from vaccination; and whether, and if so by what means, vaccination with animal vaccine should be further facilitated as a part of public vaccination.
5. Whether any alterations should be made in the arrangements and proceedings for securing the performance of vaccination, and, in particular, in the provisions of the Vaccination Acts with respect to prosecution for non-compliance with the law.

Of these five points, the first and third seem to be of the greatest importance, for on the answers returned to them must depend in great measure the answers to the others.

The Evidence.

Putting on one side, then, for the present such evidence as was offered as to individual hardship in the administration of the Acts, as to the possible alternative proceedings, and also all historical researches as to the nature of the stuff used in the vaccination of a hundred years ago, we propose to give a sketch of the general drift of the evidence on the basis expressed in the following words of Sir John Simon: "When I look at the question of vaccination, I look at it independently of the question of origins. I look at current vaccination, such vaccination as you will find at any well-conducted vaccination station in England."

Sir John Simon.

The first witness was Sir John Simon, who gave evidence as to the history of small-pox and its ravages prior to the introduction of either inoculation or vaccination. Many statistics were put in by Sir John Simon, showing the enormous diminution which had taken place in small-pox since the introduction of vaccination; one diagram showing the small-pox death-rates in the kingdom of Sweden for each year from 1774 to 1855 being of great interest, as showing how very marked had been the influence of vaccination in reducing the mortality.

DR. OGLE.

Mr. William Ogle, M.D., Superintendent of Statistics in the office of the Registrar-General, while admitting that the data as to the relative mortality of small-pox in unvaccinated times and at the present day were imperfect, pointed out that it was possible, by means of the bills of mortality for London, which existed for two centuries back, to compare the proportion existing between deaths from small-pox and deaths from all other causes, and thus he was able to show that in the present century small-pox, measured as above, had been from three to five times less common than it was at equivalent periods in the two preceding centuries. He also pointed out that, taking the cases according to their ages, the decline in small-pox had been entirely limited to the earlier years of life, the mortality in the first 5 years having fallen 85 per cent.; between 5 and 10 years of age 64 per cent.; and between 10 and 15 years of age 27 per cent.; whereas at every age-period after that the death-rate had actually increased. Although in the same time there had been a fall in the general mortality of the country it was nothing comparable to that from small-pox. There were some diseases, however, which had fallen nearly as much as small-pox, for instance, fever. But the diminution of mortality from fever had been at all ages, as one might have expected, whereas in small-pox it was confined to persons under 15 years of age, that is, within a few years of the age when vaccination had been commonly performed.

DR. THORNE THORNE, C.B.

Mr. Richard Thorne Thorne, M.B., F.R.C.P., Assistant Medical Officer to the Local Government Board, gave evidence to show how the share of small-pox borne by children varied with the stringency of the vaccination law, and how in this country the fatality of small-pox varied with the amount of vaccination possessed by the individual. He also showed that as a result of vaccination the very period of life at which small-pox in its natural state is most fatal is the period at which when the scars were good no death whatever took place. In regard to the suggestion that the lessened prevalence of small-pox might be due to improved sanitation, he pointed out that the special saving of infant life by vaccination in infancy had by no means been limited to the well-to-do classes, but had in certain instances been actually greatest among the poorer classes, who lived under inferior sanitary circumstances. He quoted from a report in regard to the nurses at the small-pox hospitals of the Metropolitan Asylums Board to the effect that out of a total of 734 nurses and attendants 79 had already had small-pox, and none of them were attacked; 645 were revaccinated before entering on their duties at the hospitals, and not a single one of them took the small-pox; the 10 that remained had, like the others, been vaccinated in infancy, but they had not been revaccinated before entering on their duties at the hospital, and every one of these contracted small-pox at one period or another of their service.

DR. J. H. RAUCH.

Mr. John H. Rauch, M.D., secretary and executive officer of the Illinois State Board of Health, gave evidence in regard to vaccination as it was practised on a very large scale when small-pox broke out in Chicago after the great fire. About 80,000 people were obtaining food from the Relief and Aid Society, and vaccination was made compulsory by demanding a certificate of vaccination before relief was given. These 80,000 people were for three or four months constantly under supervision, the officials knew all about them, and during all that time attention was only called to three cases where other than ordinary results were produced. He had not seen a case of syphilis from vaccination.

SURGEON-GENERAL PINKERTON.

Surgeon-General John Pinkerton, M.D., had been for six years superintendent of vaccination in Scinde, and for seven years Superintendent-General for the whole of the Bombay Presidency. His evidence was to the effect that at the time he went to Scinde in 1863 nearly the whole population were marked with small-pox, and blindness and lameness resulting from small-pox were common. Till then a considerable amount of inoculation had been practised, but vaccination had not been pushed at all until after 1857. After he took charge, however, inoculation was stopped, and the number of vaccinators was greatly increased so as to cover the whole area, and on going back to Scinde in 1882 he observed that the younger population was quite unmarked by small-pox, just the same as the people in England, and very few had lost an eye.

DR. A. F. HOPKIRK.

Mr. Arthur F. Hopkirk, M.D., gave evidence as to the state of the vaccination laws in Prussia. He said: "In 1834 a law was passed making vaccination and revaccination compulsory for all soldiers in the Prussian army; but there was no law making vaccination itself compulsory for the civil population of Prussia until April 8th, 1874, a law which came into action in 1875. In 1835 there was in Prussia an ordinance passed dealing with cases of infectious diseases, which declared that should any child suffer from small-pox then, if it had not been vaccinated, its parents or guardians might be punished; but there was no law rendering it absolutely compulsory that every child should be vaccinated." He also gave much statistical evidence in regard to the incidence of small-pox at different periods, and on the vaccinated and the unvaccinated. The above quotation, however, is the most important, as bearing upon inferences drawn by others against vaccination in consequence of the epidemic in 1871-72 in Prussia, which was presumed to be a well-vaccinated country. In answer to further questions on this point, a letter was put in from Dr. Koch, the head of the Imperial Health Office in Berlin, which says: "Previous to 1874 vaccination in Prussia was optional, not obligatory. Compulsory vaccination dates from April 1st, 1875."

DR. W. GAYTON.

Mr. William Gayton, M.D., Medical Superintendent of the North-Western Fever Hospital, had observed 12,920 cases of small-pox, but some of these were convalescent. The actual number of acute cases of which he could give definite and particular account was 10,403. He put in a table showing the whole of these cases classified under four headings with the case mortality of each class. The totals came out thus:—(1) Vaccinated with good marks, mortality 2.97 per cent.; (2) vaccinated with imperfect marks, mortality 9.37 per cent.; (3) said to have been vaccinated but no marks visible, mortality 27.18 per cent.; (4) not vaccinated, mortality 43.24 per cent. He also gave evidence as to the immunity from small-pox enjoyed by the staff of the hospitals with which he had been connected when they were revaccinated before commencing duty. Speaking of the proportion of vaccinated to unvaccinated cases admitted, he said (1809) that 8,234 had been vaccinated out of 10,403 who were admitted. That included those stated to have been vaccinated but not bearing any visible evidence of it. On the other hand the well vaccinated formed an extremely small proportion of those who came under observation.

DR. F. W. BARRY.

Mr. Frederick William Barry, M.D., Sc.D., was an Inspector of the Local Government Board, and in January, 1888, received instructions to inquire respecting the small-pox epidemic at Sheffield. The evidence he gave had to do, on the one hand, with the evidence of small-pox on the different parts of Sheffield, and with the influence of overcrowding and of the neighbourhood of small-pox hospitals; and, on the other hand, with the relations between small-pox and vaccination. With regard to the whole of Sheffield, of the 268,397 persons returned as vaccinated, 1.55 per cent. had been attacked by small-pox and 0.07 per cent. had died; while of the 5,715 persons returned as unvaccinated, 9.7 per cent. had been attacked and 4.8 per cent. had died. Dividing these persons of all ages into two classes, namely, children under 10 years of age and persons over 10 years of age, the results were as follows: Of 68,236 vaccinated children under 10 years of age, 0.5 per cent. had been attacked and 0.009 per cent. had died, while of 2,259 unvaccinated children under 10 years of age, 10.1 per cent. had been attacked and 4.4 per cent. had died. Of 196,905 vaccinated persons aged 10 years and upwards, 1.9 per cent. had been attacked, and 0.1 per cent. had died, while of 3,439 unvaccinated persons aged 10 years and upwards 9.4 per cent. had been attacked and 5.1 per cent. had died.

As regards the incidence of small-pox on the vaccinated and the unvaccinated in houses which had been invaded by small-pox, there were 18,020 vaccinated persons of all ages enumerated as living in invaded houses, of whom 23 per cent. had been attacked and 1.1 per cent. had died; while of 736 unvaccinated persons living in invaded houses, 75 per cent. were attacked and 37.2 per cent. had died. In all the above figures children under one month old are excluded. It is to be noted, also, that the workhouses were omitted from this calculation, as they could not be considered as "invaded houses" in the same sense as ordinary dwellings.

Dr. R. Cory.

Mr. Robert Cory, M.D., gave an account of the arrangements for the supply of calf lymph. Taking both sorts of lymph, he had personally vaccinated close on 50,000 children, and had never seen a case of insusceptibility. The only approach to such was in the case of a child 10 years of age which he vaccinated twice without result. In his opinion there was no difference between the effect of calf lymph and that from the child. "If you have a dozen children vaccinated with calf lymph and a dozen vaccinated with humanised lymph, you would not be able to tell the difference between the two." He did not believe that the vaccine virus deteriorated at all by going from human being to human being, if properly managed.

Dr. C. Creighton.

Mr. Charles Creighton, M.D., gave evidence, the major part of which related to the early history of vaccination, his point apparently being that the early observers had not sufficient evidence to justify the conclusions at which they arrived as to the protective influence of vaccination, and that the faith in this protective influence having been continuously held since then, it could not be considered to have any basis in fact. He declined, however, to discuss modern statistics, having already made up his mind.

Dr. H. W. MacLaurin.

Mr. H. W. MacLaurin, M.D., who was for some years President of the Board of Health in New South Wales, gave evidence as to the system of quarantine and isolation adopted in that colony for the control of small-pox. In his opinion the only way to bring an outbreak of small-pox under control was by notification and isolation, but he would supplement it by vaccination, because nobody knew who might be attacked, and the probability was that very few persons having been revaccinated would be attacked, and that they would have less severe attacks. In regard to Professor Crookshank's opinion that a system of compulsory isolation will replace vaccination, he said: "I do not think it will take the place of vaccination. I have a very high opinion of vaccination, and think it would be a very foolish thing to give it up, but I think that the only means of arresting and putting a stop to an outbreak of small-pox is thorough and complete notification and isolation after the manner that we have adopted in New South Wales."

The Rev. W. Fox.

The Reverend William Fox in his evidence, besides stating his general objections to vaccination, drew particular attention to the hardship suffered, by those who declined vaccination, in consequence of the Education Department requiring a certificate of vaccination before engaging a pupil teacher.

Mr. A. R. Wallace.

Mr. Alfred Russel Wallace, LL.D.Dubl., D.C.L.Oxon., had investigated the vaccination question purely as a statistical matter. He took the ground that the comparison of vaccinated and unvaccinated mortality contained in official and medical statistics must be wrong, because in the last century, with very bad treatment and bad surroundings, the average mortality was only 18 per cent., while we are now told that the average mortality of unvaccinated persons is about 40 per cent. He considered that there had been an incorrect distribution of the cases into the two classes, and also that the vaccinated and the unvaccinated were not taken from the same class of people. He, however, had not paid much attention to the statistics of the Metropolitan Asylums Board. From a comparison also of the prevalence of small-pox in the last twenty years of last century and the first twenty years of this, he showed what a very large diminution in the disease had taken place; it was diminished by three-fourths. This, he maintained, could not have resulted from vaccination, unless at that period about three-fourths of the population had been vaccinated, while it appeared certain that nothing like one-fourth had been vaccinated. Another point was that although since 1822 a steadily increasing proportion of the population has become vaccinated, there had been no diminution of small-pox from the time when very general vaccination had been attained (about 1850 to 1860) down to 1883, where his statistics terminated. He also considered that the greatly diminished small-pox prevalence in Sweden, which came in with this century, was far too sudden to be explicable by the introduction of vaccination, which was a gradual affair. The great fall in the prevalence in fact occurred at a time where only about a quarter of the births were being vaccinated, and then after 1822 there had been a rise in the mortality from small-pox, notwithstanding the increasing prevalence of vaccination. He further put in certain statistics regarding France, a country in which vaccination was not compulsory, the effect of which was to show that in the different departments the amount of small-pox increased as the amount of vaccination increased.

Mr. A. Wheeler.

Mr. Alexander Wheeler pointed out that during the eighteenth century small-pox increased in prevalence. This he put down in a measure to the practice of inoculation spreading the disease, and he considered that the diminution of small-pox since the beginning of this century was in great measure due to the cessation of inoculation. In regard to the immunity of nurses who had been revaccinated, he questioned whether many of them had not had small-pox before and thus obtained protection. He also stated that among 468 nurses employed at Deptford and the Western Hospital and Fulham, 9 had small-pox on duty; he, however, had no evidence that they had been revaccinated.

Mr. W. Tebb.

Mr. William Tebb, the President of the London Society for the Abolition of Compulsory Vaccination, gave evidence which was chiefly directed to demonstrate the evil effects which were stated in certain cases to follow vaccination. In 1883 he visited Dortrecht, Holland, to investigate certain fatalities alleged to have followed vaccination. It was said that 68 recruits had been revaccinated with humanised lymph from tubes, and that after a few days 7 of them were found seriously injured in the vaccinated arm, and that 3 of them died in consequence. On inquiry, it turned out that these fatalities were due to erysipelas, which, according to a letter received on the subject, might have been avoided by direct arm-to-arm vaccination. A revaccinated Swiss soldier was mentioned as having suffered from caries caused by revaccination fifteen years before. He next gave an account of the inoculation of 58 recruits in Algiers with syphilis as the result of vaccination, as reported in the papers at the time, and as told to him later, on his visiting Algiers, by Staff-Colonel Gussaud. What he considered proved was that the child from which the syphilis was communicated was apparently a healthy one. Evidence was also given as to an outbreak of impetigo contagiosa which occurred soon after vaccination of certain children and spread to others. It was stated, however, that in this case the "vaccination" was made with a mixture of lymph and glycerine and thymol, and that the same lymph was used in other places without producing the same results. He next drew attention to a series of 9 deaths occurring after the vaccination of 40 children in the neighbourhood of Villefranche. It appeared that an official investigation had ended in acquitting the doctors of all blame, but the point raised both as to these cases and the Algerian soldiers was that if with the greatest care such accidents might happen, all that told against vaccination. A good deal of evidence from various sources was presented by this witness as to possible dangers in vaccination, the possibility of communicating leprosy being one of the questions raised. In regard to this Mr. Hutchinson asked whether it was "likely that a disease which cannot be inoculated when all care is taken can yet be conveyed by accident." The witness stated that there was evidence on the other side, giving an instance of a pri-

soner being inoculated with leprosy by vaccination. It turned out, however, that some of this man's brothers were lepers, and that he was living amongst a population of whom one in every eight was a leper! "Surely," said Mr. Hutchinson, "it is not fair, is it, to attribute his leprosy to the inoculations?"

Professor Crookshank.

Professor Edgar March Crookshank, M.B., gave a large amount of evidence as to the history of inoculation and vaccination. He considered that vaccine lymph was not all derived from the same source, not all from cow-pox; that Jenner's own strain of lymph was lost, and that the lymph circulated by Woodville and Pearson became the current lymph in England and on the Continent, and that the lymph thus circulated was that of small-pox, and not cow-pox. He thought, however, that there was a temporary antagonism between cow-pox and small-pox, that is to say, that for a period of two or three years small-pox, by the test of inoculation, would not take after an attack of cow-pox. Sheep-pox also exercised the same temporary antagonism to small-pox, but he drew a distinction between this and any specific protective power, as of a previous attack of small-pox. He maintained the efficacy of isolation in dealing with outbreaks of small-pox, but if he had charge of a small-pox hospital, and was going to admit nurses into it, he would "vaccinate" them, not, however, with cow-pox, but with variola. Whether, however, he would for this purpose perform the now illegal inoculation from a small-pox patient, or would be content with current vaccine lymph of variolous ancestry, he did not say. When asked, however, whether vaccination as generally practised did protect many, he answered: "Yes; for a time." In a footnote, however, he stated that he understood the question to refer to variola vaccine, he having just before insisted that the immunity of the nurses referred to by Marson was not due to vaccination with cow-pox, they having been vaccinated with Ceely's variola vaccine.

Sir James Stansfeld.

The Right Honourable James Stansfeld, M.P., held that there was a sufficient case for what he would call "moderate compulsion," on the lines of an exemption from further penalties of those who had been twice fined a certain sum.

Mr. C. H. Hopwood.

Mr. Charles Henry Hopwood, Q.C., gave an account of the legislation and discussions in Parliament which had taken place on the subject, and gave a long list of his objections to vaccination.

Mr. J. T. Biggs.

Mr. John Thomass Biggs related cases in which, in his opinion, illness or death had been caused by vaccination. In his opinion vaccination was an exciting cause of diarrhœa in children; he also thought that in the case of deaths occurring after vaccination it was not always the practice of medical men to mention vaccination on their certificates, and that, therefore, the actual deaths from vaccination very largely exceeded those returned by the Registrar-General. He put in various statistical tables in regard to vaccination and small-pox in Leicester. He then described the system adopted in Leicester in dealing with cases of small-pox.

Other Evidence.

A very considerable amount of evidence was also given as to hardship in the operation of the Vaccination Laws, and as to injurious results following vaccination.

The last of the published evidence was given on July 22nd, 1891, and we believe that since then about three times as much more has been received.

The Charge against Dr. Stocks.—A circular has been issued by Mr. A. S. Muir, 11, York Buildings, Edinburgh, Hon. Secretary of a Committee which has been formed with a view to raising a testimonial to Dr. George M. Stocks "as an expression of sympathy in the position in which he was recently and so unwarrantably placed." It is not desired by the Committee to do otherwise than free Dr. Stocks from the expenses incurred by him to his counsel and agents, and any subscription will be duly acknowledged by Mr. Muir.

RECORDS OF AN OLD MEDICAL SOCIETY:

SOME UNPUBLISHED MANUSCRIPTS OF EDWARD JENNER.

Dr. Alfred H. Carter, of Birmingham, has kindly forwarded to us the manuscript records of the "Gloucestershire Medical Society," of which Jenner was one of the founders. They were placed in his hands by a medical friend some years ago; though he cannot trace their history, there can be no question of their authenticity. The papers comprise an account of the foundation of the Society, with its regulations, signed by all the members; reports, in more or less perfect sequence, of its transactions for the first three or four years of its existence; and the original manuscripts of a few papers read at the meetings, and certain letters. Among the papers are one complete communication and two fragments by Jenner, all in his own handwriting.

The "Gloucestershire Medical Society."

The Society whose minutes have thus strangely survived is probably the oldest provincial medical society of which there is any record. It was founded in May, 1788, and held its meetings in the parlour of the Fleece Inn, at the village of Rodborough, in Gloucestershire. It consisted only of five members, all personal friends, practising in the district, and evidently combining good-fellowship with zeal for knowledge.

The following are the regulations of the Society, in whose title there is the hiatus indicated by the blank, with the list of its members:

Regulations.

Resolved:—

1. That this Society, which was at first instituted, and has now twice met for the purposes of conviviality, be for the future extended to the more important end of improvement in the different branches of science connected with medicine and surgery.
2. That for this purpose it be agreed to meet thrice a-year, on the first Wednesday in June, the last in July, and the second in September.
3. That the first meeting be on Wednesday, July 30th next, at the Fleece Inn at Rodborough.
4. That each member pay half a guinea annually in order to defray any accidental expenses which may be incurred by the Society in the prosecution of such medical inquiries as may be the objects of the institution.
5. That the members endeavour to provide original papers to be read at the respective meetings on some of the following subjects:—
   (1) The anatomy, physiology, and pathology of man and other animals.
   (2) The seat, distinctions, and causes of diseases, especially as illustrated by dissections.
   (3) The choice, culture, and preparation of the different substances used in medicine.
   (4) The comparative effects of those substances, and of various modes of treating diseases.
   (5) The use of new medicines or measures, and the new application of old ones in cases which resist those commonly employed.
   (6) The improvement of surgical instruments.

   The paper to be discussed with candour, yet with freedom; and fair copies on folio foolscap paper, with an inner blank margin of at least an inch, to be delivered to the President at the first or second meeting after that at which they were read; in defalt of which the member omitting shall forfeit half a guinea to the common stock.
6. That, as the members have in view the extension of useful knowledge, which cannot be effected by their meeting in any other way than by publishing their papers when a sufficient number of these shall have been communicated, they shall severally be reviewed by a Committee consisting of the whole Society except the respective author; and the decision of that Committee shall be final with regard to the merits of the paper, though the author shall still have it in his power to refuse its being published.
7. That when a selection has been thus made the papers shall be redelivered to their authors, who, after having retained them three months for the purpose of correcting or otherwise amending them, shall then be obliged, under the penalty of half a guinea for each paper, immediately to restore them to the President.
8. That such papers as are judged worthy of being printed shall be published at the expense and for the benefit of the Society.
9. That each volume so printed shall be dedicated by a President, according to rotation, to such person or persons as he shall choose, and the Society shall not disapprove.
10. That the chair be taken precisely at 1 o'clock at noon, and that each member who is not present at that hour shall forfeit half a guinea to the common stock.
11. That each member who neglects entirely to attend shall forfeit one guinea to the common stock.
12. That the reading of papers or medical conversation continue till 4 o'clock, and that a dinner at 3s. 6d. a head, exclusive of liquors, be on the table at a quarter past four o'clock; the ordinary to be paid by all the members whether present or absent, and the wines and other subsequent expenses by those who are present.
13. That as a principal part of the view of this Society is the mutual communication of knowledge without fear, reserve, or any other authority, than that of truth, no new member shall be admitted for these seven years to come whose age exceeds 40 years.
14. That nevertheless as it is still wished to retain that conviviality for the sake of which the Society was first instituted, it shall be of the most select kind, consisting at present of the following old friends, school-

fellows, and fellow students: John Heathfield Hickes, M.D., of Gloucester; Edward Jenner, surgeon, of Berkeley; Thos. Paytherus, surgeon, of Ross; Danl. Ludlow, jun., surgeon, of Sodbury; Caleb Hillier Parry, M.D., of Bath.

15. That for the same reason no two physicians or surgeons of the same place shall become members.

16. That for the same reason the mode of admitting new members be by the unanimous application of the Society to such person or persons as they may wish to have among their number.

17. That no visitors be admitted.

18. That each member shall in rotation for three meetings hold the offices of President, Secretary, and Treasurer; regulating the conversation, making minutes of the proceedings of the respective meetings, and delivering in an annual account of the fund of the Society.

19. That Dr. C. H. Parry be appointed President of the three meetings next ensuing.

We whose names are underwritten approve and declare ourselves to be bound by the above regulations.

(Signed) C. H. Parry.
J. H. Hickes.
Edwd. Jenner.
Thos. Paytherus.
Danl. Ludlow.

Jenner on the Effects of Mechanical Obstructions in the Heart.

The minutes of the first meeting of the Society as a regularly constituted body are dated July 30th, 1788, when Dr. Parry read part of an introductory address on the Best Mode of Conducting Medical Enquiries.

Mr. Jenner communicated some remarks on the Effects produced on the Vessels about the Head by Mechanical Obstructions to the Passage of the Blood through the Cavities of the Heart. The following is the paper:

When the heart becomes diseased from obstructions formed within its cavities, the symptoms arising appear to be very different from those which show themselves in angina pectoris. In both cases there is a very painful sensation about the chest upon an exertion, but in the former the brain becomes affected, and not in the latter as I have ever seen. This may easily be accounted for from the appearance on dissection. The outlines of the following cases will probably serve to point out the difference.

A young woman for some years was oppressed with a complaint about her chest—on motion her breathing became very laborious, her countenance as livid as if the vessel of the neck had been compressed with a cord. I have often seen her reel in passing along a room after she had taken a few paces, and her senses suffer a momentary suspension.

She died. Another young woman became affected in a manner similar to the former. She died, and I was fortunate enough to gain an inspection of the body. The chief disease was found about the chest. The passage for the blood, from the left auricle to the left ventricle, was so contracted from ossification of the valvula mitralis and the surrounding parts that it was with some difficulty my little finger would pass from one cavity to the other.

If the blood be impeded in its progress from the left auricle to the left ventricle it must of course be accumulated in the vessels of the head so as to compress the brain. The check will first be given to the circulation through the pulmonary arteries, and thus be communicated to the vessels, which pour their contents into the right ventricle.

Jenner on Disease of the Heart Following Rheumatism.

On July 29th, 1789, "Mr. Jenner favoured the Society with Remarks on a Disease of the Heart following Acute Rheumatism, illustrated by Dissections." This is probably the paper of which Baron says, in his *Life* of Jenner, that the latter especially lamented the loss. "It contained observations," he adds, "respecting a disease of the heart which frequently comes on during attacks of acute rheumatism, and leads to enlargement and disorganisation of the part. This formidable disorder had very much escaped the notice of medical men. Jenner's observations were original, and had they been published at the time they were first communicated to the Society, his claims to priority could not have been set aside as they have been since that time by other writers."

Swine-pox.

On July 28th it is recorded that Dr. Hickes favoured the Society with Observations and Experiments made upon Persons labouring under an Eruptive Fever which appeared in Several Parts of Gloucestershire in the Latter End of the Year 1789. The disease was evidently quite new to the author, but it was known to the common people as the swine-pox. It greatly puzzled the medical staff of the Gloucester Infirmary. In the case of a girl mentioned by the author the eruptions "looked so much like the small-pox that the medical gentlemen who saw her on the same day with myself were not able to determine whether it was that disease or not, though both of them had been in the habit of inoculating, and one of them is a man of acute observation and great penetration, and who has very deservedly acquired extensive practice and much reputation, namely, my friend, Dr. Jenner, of Berkeley." Jenner's son, Edward, then about 10 months old, whose nurse was one of the patients affected with the mysterious eruption, was inoculated on December 17th, 1789, with matter taken from the pustules of the girl, which, from its colour and consistence could not be distinguished from the variolous matter. Two female servants in a neighbouring family, who had never had small-pox or chicken-pox, were inoculated at the same time from the nurse. Jenner's own account of the result, as given in Dr. Hickes's paper, is as follows:

The two young women who were inoculated at King's Hill with the swine-pox matter sickened on the ninth day after its insertion into the arm. The symptoms were more severe than we generally find them in patients sickening with small-pox from inoculation. The headache was remarkably severe, and the state of lassitude and general debility continued longer. I could not observe any material difference between the progress of the inflammation in the arm and its termination in this disease and the common small-pox. A few pustules or, rather, little eminences appeared which did not suppurate. They very much resembled the eruption in the case of Edward Jenner.

Further on we learn from Dr. Hickes that "on January 12th, 1790, Edward Jenner, the child I before spoke of as having been inoculated from the nurse, and had the disease called the swine or pig-pox in consequence of the inoculation, was inoculated with the matter of the true small-pox, as was at the same time the nurse, but no inflammation appeared upon their arms or any other signs of disease. The child was inoculated several different times afterwards with matter taken from different persons afflicted with the true small-pox, but no effect followed."

Several cases of patients are cited who had contracted the "swine-pox" by contagion, being afterwards inoculated with variolous matter or exposed to the contagion of that disease without contracting small-pox. Dr. Hickes made inquiries both among medical practitioners and the country people; the latter, it is said by one surgeon, called it sometimes the "pig-pox, but more frequently the cow-pox." The professional men could not make up their minds whether this disease was small-pox or not. Dr. Hickes concludes that "if it be not the small-pox, it certainly is a disease which renders a person who has had it much less liable to receive the infection of the small-pox or the febrile consequence of it."

The subject seems to have excited a good deal of interest among the members of the Society, for among the papers is the following note, which is not in Jenner's handwriting nor in that of Dr. Hickes:

Memoranda.

To collect cases of swine-pox; to make as many experiments as possible on the subject, and communicate them at the next meeting.

To bring matter or send it before our next meeting.

To add the general evidence of other practitioners as to the first appearance, extent, and event of the disease.

The opinion of the old women.

Letter to Dr. Hickes on the S. W.

At a later meeting (September), it is recorded that "Dr. Hickes and Mr. Jenner severally communicated to the Society some further particulars relative to the swine-pox."

The following undated fragment is in the handwriting of Jenner, and appears to be an announcement of a proposed publication of an experimental inquiry by the members of the Society on the subject:

We hear that an eruptive disease has lately spread through many parts of the county of Gloucester, in its appearance very similar to the small-pox, but generally called by the people of that county the swine or pig-pox. It is there believed that this disease acquired within the natural way or by inoculation is capable of preserving the patient from the infection of the small-pox. It is with pleasure we announce to the public that the members of the medical society who meet at Rodborough have for some months past been engaged in an experimental inquiry into the nature of this disease, the result of which will appear in the 1st vol. of their mems., which they propose publishing in the course of the ensuing year.

Jenner on Hydatids of the Kidneys.

On July 28th, 1790, Jenner read the following paper:

James Merrett, aged 22, about eight or nine years ago felt an uneasiness about the region of the kidneys. As it was never severe, and only affected him after laborious exercise, he did not apply for medical help for three years afterwards. The pain now becoming very violent, he applied to me, and a blistering plaster was directed to be put upon the part where the pain was felt most sensibly. About two years ago he was affected with slight symptoms of nephritis, and on making water he plainly found now and then some substance pass the urethra. Concluding it was gravel, and not being prevented by it from following his usual occupation, which was that of a fisherman in the River Severn, he paid not much attention to it. In this manner he was affected at intervals of three or four months (though at all times somewhat uneasy) until he again made application to me, and this happened in consequence of one of the paroxysms being more than ordinarily severe. It was on November 8th, 1789, I found him much indisposed; the pain in his back was exceedingly

acute, and darted from the kidneys in the course of the ureters, the symptoms being similar to those which accompany the discharge of sabulous matter from the kidneys, and supposing from the narrative of the patient that he had formerly passed concretions from the urethra, I treated the case in the common way. However, no relief was obtained, and he never went through a day without feeling constantly an uneasiness and frequently very severe pains about the small of the back. I now discovered the substances coming from him to be hydatids; he brought me a small vial containing a great number of them. They are of a globular form and of various sizes, from that of a small pin's head to that of a pea. Among them was interspersed the skins of others which had passed the ureters whole, and had burst in the bladder. This bursting he was sensible of, for he had often felt excruciating pain in the bladder accompanied with a total suppression of the urine for a short time, when something would seem to give way, and presently after the skin of a broken hydatid would be discharged with a stream of urine.

As it is an opinion pretty generally received that hydatids are insects, it occurred to me that oil of turpentine might be so introduced into the system as to destroy them; and their present situation being peculiarly favourable for the experiment, as this essential oil is known to pass through the urinary passages without undergoing any apparent change, on May 18th, 1789, he was put upon the following plan:

℞ Ol. terebinth 5ij
Conf. rosar. 3ij
Sy. simp. q. s. ft. electarium

Of this he tooke a large teaspoonful twice a day, and upon the skin sometimes of the back sometimes of the arms, about a spoonful of the oil of turpentine was directed to be rubbed daily. After he had pursu'd this course about a fortnight, the pains began to diminish. At the end of a month he scarcely perceived auy uneasiness, and he is now, aud has been for some weeks past, entirely free from the complaint. The hydatids which he passed at the commencement of this course were all burst and collapsed, and he has passed none lately iu any shape. For this last fortnight he has omitted the use of his medicines, supposing himself quite well, but he is now put upon the use of the turpentine again.

This is doubtless the case concerning which John Hunter writes to Jenner as follows on December 8th, 1790:

I have just received the favour of yours. I have just now forgot the case of the hydatids; but if there was anything that struck me, I daresay it was laid by. They are frequently in the kidneys, but I should doubt your oil of turpentine having any merit in bringing them away. My reason for supposing them animals is because they move after they have been extracted. I have taken them out of the head or brain of a sheep, and they have contracted in different parts of them when put into warm water. I should be glad to employ you if I knew in what; but if anything comes across my imagination I will think of you. The measly pork are hydatids.

Miscellaneous Communications by Jenner.

On July 13th (year not given) the minutes state that "Mr. Jenner favoured the Society with a few particulars respecting a boy that passed an extraneous substance into the bladder, and another case of the sudden absorption of the fluid from an hydrocele." On July 25th, 1792 (the year Jenner got his M.D. from St. Andrews), it is recorded that "Doctor Jenner read a paper giving an account an extraneous body being introduced into the bladder of a boy 14 years of age." Here the minutes of the Gloucestershire Medical Society come to an abrupt and tattered conclusion.

Fines and Forfeitures.

One gets little glimpses of the social side of the Society in these records. Thus the minutes of a meeting in September, 1788, state that no business was transacted, but that Dr. Parry (the President) was fined one guinea for absence. On July 29th, 1789, there is a note of an account of 7s. 6d., disbursed by Dr. Hickes for "two dinners ordered on the wrong day." Various forfeitures are recorded for being late, the penalty for which was 10s. 6d. On June 5th, 1793, Jenner himself is fined 1 guinea for absence.

The Convivio-Medical Society.

The Gloucestershire Medical Society was called by Jenner the Medico-Convivial Society, but he was a member of another, which met chiefly at the Ship, at Alveston, about ten miles from Bristol. This he called the Convivio-Medical. Baron says that at the meetings of this Society Jenner was wont to hold forth on the cow-pox question with such insistence that he was voted a bore by his fellow members, and finally threatened with expulsion if "he continued to harass them with so unprofitable a subject." Truly, there are some that having ears, yet hear not!

LITERARY NOTES.

The May issue of the *Practitioner* is a Jenner centenary number. It contains original papers on subjects connected with vaccination by Dr. Monckton Copeman, Dr. E. Seaton, Dr. Buist, Dr. Colcott Fox, and Dr. E. J. Edwardes; editorial articles on the Gloucester epidemic, the Vaccination Commission, small-pox as it used to be before Jenner drew its fangs; abstracts of foreign papers relating to vaccination; and a life of Jenner, with an excellent reproduction of Northcote's portrait. In connection with the *Practitioner*, a reprint of Jenner's *Inquiry* is published. Mr. Malcolm Morris, the editor, is to be congratulated on a distinct journalistic success.

The following note is to be found in the life of William Allen, Lecturer on Chemistry at Guy's Hospital: "First month, 9th, 1802. Joseph Fox invited me to meet Dr. Jenner, Astley Cooper, etc., at his house, and go from thence to the Physical Society at Guy's, a paper on cow-pox being before the Society."

It is stated elsewhere that Jenner was fond of making verses. His friend Gardner thought that the world had lost a great poet by the discovery of vaccination. This seems unlikely. From the specimens that have survived it is clear that Jenner's was a *musa pedestris*, though not untuneful. The "Address to a Robin" may serve as a specimen:

Come, sweetest of the feathered throng!
And soothe me with thy plantive song:
Come to my cot, devoid of fear,
No danger shall await thee here:
No prowling cat, with whisker'd face,
Approaches this sequester'd place;
No schoolboy with his willow bow
Shall aim at thee a murd'rous blow;
No wily lim'd twig e'er molest
Thy olive wing or crimson breast.
Thy cup, sweet bird, I'll daily fill
At yonder cressy, bubbling rill;
Thy board shall plenteously be spread
With crumblets of the nicest bread.
And when rude Winter comes and shows
His icicles and shivering snows,
Hop o'er my cheery hearth, and be
One of my peaceful family;
Then sooth me with thy plantive song,
Thou sweetest of the feather'd throng!

The following extract, in a lighter vein, is from a poem on "Berkeley Fair." Jenner is describing the sights to be seen at the fair.

Here, neighbours, are sights such as never before
Were seen at a Fair, and never may more.
. . . . . .
My cabinets all, the subject's terrific,
Shall nothing contain which is not scientific;—
There's an encrinite's head, a cornu ammonis,
And marquisites fit to adorn an Adonis;
Fine corals, all fossil, from Woodford's grand rock;
And granites from Snowdon in many a block;
Alcyonites, too, we have joined to our stock;
Hippopotamus' bones, and the great alligator,
And things most surprising thrown out of a crater;
All changed into flint are an elephant's jaws,
The mammoth's vast teeth, and the leopard's huge paws;
There are beautiful agates washed up by the fountains,
And crabs that were found on the tops of the mountains;
Asbestos, chert, chrysolite, quartz, hæmatites,
Madrepore, schistus, basalt, and pyrites;
Oolites, zoolites, gryphites a store,
Pentacrinites, chlorites, and many things more.
All this we'll display to those who are willing—
Though the sight's worth a crown—yet for one single shilling!

The following anecdote, told by Baron, is interesting:

The celebrated Charles James Fox, during a residence at Cheltenham, had frequent intercourse with Jenner. His mind had been a good deal poisoned as to the character of cow-pox by his family physiciau, Moseley. In his usual playful and engaging manner, he said one day to Jenuer, "Pray, Dr. Jeuner, tell me of this cow-pox that we have heard so much about; what is it like?" "Why, it is exactly like a section of a pearl on a rose leaf." This comparison, which is not less remarkable for its accuracy than for its poetic beauty, struck Mr. Fox very forcibly.

As much has been made in certain quarters of the rejection of Jenner's first draft of his famous *Inquiry*—a specimen page of which is given in *facsimile* at p. 1259—it may be as well to give Jenner's own account of the matter. In a letter to James Moore (author of *History of Small-pox*, etc.), published by Baron,[1] he says:

I explained in conversation, as I said before, all that passed respecting my first paper on the cow-pox intended for the Royal Society. It was not with Sir Joseph [Banks], but with Home [Sir Everard]; he took the paper. It was shown to the Council and returned to me. This, I think, was in the year 1797, after the vaccination of one patient only; but even this was strong evidence, as it followed that of the numbers I had put to the test of the small-pox after casual vaccinatiou.

[1] *Life*, vol. ii, p. 364.

BRITISH MEDICAL ASSOCIATION.
SUBSCRIPTIONS FOR 1896.

Subscriptions to the Association for 1896 became due on January 1st. Members of Branches are requested to pay the same to their respective Secretaries. Members of the Association not belonging to Branches are requested to forward their remittances to the General Secretary, 429, Strand, London. Post-office Orders should be made payable at the General Post Office, London.

British Medical Journal.

SATURDAY, MAY 23RD, 1896.

THE JENNER CENTENARY:

A Prophet without Honour in His Own Country.

The history of vaccination, which may be divided into three periods, is a somewhat curious one. In its first period it was little more than a myth—an article of folk-lore; in its second period it was more than this, but still a specific remedy rather than a rational procedure; upon its third period, when it is recognised as an instance of a general law, it is now entering.

How long the west country milkmaids had gossiped of their immunity to dull ears we know not; Jenner, in the true spirit of the man of science, who feels that no belief is uncaused, and that all beliefs have a core of truth, caught at the chance word. Is not the "superior person" usually lacking a little in humility or in sensitiveness in this respect; is he not too ready to set down the sayings of smaller folk as mere trifling or as sheer ignorance? The Berkeley milkmaids had no doubt prated of the virtues of vaccination in the hearing of many worthy and ingenious gentlemen as no doubt milkmaids and their like are doing to-day; yet but one man in a generation has ears to hear.

Poor little John Phipps, too—the brave boy—is it not his centenary also? We wonder how he bore being gazed at as the barbarians gazed at St. Paul; they looked, no doubt, that he should have swollen or fallen down suddenly; but no harm came to him, nor of the small-pox either. Even as matters stood, what a dramatic scene that was! Had the chorus but known how fully charged with the fate of man that drama was, how glorious the issue of the play! It is pleasant to think that Jenner cared for Phipps in after-days when John—the fateful cherub—had probably grown up into a John as dull as the rest of us.

And where is the chorus here in our own country now to sing of Jenner's immortal fame, and of gratitude to our deliverer? Frenchmen, Russians, Germans, Americans, all are publicly and heartily celebrating a great Englishman; but where are the English? Almost as profoundly silent as vaccination commissioners! It is not our way, one says, to get up national feasts or to be drilled into demonstrations on anniversaries. But perhaps it ought to be our way? When we choose it can be our way well enough; do not we rejoice with our Lord Mayor even in November? Do not bald men, past the fires of their youth, yet gather from the four winds of Britain every May to demonstrate in Exeter Hall? We can make a noise if we like; but herein we are as the honest man who buttons up his pocket in his dislike of the ostentation of charity.

Is there not a truer reason for our neglect of the Jenner celebration than national reserve; a reason less to our credit? Is not our apathy in celebrating our great men of science due to this, that of all western peoples the Englishman is nowadays the least educated? As Virchow truly said the other day the English are before the Germans in sanitation, but far behind them in education. Our people have greatness in them; the not infrequent great man fights his way to the top through all the discouragement of contemporary ignoramuses, soiled and battered by the fight; but all we who are not big enough for this fight remain an uneducated mass. The average man is content with his mean position; his mind is not only untrained to desire intellectual excellence in himself, but he is also without the perception to admire excellence in his great contemporaries. Nay, he is brought up in a certain suspicion or even in a positive mistrust of the intellectual life. This is not true of the working man only; for this state of things not our State education only, but our public schoolmasters also, as a body, are largely responsible; swayed, as they themselves too often are, by a like aversion.

Jenner's feast, and the feasts of other great men, are ignored in England because Englishmen as a nation have not learned to see even the commercial value of brains, and are far indeed from any disinterested love of knowledge—of knowledge for its own sake. Yet what did Jenner's discovery mean? We have said that vaccination is now entering upon its third period as an instance of a general law. Pasteur at the London Congress said in his address on Chicken Cholera that he was merely developing Jenner's discovery. Incalculable as is the value of vaccination as a protection against small-pox, yet a value even more widely reaching than this is seen in the light now falling upon the field of prophylaxis, and not of prophylaxis only, but also of cure. Jenner opened the door to a whole realm of therapeutics which we are only now beginning to survey in part. The folly of the "anti-vack," even if he shouted from the housetop, would be but as idle wind in a country where men possessed some little knowledge, or, still better, were trained in the scientific spirit.

Jenner in his sleep little recks of our praise or blame; he is beyond these voices. But the blight of our neglect of him, and of great men like him, falls not on them but on us, who lose in this apathy the glow of enthusiasm which should inspirit us, their children, to see the visions which they saw, and to follow in their steps.

THE LAW AS TO VACCINATION AND ITS FUTURE.

The first Vaccination Act for England and Wales was passed in 1840, and since that date six other Acts have been passed. The present vaccination law is embodied in the Vaccination Act, 1867, as added to and amended by the Act of 1871. Under the existing law, every child who has reached the age of 3 months who is not certified to be either insusceptible of vaccination or unfit for vaccination, or to have had small-pox, comes within the compulsory clauses of the Act, subject, however, to the condition that where the attendances of the public vaccinator are at intervals exceeding three months, no default arises until after the termination of the next ensuing attendances. Primary vaccination is gratuit-

ously performed by the public vaccinator at his stational attendances for all classes of persons, and a vaccination officer is appointed in every district to see to the enforcement of the law as regards all children under 14 years of age. Revaccination at or after the age of 12 years may also be procured gratuitously, subject to certain conditions affecting the supply of lymph available; but it is permissive, not compulsory.

The vaccination authority is the Board of Guardians of each union; and upon the guardians devolves the duty of giving instructions to the vaccination officer to enforce compliance with the law. The general supervision of the vaccination law is vested in the Local Government Board, who issue orders and regulations as to the duties of the several officers concerned; and who, through their medical inspectors, use their influence to maintain such a standard of efficiency in the work of public vaccinators as is known to afford the best available protection against small-pox. The law, and the instructions issued under it, aim at securing vaccination by fresh lymph as opposed to preserved lymph; and hitherto this has been practicable only by resort to that which is known as arm-to-arm vaccination. But calf-to-arm vaccination is recognised as fully equal to arm-to-arm work as regards the protection afforded. The law and instructions under which public vaccination is carried out in England and Wales have been submitted to the Royal Commission appointed on May 29th, 1889, and pending the issue of their report no material change can be made in the methods of procedure. But it is obvious that the time has come for some further change in the law; and the main interest which now attaches to the question of the law of vaccination is, not what the present law is or effects, but what are the indications afforded by recent experience as to the best statutory scheme in the future.

Never since vaccination came into operation has there been more convincing proof than is now available as to the necessity of a compulsory law as to vaccination; and, as regards primary vaccination, this compulsion must take account both of the duty of parents in securing for their children the protection afforded by vaccination, and of the duty of the vaccination authority in enforcing compliance with the law. Dealing first with the parent, compulsion has hitherto been indirect; the imposition of a fine, or the imprisonment of the defaulting parent, has been relied on; and though this has succeeded in the large number of cases where carelessness or indifference has been the main cause of default, yet it has failed in a few instances where fine and imprisonment have been submitted to, the children in question still remaining unvaccinated. Direct compulsion, that is to say, the actual and forcible vaccination of a child, can hardly be regarded as a practicable measure; hence some alternative must be found.

Thus, vaccination should, as at present, be compulsory in infancy, but it might be conceded that any parent objecting to vaccination should be compelled to make a statutory declaration before a magistrate to that effect, a record of the transaction being kept and transmitted to the sanitary authority of the district in question. The making of such a declaration must involve as much trouble on the part of the parent as the attendance at a vaccination station would involve, and no parent or guardian should be allowed to make the declaration otherwise than in person unless on production of a medical certificate of ill-health.

We next come to the vaccination authority. Only one reason, we imagine, could justify the devolution of so important a public health function from the sanitary to the Poor-law authority, and that is the comparatively large area of Poor-law unions and the consequent limitation in the number of executive authorities. But so many guardians have during recent years exhibited such an utter indifference to the public health aspects of vaccination; and so many, after taking upon themselves the duty of a vaccination authority, have not only openly advocated disobedience to the law, but have refused to perform their own statutory duty, that it seems all but impracticable to allow these Poor-law bodies to retain this duty towards the public health.

On the other hand, it would hardly do to constitute some 1,600 separate sanitary authorities as vaccination authorities; for such subdivision would in itself be an almost fatal source of weakness. Hence, one of the most important questions which will have to be solved by the Royal Commission is that of the proper vaccination authority of the future. As to this, it is well worthy of consideration whether this duty should not be handed over to county councils, including, of course, the town councils of county boroughs. If this were carried out we rather doubt the desirability of the retention by the central government of the power of superseding the county authority in cases of default; for the constituencies of the counties and county boroughs ought to be sufficiently large and important to ensure such an adequate sense of responsibility in this matter as to secure the election of reasonably intelligent and properly qualified councillors. The power to over-ride a local authority lessens the sense of responsibility on the part of the individuals of the body concerned.

Then again, an effort should be made to remove all reasonable objection on the part of parents. Since the occurrence of Mr. Jonathan Hutchinson's cases of vaccino-syphilis in 1871 no effort has been spared on all hands to ascertain if similar cases have happened in this country; yet every effort has failed. But the possibility of such an occurrence cannot be altogether set aside; hence we feel that the Royal Commission would be right if they recommended that every parent seeking vaccination, as provided by the State, but objecting to the use of humanised lymph, should be allowed to have his child vaccinated with calf lymph. Such a provision would, unquestionably, lead to a very general use of calf lymph, and since our present laws and regulations are based on the assumption that the use of fresh lymph was mainly to be attained by resort to arm-to-arm vaccination, the law and regulations involved would have to be repealed, and they would have to be so modified as to ensure that all public stations should be so organised as to provide that vaccination, and above all primary vaccination, might be done with fresh lymph from calf to arm, instead of with preserved calf lymph. This would, of course, mean the multiplication of calf stations, and although we need not here discuss the precise method by which this plan could be carried out, yet we feel certain it could be done by county councils, and we are equally certain that it could not be done by a majority of the existing sanitary authorities, nor by Boards of Guardians.

On no point has modern experience been more clear than as to the necessity for securing revaccination at about the tenth or twelfth year of life; and German experience has proved that compulsory revaccination is not only necessary,

but effective, in so far as the control of small-pox is concerned. Formerly, when vaccination was so largely carried out in early youth and at adult age, it practically conferred a life-long immunity; now that vaccination has been pushed back to the first few months of life, the protection against attack is much less than was formerly anticipated, although protection against death extends to later years. No State system of vaccination will therefore be complete unless revaccination is required; and this could probably be best carried out by making it obligatory on school authorities to report to the vaccination authority any child who has not presented a certificate to the effect that successful revaccination has been performed during, say, the tenth year of life.

Whilst we doubt the expediency of a central department of the Government having power altogether to supersede the vaccination authority, as is now provided for in such matters as the giving of instructions to vaccination officers to enforce compliance with the law, yet we consider that no State system of public vaccination should be independent of State control. Uniformity in the efficiency of the work as regards, for example, the provision of proper lymph supplies and the maintenance of a proper standard of vaccination, is most desirable, and this cannot be secured except under a system of inspection and control by the central authority.

Such a scheme as we have advocated would doubtless tend to the diminution in the number of public vaccinators and to throw the work of public vaccination largely into the hands of practitioners who are not engaged in private practice, much as is the present tendency in the case of medical officers of health; but it would materially add to its efficiency. And, just as the central authority have power to require returns and reports from sanitary authorities and their officers, so should they have the same powers with regard to vaccination authorities and officials. It would also be necessary to efficiency and uniformity of administration that power should be vested in the central authority to require the resignation of any such officials as failed after inspection and warning to comply with regulations framed by them to secure a proper standard of protection as the result of the vaccination performed by the officials concerned.

VACCINATION AND ITS DEVELOPMENTS: JENNER AND PASTEUR.

During the last two or three decades, as in the history of all scientific work, men have been very prone to ascribe to accident what they have called the fortunate discoveries of some of our greatest scientific workers. Nowhere has this been more clearly put forward than in the field of the production of immunity by inoculation, and nowhere can the materials for the refutation of this erroneous idea be more readily collected or more advantageously applied. It has certainly been the fashion amongst a certain class to sneer at the claims made on Jenner's behalf, in connection with the introduction of vaccination against small-pox, but it may safely be argued that scarcely one of the objectors of this class has taken into consideration the fact that the same materials that Jenner had at command lay ready to the hands of other observers, but that up to his time little or no improvement had been made on the method of protective variolation, which had, early in the eighteenth century, been introduced from the East. In the light of what we now know of protective inoculation and of those of Jenner's theories that have stood the test of time, it may safely be asserted that to Jenner still greater honour must be given than many of even his most enthusiastic admirers pay to him. In this connection it may not be without interest to compare the work done by Pasteur with that of his predecessor, especially as many of those of his contemporaries and successors who have studied and criticised Pasteur's work, and who have appreciated the tremendous issues that have arisen out of it, have, just as in Jenner's case, on the one hand ascribed much of it to lucky accident, or, on the other, have claimed that it was the outcome of preconceived ideas. No doubt if by preconceived ideas we mean the application of a logical and accurate mind to the experimental proof and gradual development of theories based on careful observation, then this latter theory may be accepted, especially as this form of preconception is only to be found in connection with the highest form of scientific mind.

In drawing a parallel it is interesting to note that Jenner and Pasteur, working on somewhat the same lines, the latter undoubtedly having the work of the former in view when he commenced his great experiments on immunisation, fell for a time into much the same traps, and met with the same difficulties, but ultimately arrived at the same results.

On May 14th, 1796, the first official protective inoculation with vaccinia was made by Jenner, who believed that in the virus from the cow-pox vesicles he had found "an antidote capable of extirpating from the earth a disease which is every hour devouring its victims—a disease that has ever been considered the severest scourge of the human race;" he had applied a new method, the outcome of careful observation, to the protection against small-pox of people who had not already had that disease. The results were so startling that he was led to expect and claim for his system more than he had a right to expect; but, as has frequently been pointed out, only time and experience would allow of the confirmation or modification of his claims. On February 28th, 1881, Pasteur gave his official communication to the Academy of Sciences in Paris, and on May 5th of the same year he practically applied his method of protective inoculation and repeated for anthrax what eighty-five years before Jenner had done for small-pox.

Without in any way detracting from Pasteur's work, rather indeed as an additional testimony to the process by which he arrived at his results, it may be stated that it is evident that he was following exactly in the case of another disease the lines followed by Jenner in his work on small-pox. Pasteur, with his knowledge of the etiological factor of anthrax, was able to work not with a lymph, but with the specific causal agent of the disease with which he was experimenting, and his experiments on the modification of this causal agent are therefore more accurate and more convincing. He had a definite organism which he could cultivate in various manners, treat with various reagents, and then watch the process of disease set up by the modified organism; having isolated this bacillus he could, as it were, perform pure experiments the results of which were not obscured by the working of extraneous factors.

Pasteur's methods of modification of the organism or of the virus were essentially those that had been tried by Jenner himself or by those who had studied cow-pox and its relation to small-pox. We find, for example, that as early as 1839

Thiele maintained that cow-pox was nothing but small-pox that had lost some of its characteristics and virulence during its passage through a cow, and he showed that the virus from small-pox might be so modified by drying and by diluting it with milk, that when inoculated it gave rise to the symptoms and appearances not of small-pox, but of almost typical cow-pox. A couple of years later Ceely arrived at practically the same conclusion, and we see here the first application of those methods that are now so commonly employed to modify virus that is to be used for purposes of protective inoculation.

Beyond this, however, some of the earlier observers had a shrewd suspicion that the passage of the cow-pox back to the human subject had a certain effect in exalting the activity of the virus, and this was put forward as affording an explanation of the fact that it was sometimes difficult to obtain any very definite manifestations of cow-pox in cows that were inoculated with small-pox virus, although material taken later from the seat of inoculation was capable of setting up undoubted vaccinia in the human subject. Many of the difficulties then experienced in transmitting the virus from the human subject to the cow have since been overcome, and the course of the process of transformation has been more accurately studied, but there can be no doubt that these earlier observations paved the way for Pasteur, who had so recently grasped the fact of the bacteriological causation of some of the specific infective diseases, and that this indicated and opened up the way for the working out of the process of immunisation against anthrax.

It may be pointed out that three observers at least were working along the lines originally indicated by Jenner and by Thiele. In June, 1880, Greenfield showed that by cultivating a virulent anthrax bacillus through successive generations in the aqueous humour of the eye of the ox, he was able to bring about a distinct modification of the bacillus anthracis; this modified bacillus set up a mild attack of anthrax, and presumably protected an animal against more virulent attacks. In July of the same year Toussaint notified to the French Academy that he had been able to obtain the same results, in somewhat irregular fashion no doubt, by subjecting the blood from an animal that had died from anthrax to processes of defibrination and filtration. Not satisfied with this, however, he found that he could obtain more definite and regular results by subjecting the anthrax virus to a temperature of 55° C. for comparatively short periods. Duguid and Sanderson, and later Klein, made use of the method that had also been used or suggested by Thiele in connection with small-pox; they modified the anthrax virus by passing it through smaller animals, the former using the guinea-pig, the latter the white mouse; and there can be little doubt that although in these cases the proof obtained at the time was not absolute, they succeeded in obtaining a modified virus which was capable of giving a mild attack of anthrax, and so of protecting large animals against more virulent attacks. Pasteur, by more accurate experiment, obtained somewhat similar results; he passed the anthrax bacillus through the common fowl, and as a result of his observations he came to the conclusion that the higher temperature of the fowl had something to do with the modification of the activity of the bacillus; he therefore heated the anthrax bacillus to the temperature (42° to 44° C.) to which it was exposed in the fowl, with the result that between the fresh virulent anthrax culture and an inert culture obtained by heating to the above temperature during a period of six weeks he was able to obtain all intermediate stages of virulence. These observers, then, in the case of anthrax — following up the theories advanced by Jenner and Thiele, which must have been based, as we now know, upon most careful and accurate observation—had obtained experimental proof of what has since proved to be a principle of comparatively wide application. Again, applying the old principles of attenuation and exaltation of a virus of unknown character (as regards the actual etiological factor), Pasteur succeeded in obtaining a modified virus by growing the organism, causally associated with fowl cholera in ordinary broth through successive generations for a period of three months. He thus obtained an attenuated or a protective virus, which could, however—as had been suggested by Thiele in the case of small-pox virus—be again exalted by passing it through a series of fowls, after which it was found that it regained its original activity, which it would retain at a fixed level so long as it was passed through the same species of fowl. In the same way the organism of swine fever or rather of *rouget* might be attenuated by passing it through a series of pigeons; similar modifications were also observed in the virus of rabies. Here, again, Pasteur and Jenner come into very close touch, for the later observer worked with hydrophobia under adverse conditions almost identical with those under which the earlier investigator had to contend—he had to do with a virus in which he was unable to demonstrate or separate the specific etiological factor. Working along Jenner's lines he obtained the same results; the virus was modified by passage through animals: in one set—the monkey—it was attenuated, in the other set—the rabbit—exalted. Thiele's observations were also fully confirmed, dilution or drying of the virus rendering it less active.

It would be possible to give numerous other analogies between the theories and the practice of these two great men—Jenner and Pasteur, but those given are quite sufficient for our present purpose. Jenner's work was epoch making; it was of such a character that it stimulated into special activity the greatest scientific minds of the earlier part of the present century, and although no further special advances could be made until the discovery of the lower forms of vegetable organisms, and of the part that they play in fermentative, putrefactive, and disease processes, had been made, and until Traube, Davaine, and Koch had each made their contributions to the etiology of the specific infective diseases, Pasteur's great claim to be the direct successor of Jenner rests on the fact that he was able to focus what had already been done, and to fill in as the result of his own observation and induction, the gaps that remained before Jenner's special theories as regards small-pox and cow-pox could be applied generally to the specific infective diseases that resemble small-pox in their history—cause, course, and prevention.

Jenner, as we have already said, claimed that he had found the antidote or "specific" for small-pox; similarly Pasteur, in the earlier stages of his investigations, was so successful that he also thought that he could produce a specific immunity against anthrax. We know, however, that what holds good for the one holds also for the other, and that

although a high degree of protection may be conferred against many of the specific infective fevers, there invariably comes a point at which the immunity ceases; this point, however, is so high in the scale that a very large proportion of the cases protected require no further assistance to ward off ordinary attacks of these diseases.

It is this want of absolute immunity—which, after all, we were bound to anticipate because of the biological limitations of the powers of reaction, general and specific, of tissues of the human and of the animal body—that has been used by Jenner's opponents as a thong with which to scourge his system of protective vaccination. Let them remember, however, that Pasteur and his followers after falling into the same error, ultimately recognised these limitations, but have still been able to demonstrate the efficacy of protective inoculations in conferring immunity against all but exceedingly active virus, or against very large quantities of virus of ordinary activity, in a series of diseases which at one time were considered to be almost incurable. Those who are jealous for Jenner's honour cannot but watch with satisfaction how observation after observation, experiment after experiment, appear to fill in the gaps left by him in his work and to confirm in some fresh detail the theories that he advanced when pressing on his fellows the value of vaccination in protecting against small-pox—at that time the despair of the physician and a veritable scourge in the land.

OUR JENNER CENTENARY NUMBER.

This issue of the British Medical Journal is intended as a tribute to the memory of the great man who, one hundred years ago, put his theory as to the protective efficacy of cow-pox to the proof, and gave the world the priceless gift of vaccination. Of the feelings with which the men who had seen the dragon of small-pox ever greedy for fresh victims regarded the scientific St. George who rid them of the dreaded monster, the innumerable medals struck in honour of his discovery, and the marks of distinction showered upon him—as set forth elsewhere—bear eloquent witness. If in these latter days Jenner is almost forgotten by the people, and has become little more than a legendary figure to the bulk of his own profession, that very fact is a proof of the completeness of the victory which he won for us over one of the most "formidable shapes" of death. Jenner is forgotten because small-pox, as it was before his coming, is unknown to the present generation. After all, Jenner's best monument is his work; hence it has been thought that the fittest tribute that could be paid to his memory here would be such a record of his life and work as would show what he was and what he did for mankind. The literary contributions speak for themselves, but we may be allowed to call attention to one or two features which we think likely to be of special interest. The series of thirty coloured illustrations of vaccinia and inoculated variola are reproductions of a set of coloured drawings by George Kirtland, which were kindly lent for the purpose by Mr. G. W. Collins, of Wanstead. Mr. Collins was fortunate enough to pick them up at a bookstall some ten years ago, when he was acting as Medical Inspector under the Local Government Board, and their extraordinary merit has been recognised by all competent judges who have examined them. They were shown to the Royal Commission on Vaccination, and they have been pronounced by leading authorities on the subject of vaccination to be far more complete and perfect than the plates of a similar kind published at the beginning of the century by Pearson in London, and by Ballhorn and Stromeyer in Germany, and in fact, to be absolutely unique. We refer readers to the description of them given by Dr. J. C. McVail in another column. Of the history of these illustrations nothing is known, but of their authenticity there cannot be a doubt. As to the artist whose work they are, an extended search through libraries, catalogues, and biographical dictionaries—in which we have to acknowledge valuable help obligingly given by Mr. D'Arcy Power and Mr. James B. Bailey, Librarian of the Royal College of Surgeons—has revealed the following particulars. George Kirtland is described in Graves's catalogue as of Woodstock, and he exhibited pictures at the Royal Academy towards the close of the last century. In 1791 he exhibited a group of portraits of "Country Persons," and in 1798 "Dissections of Horses' Hoofs, etc." Kirtland also illustrated Freeman's *Mechanism of the Horse's Foot* published in 1796, and Mr. Freeman speaks of him in the preface to that work as "a draughtsman . . . who could represent with accuracy anything that was set before him." The drawings are beautifully executed, and were drawn in copper-plate by W. Skelton. Kirtland also illustrated Professor Coleman's work on shoeing, which was published in 1798. Perhaps some of our readers may be able to give us further particulars as to the skilful artist who, in addition to his other productions, has left a work of unique value to medical science which we are happy to be the means of making widely known to the profession. It is right that we should also acknowledge the assistance which we have received from Dr. W. R. Awdry of Berkeley and Mr. F. Mockler of Wotton-under-Edge in obtaining the photographs of Jenner's birthplace and the house in which he lived, the "Temple of Vaccina" where he used to vaccinate all who came to him, and the memorial window in Berkeley Church which are reproduced elsewhere. To Mr. T. Malcolm Watson we are indebted for permission to reproduce the oil painting of Jenner, supposed to be by Lawrence, which is in his possession. We have also to acknowledge the courtesy of Dr. Alfred H. Carter, of Birmingham, for placing at our disposal the manuscript records of the old Gloucestershire medical society, of which Jenner was one of the founders. An account of the contents of this most interesting document is given in another column, where an unpublished paper, communicated to the Society by Jenner, and one or two fragments in his handwriting, are reproduced. In conclusion we can only say that we offer to our readers what we hope will be considered a not altogether inadequate record of Jenner's life and work. Such as it is we dedicate it, in the appropriate words which were placed around his portrait in Paris in 1802, *Viro de matribus, de pueris, de populis bene merito.*

THE STATUE OF JENNER IN KENSINGTON GARDENS.

The monument to Jenner, a photograph of which is reproduced at page 1248, stands in Kensington Gardens at the north end of the Serpentine. It occupies a commanding position, looking west across the ornamental waters basins, and has a background of trees. It is a colossal bronze statue. Jenner is represented seated, but in an alert attitude with a keen expression on his strongly moulded face. The chair, of antique pattern, bears on either side the serpent and staff of Æsculapius. The statue stands on a limestone pedestal, about 5 feet high. In its front is a red granite panel bearing the one word

JENNER.

At the foot of the statue on the left side is the sculptor's signature, "W. Calder Marshall, R.A., Sculpt., 1858." The cost of the memorial was defrayed by an international subscription raised by a Committee reconstituted in 1852 under the chairmanship of Dr. Conolly after a period of suspended animation. America was the largest contributor to the fund, sending £340; Russia came next with £241, and would have contributed more, but that while the subscription was in progress in that country the Crimean war broke out; England came third on the list with £196, of which not very bountiful gift £25 was presented by a single subscriber, Prince Albert;

Italy sent £93, Sweden and Norway £83, Prussia £28, Holland and her colonies £25, and other foreign countries the remainder of a total of £1,065. The unveiling of the monument, which was first placed at the south-west corner of Trafalgar Square, was celebrated by a meeting held in 1858, on May 17th, the anniversary of Jenner's birthday. Prince Albert presided, and eulogised Jenner as one of the greatest benefactors of the human species. "The discovery," he said—we quote from the report in our columns on May 22nd, 1858—"was the result of long and thoughtful observation and induction from facts and experiments to which the discoverer's whole life was devoted." A report read by the honorary secretary, Mr. Irving, referred particularly to the international character of the commemoration; Dr. Conolly gave an address, and the Marquis of Lansdowne made a speech, in the course of which he recalled the fact that half a century earlier he had moved the House of Commons to give a well-merited reward to Jenner. He had then had some intercourse with Jenner, and had observed how effectually, though slowly, he had triumphed over opposition.

A JENNER MEMORIAL MEDAL.

WE have much pleasure in announcing that the Epidemiological Society has decided to found a medal in honour of Edward Jenner. The proposal comes with special fitness at the present time, and will do something to redeem Jenner's countrymen, and the medical profession in particular, from the charge of indifference to his memory. The Epidemiological Society naturally has a special interest in the matter on account of its past work in connection with the Vaccination Acts, and the work that possibly lies before it in connection with the repression of small-pox if vaccination ceases to be compulsory. We give below the official intimation of the proposal to found a Jenner Memorial Medal, which we have received from the officers of the Epidemiological Society:

Epidemiological Society of London,
11, Chandos Street, Cavendish Square, W.
May 18th, 1896.

SIR,—At the annual meeting of this Society, which was held at the above address on May 15th, 1896, it was unanimously resolved, having regard to the historical connection of the Society with vaccination and other preventive measures, to found a medal in memory of Edward Jenner, on this the centenary celebration of a discovery which has been attended with such brilliant results in the direction of preventive inoculation.

It is proposed that the medal shall be founded with a view to the promotion of epidemiological research, and that it shall be bestowed from time to time by this Society on persons who shall have contributed to the knowledge of preventive medicine. It is felt that in the foundation of a memorial of this character the members of the medical profession should be afforded an opportunity of taking part. Donations (not exceeding 1 guinea) may be sent to the Honorary Treasurer of the Society, at 6, Hereford Mansions, Bayswater, W., and a list of donors to this fund will be issued in due course.

We are, Sir, your obedient servants,
SHIRLEY F. MURPHY, President.
R. D. R. SWEETING, Hon. Treasurer.
H. TIMBRELL BULSTRODE, Hon. Secretary.

To the Editor of the BRITISH MEDICAL JOURNAL.

SOME OF JENNER'S PATIENTS.

IT is not without interest to note that several people still live near Jenner's old home who were vaccinated by him. One of them is a man 86 years old, who appears to have been vaccinated when 5 years old. According to his statement, Jenner came over to the village at the request of the squire, who asked him to vaccinate the parishioners, who all attended at the Court for the purpose. He well remembers the sharp puncture of the lancet. Within recent years he has been revaccinated at the suggestion of his doctor. Another old man of about the same age, who was vaccinated by Jenner at the same time, is now in the Gloucester Union. In the *Gloucester Chronicle*, from which we have culled these particulars, we are reminded of the *modus operandi* of one of Jenner's disciples, who used to vaccinate his patients on one arm, and, as soon as the pock had matured and a certain time had elapsed, he vaccinated again on the opposite arm to test the original operation, which he considered was successful if the second puncture did not produce any effect.

PRECURSORS OF JENNER.

THE milkmaids in Gloucestershire and elsewhere had found out for themselves that cow-pox was a safeguard against small-pox before the insight and patient labour of Jenner transformed a piece of folklore into a scientific truth and made the medical profession all over the world receive it as such. It is also unquestionable that he was not the first to inoculate cow-pox with the object of giving protection against small-pox. The first vaccinations of which there is any record were performed by Benjamin Jesty, a farmer of Yeominster in Dorsetshire, who in 1774 inoculated his wife and two sons, aged respectively 3 and 2 years. He himself had had cow-pox before by contagion from the cow. Jesty's vaccinations were successful, and his family remained proof against small-pox inoculation and contagion. Again, in 1791, a Holsteiner named Peter Plett successfully vaccinated some children. He was tutor in a family at Schönwaide, in Holstein, where the milkmaids had also discovered the protective efficacy of cow-pox against the more serious disease. Plett having seen a medical man perform variolous inoculation, conceived the idea of inoculating cow-pox. Accordingly he vaccinated his employer's three children, making incisions with a pocket knife on the back of the hand between the thumb and forefinger. This rough-and-ready method of vaccination was successful, and when an outbreak of small-pox occurred in the place three years later, the children of Plett's employer were the only ones spared by the disease. Neither Plett nor Jesty, however, appears to have followed up the matter; hence nothing came of their happy thought. A claim was also advanced by Husson on behalf of a French Protestant minister of Montpellier named Rabaud. Husson's story is that this worthy divine had in 1781 conceived the idea of the artificial induction of cow-pox as a prophylactic, that he communicated this to Dr. Pew, an English physician who happened then to be at Montpellier, and that the latter communicated it to Jenner. Even if this were true, it would be of little importance, but as a matter of fact it is not true. The story was completely demolished by Jenner's biographer, Baron. The supposed passages from ancient Sanscrit writers which have been cited to show that vaccination was practised by the Hindus many centuries before Jenner are interpolations made with the object of getting vaccination accepted by the natives as a practice consecrated by their own traditions. Let Jesty and Plett have the credit that is their due; they had a glimpse of the truth, but they passed away and left no trace. To Jenner alone belongs the glory of having given to man the means of ridding himself of a hideous scourge, and to science a new truth which, fruitful as it has already been, contains within it the germs of developments yet undreamt of.

THE CONTROL OF SMALL-POX IN LONDON.

THE haphazard manner in which the sanitary administration of this country has grown up is curiously illustrated by the small part played by our metropolitan sanitary authorities in the prevention and management of small-pox. The principal prophylactic measure—namely, vaccination—is entirely taken out of their hands and given over to the guardians of the poor, on whose co-operation and good will it depends whether the Vaccination Acts are put in force in any district. Not only then is the authority which has to provide the hospital accommodation left entirely at the mercy of the guardians in regard to the extent of the accommodation which will be required, but if any really serious epidemic were to arise a duplicate machinery for vaccination would have to be provided. While then the vaccination is in the

hands of the guardians, who enforce the law without the slightest regard to uniformity—some parts of London ranking with the best vaccinated towns, and others, if not with the worst, at any rate standing very lown dow on the list—the ambulance service is taken out of the hands of the local sanitary authorities and given to the Metropolitan Asylums Board, as also is the provision of hospital accommodation. Yet this Board is by no means bound to provide accommodation for any but paupers; and although in scattered outbreaks of small-pox all goes well, it is not difficult to imagine what would happen were the disease once to break bounds. If small-pox were to infect anything approaching the proportion of the population it has attacked at Gloucester the existing provision for its treatment would be utterly swamped, and the Asylums Board unable to borrow money except with the sanction of the Local Government Board, and unable to acquire sites except after long and tedious formalities, might have to fold their hands as they did in regard to scarlet fever—put up the notice "hospitals full," and leave the sanitary authorities to stew in their own juice. We do not say such things would happen, for we are an adaptive race, and no doubt something would be done; but in view of the disjointed and disconnected machinery by which public health matters are regulated in London, it is well to bear in mind that the system we work under is but a fair-weather arrangement which is sadly likely to break down whenever any strain is put upon it.

"CONCRETE FACTS" CONCERNING VACCINATION.

It is curious to note the suspicion with which many people regard all forms of statistics which involve any but the simplest arithmetical computations. A single great block of the most heterogeneous mixture of facts they will accept; nay, they will, as Dr. Creighton did in his evidence before the Vaccination Commission, rely on it as a "concrete" fact, but any attempt to be more exact, or to sort out this chaos into heaps of similar facts, they resent as an attempt to hocus-pocus and ring the changes. Dr. Creighton said he had a certain distrust of statistical arrangements of all kinds, and preferred to take the facts in as concrete a form as possible. He thought that the Sheffield epidemic was a concrete fact of the most striking kind, as showing the failure of vaccination to ward off small-pox, and that it was impossible to reconcile the Sheffield epidemic with the opinion that vaccination is protective to the community. Yet all the time the statistics of the Sheffield epidemic, by the simple process of dividing the people attacked into two classes according as as they were vaccinated or not, without adding or subtracting a single individual from the total, showed that 49.6 per cent. of those who were unvaccinated had died, against only 4.8 per cent. of those who had been vaccinated. Such concrete facts as those which Dr. Creighton appears to prefer are a constant cause of false inferences, and as much of the most valuable evidence laid before the Vaccination Commission is derived from a careful assortment of the cases into similar groups according to their conditions and their ages—things which are purely matters of fact—it is worth while to bear in mind that, supposing every individual case of small-pox which occurred during the epidemic in Sheffield had fallen upon unvaccinated persons, and the vaccinated had absolutely escaped, the concrete fact of a town vaccinated to the extent of 95 per cent. of its population would have remained unchanged, although its teaching, if accepted as showing the inutility of vaccination, would have been absolutely false. We draw attention to this because it is a standing source of error. "Concrete facts" containing a multitude of dissimilar elements are of but small value, and their real meaning cannot be ascertained until they are sorted out. It is clear that the concrete fact of the Sheffield epidemic would have been just the same even if not a single vaccinated individual had been attacked.

THE ETIOLOGY OF VACCINIA.

So much has been said and so many views have been held as to the relation between variola and vaccinia that it is desirable to call attention to some experiments made by Dr. Klein, F.R.S., in regard to the production of vaccinia from variolous lymph, which are described in that portion of the evidence given before the Royal Commission which is not yet accessible to the public. The experiments were made for the Local Government Board, and are to be found in the Report of the Medical Officer, 1892-93. Two tubes were received from Dr. Simpson, of Calcutta, which had been thus obtained: Lymph taken from a small-pox patient on the fifth day of eruption was inserted into calf No. 1. On the seventh day lymph was taken from this calf and inserted in calf No. 5. On the sixth day lymph was taken from calf No. 5 and transferred to child No. 1. On the fifth day lymph was taken from child No. 1 and transferred to child No. 3 and child No. 4. On the sixth day lymph was taken from child No. 3 and transferred to calf No. 21. The vesicles of this calf were scraped 122 hours later. The material thus obtained was powdered up and mixed with double the quantity of lanolin. This mixture formed the the contents of one of the tubes (*a*). The other tube (*b*) was obtained in a very similar manner. The lymph from each of these tubes was inserted by Dr. Klein in a separate calf, and in both cases typical vaccinia was the result. From one of them 3 children were vaccinated, and in all the result was typical vaccinia, indistinguishable from that raised at the Government Animal Vaccine Establishment. There was no general eruption, and in no way did they during the several weeks that they were kept under observation show anything different from the process of normal vaccinia, and from these children other children were vaccinated with typical results. A calf was also vaccinated with a similar typical result. Photographs and drawings are given of these results both in regard to the infants and the calf. In another series of experiments lymph was collected at the hospital ships from patients suffering from confluent small-pox. This was inserted into calf No. 2 by cutaneous incisions. On the fourth day several of the incisions were swollen but there was no vesiculation. These were compressed and scraped, and with the stuff so obtained calf No. 4 was inoculated by twenty-four incisions. On the fifth day four of the incisions in calf No. 4 were raised and surrounded by an areola, but there was no trace of a vesicle. In the same way as before calf No. 6 was inoculated; again there were no vesicles but the effect was unmistakable, and from this calf inoculation was performed at Lamb's Conduit Street, with perfectly sterile instruments and every possible precaution, on calf No. 8. On the seventh day this had evidently "taken" but no vesicles appeared. Scrapings were, however, obtained and inserted in five places in the arm of an infant, with the result of producing unmistakable vaccinia. The case exhibited in all respects a process of ordinary vaccinia. A scab taken from this child's arm more than a fortnight after the vaccination was mashed up in sterile salt solution, and used for vaccinating calf No. 16 with complete success, and lymph from this calf was used to vaccinate two infants and produced typical vaccinia, and also in other infants who were vaccinated from the two last mentioned. The photographs undoubtedly show true typical vaccinia.

THE GLOUCESTER EPIDEMIC: HOW IT AROSE.

So many incorrect accounts of the origin of the epidemic of small-pox at Gloucester have been circulated, mostly with the object of minimising its relations to the disregard of vaccination which had for some years prevailed in that city, that it will be well to put on record here a brief statement of the matter. So far back as twelve months ago, one or two sporadic cases of small-pox occurred in the city and surrounding suburbs, but up to the end of September they did not exceed 6 in number. Then a slight increase took place, few

weeks being without a case, and by the beginning of this year as many as 5 and 6 per week were notified. Up to this time, however, the disease was well under control, and the resources of the existing isolation hospital, though very limited, were sufficient to meet all requirements. But in the last week of February a sudden explosion of infection took place, the notifications suddenly ran up to 61, and the accommodation of the hospital was at once exhausted. Previous to this explosion, although some unvaccinated children had been attacked, the bulk of the cases had been young persons and adults, who had been vaccinated in infancy, but whose protection had not been renewed by revaccination. The great outburst of the infection which then took place occurred chiefly in unvaccinated children under 10 years of age, most of whom had been in attendance on the infant department of one of the large Board schools which have within the last few years been erected in the newer part of the city. The precise source of the infection by which this conflagration was kindled has been a subject of much controversy, the antivaccinators having endeavoured to make capital out of it by asserting that it was introduced into the school by "a vaccinated teacher." Whether this be so or not is a matter of no great importance either way. What is of prime consideration is that the number of centres of infection thus established, in a neighbourhood which was swarming with unvaccinated children, and under conditions which, in consequence of the sudden exhaustion of accommodation at the hospital, rendering effective isolation impossible, at once gave such an impetus to the epidemic that from that moment it became impracticable to control it. Under the influence of the panic created by this circumstance, the local authority were driven to make desperate efforts to overtake the pestilence by putting up building after building, constructed of iron and wood, for the purpose of extending the available accommodation; but all in vain, for the number of cases that had to be treated in their own homes grew steadily larger. There is little cause for wonder if, in the rush which was thus made to increase the mere ward space of the hospital, there was some oversight in at the same time providing for corresponding enlargement of the administrative arrangements; until a time at length arrived when it was apparent that the whole machinery must come to a standstill unless a vigorous effort were made to systematise it, and to put it under effective control. It is, of course, very easy to blame those who were responsible for this administrative breakdown, but it is less easy to apportion precisely the responsibility which is due to the different parties involved. That the hospital itself has been the cause, in more ways than one, of the increase of the epidemic is unquestionable, and it is one of numerous illustrations of the general irony of the situation that only a short time prior to the present outbreak, the urban and rural authorities of Gloucester had practically decided to unite in erecting a joint hospital some distance outside the city, as a result of which the present hospital would have been entirely removed. As it is, several thousands of pounds have been expended in the erection of buildings of such a temporary character that, apart from their being unfit for use for any other disease than small-pox, it is very doubtful whether they can be removed and used again even for that purpose, and it is more doubtful still whether the Local Government Board will allow any loan to be effected to provide for payment for them. In this, as well as in other respects, the present epidemic is a serious caution to the sanitary authorities of other places as to the folly of postponing the duty of making provision to meet such an outbreak as this, of the certainty of which they had been repeatedly warned, until the enemy was at their doors and had forced the first line of defence before they had had time to strengthen it adequately.

THE GLOUCESTER EPIDEMIC: LAST WEEK'S REPORT.

The new cases notified at Gloucester last week were slightly in excess of those of the previous week, being 84 as against 81. But this increase was apparent rather than real, being due to a large return received from a single medical practitioner on one of the early days of the week, a considerable portion of which ought really to have been sent in during the week before. Making allowance for this discrepancy, there has been, therefore, a further diminution of new cases, though not a large one. From the returns to hand for the present week there is reason to conclude that a larger diminution will be recorded, and, what is equally satisfactory, the type of the epidemic is distinctly ameliorating.

HOW GLOUCESTER LOST FAITH IN JENNER.

The irony of events has surely never asserted itself in a more striking way than it has done in the relations of the centenary of Jenner to the city and county with which his labours are more intimately associated. One hundred years ago Edward Jenner was engaged in the practice of his profession in the small town of Berkeley, in Gloucestershire, sixteen miles from the county town and episcopal city of Gloucester, then the chief urban centre of the county, a position from which it has been since ousted by the increase in the population and social importance of Cheltenham and by the enormous growth of the Gloucestershire portion of the city of Bristol. Although Jenner was no exception to the truth of the old adage that a prophet is generally less honoured in his own country than he is outside of it, he was not without warm supporters in Gloucestershire at an early stage of his discoveries, who recognised their importance and appreciated the distinction they were likely to confer upon the county which was their scene. This recognition was formally emphasised in the marble embodiment of her distinguished son, which the county placed in the cathedral at Gloucester two years after his death. Nor is there any reason to think that from that time until about fifteen years ago the appreciation of vaccination as an effective preventive of small-pox was not so great in Gloucestershire as it was in any other portion of the United Kingdom. But about that time a change began to manifest itself in this hitherto undisturbed feeling of confidence in vaccination which Gloucestershire, in common with the rest of Great Britain, had maintained. A centre of infection was developed in the cathedral city by the establishment in it of a local branch of the organisation which, under the name of the Anti-vaccination League, had begun the mischievous agitation against vaccination it has since so persistently carried on. The influence of this agitation in Gloucester would probably have been small had it not been for the casual support it was able to obtain from the fact that the leader of the movement happened also to be the proprietor of a daily newspaper which had a few years before been established in Gloucester, and was thus in a position to lend the publicity of his columns without stint to every statement, however absurd, which tended to throw discredit on Jenner's work. By this means, aided by a copious diffusion of mendacious antivaccination literature, the faith of the Gloucestrians in vaccination was gradually but surely undermined. The next stage in the campaign thus cleverly commenced was to "nobble" the local Board of Guardians by making compulsory vaccination a test question at the annual elections, and in this way to obtain a majority by whose aid a resolution was passed nine years ago suspending the prosecution of vaccination defaulters. From that time to this the state of public opinion in Gloucester, which by a process of inoculation had diffused itself into the neighbouring portions of the county, has become increasingly disaffected towards vaccination. With the exception of periodical protests in the annual reports of the medical officers of health for the city and county, there was no effort made to stem the flood of misrepresentations with which the antivaccinators assiduously deluged the district. Then came the epidemic which in the early part of the present year burst like a thundercloud over the city, and awakened it rudely

from the fools' paradise into which so many of its inhabitants had been beguiled. Whatever may be the results of the retributive catastrophe by which Gloucester has thus been visited, in checking its prosperity and exhibiting it to the nation as an object-lesson to other localities which have followed similar counsels of unwisdom, there is every reason to hope that the antivaccinators will never again be allowed to diffuse their pernicious literature unopposed, as they have hitherto done. The Jenner Society, which has recently been established in Gloucester, has already done good work in exposing the fallacies and misrepresentations by which the antivaccinators have endeavoured to whittle away the teachings of the epidemic, and if well-supported will be able to present in future a substantial barrier to their mischievous efforts.

THE HAMBURG VARIOLA VACCINE LYMPH.

We have to thank Dr. Leonhard Voigt, Senior Public Vaccinator, Hamburg, for the reprint of his highly interesting article on the Protection afforded by the Hamburg Variola Vaccine Lymph of 1881.[1] He states that in the year 1881 a calf was inoculated with small-pox lymph. The sore produced took the character of cow-pox, and is the origin of the now celebrated stock of Hamburg vaccine lymph. For the first few years this lymph, both in the fresh condition and when stored, showed a higher activity and caused a better development of vaccine pustules than the kinds of lymph previously used. Dr. Voigt waited with interest for eleven years to pass by, in order to see what effect this lymph would have in revaccinations of children already vaccinated with the same lymph in early childhood, and now shows clearly that the failures reached 30 per cent. in the Hamburg revaccinations in the year 1894, although vaccination is in practised hands. This is an astonishing result when we consider that the average of failures which the other vaccine institutes of Germany present is under 6 per cent., and Dr. Voigt concludes that the present Hamburg lymph is exceptionally good in its protective influence against small-pox. But what an object lesson for England is furnished in the fact that small-pox epidemics are so rare in Germany with its compulsory revaccination of school children that Dr. Voigt, as he says himself, can only test the efficacy of his Hamburg lymph by revaccinations! Further, Dr. Voigt states that Chauveau was wrong in asserting that every vesicle which follows the artificial inoculation of small-pox lymph into the cow is really due to accidental transference of vaccine lymph. Experiments have now been so numerous and so carefully performed that there can no longer be any doubt that small-pox can be transferred to the cow, and so cause cow-pox. And the sudden appearance of a high grade of insusceptibility in the Hamburg revaccinations is a fresh argument against Chauveau's view.

Any of our readers who may wish to have separate reprints of the series of coloured illustrations by G. Kirtland, showing the appearances after inoculation of cow-pox and small-pox matters respectively up to the sixteenth day, should make early application to the General Secretary, as it will not be possible to preserve the lithographic plates for any lengthened period.

We regret to learn that there has been no improvement in the condition of Sir Russell Reynolds, which is one of great gravity.

Sir William Priestley took the oath and his seat as M.P. for the Universities of Edinburgh and St. Andrews last week, and received a cordial welcome from both sides of the House.

Owing to the pressure on our space caused by the publication of the articles in connection with the Jenner centenary it has been necessary to hold over a large number of letters, notes from correspondents, and other communications intended for publication.

Nature publishes a warmly appreciative memoir of the President of the Royal Society (Sir Joseph Lister), with an excellent photogravure. The biographical notice is by Professor Tillmans, of Amsterdam.

We learn from a trustworthy source that the Royal Commission on Vaccination are hard at work on their report, and we have reason to believe that they will not let the present session of Parliament pass without presenting it in its final and complete form.

SIR JOHN MILLAIS.

We are glad to learn that, considering the gravity of the disease from which Sir John Millais is suffering, his strength is well maintained and his cheerfulness is unimpaired.

BIRTHDAY HONOURS.

The Queen has been pleased, on the occasion of the celebration of Her Majesty's birthday, to award the following among other honours: To be Companion of the Order of St. Michael and St. George, Surgeon-Lieutenant-Colonel Rogers Pasha, of the Egyptian Sanitary Department; to be Companion of the Order of the Bath, Surgeon-Major-General Charles D. Madden, Q.H.S., retired pay, late Army Medical Staff; to be Knight Commander of the Order of the Star of India, Brigade-Surgeon-Lieutenant-Colonel Alfred S. Lethbridge, M.D., C.S.I., of the Indian Medical Service; to be Companion of the Order of the Indian Empire, Brigade-Surgeon-Lieutenant-Colonel Benjamin Franklin.

THE PATHOLOGICAL SOCIETY OF LONDON.

The meeting of this Society on May 19th being the last of the session, the ordinary business was followed by the usual votes of thanks to the retiring officers. The question of admitting women to the membership of the Society was formally raised and discussed. On a vote being taken it was made evident by a large majority that the opinion of the meeting was opposed to the proposition. The chief reason advanced by speakers against the proposal was that the presence of women would hamper discussion, and so injure the objects and progress of the Society. Professors Baccelli, Koch, Welch, and Ziegler were elected honorary members.

ROYAL COLLEGE OF SURGEONS IN IRELAND.

The annual meeting of the Fellows of the Royal College of Surgeons in Ireland will be held on Saturday, May 30th, when the report for the year will be submitted. On Monday, June 1st, the election of officers will take place. Sir Thornley Stoker will vacate the presidential chair, and Mr. William Thomson will become President. Mr. Kendal Franks will become Vice-President, Mr. Swan, who would otherwise have been elected, having retired in his favour. For the Council Sir Thornley Stoker, Sir William Stokes, Mr. Humphrey Broomfield (Carlow), Mr. Sherlock, and Dr. Harrison Scott will be new candidates.

THE DIFFICULTY AT THE GENERAL HOSPITAL, ADELAIDE, SOUTH AUSTRALIA.

We have already on several occasions explained sufficiently the circumstances of the controversy which has arisen between the medical staff of the Adelaide General Hospital, South Australia, and the Government of that colony. The Premier (Mr. Kingston, Q.C.) appears to have made himself very conspicuous by the violence of his language in criticising the action which the medical staff felt themselves compelled to take as a protest against the arbitrary course adopted by the Government. Too much importance must

[1] Der Impfschutz der Hamburger Variola vaccine des Jahres, 1881: *Deutsche Vierteljahrsschrift für öffentliche Gesundheitspflege*, 1896, Heft 2.

not be attached to the utterances of politicians in the heat of a general election, but there is one statement reported to have been made on behalf of the Government as to which we felt bound to make some inquiries, although it was on the face of it exceedingly improbable. When the negotiations which had been opened with the medical profession on the spot finally broke down, it was given out that in reply to cablegrams it had been ascertained that "three hospital experts could be obtained at Guy's for a reasonable figure," and would come out if called for. We have communicated with the medical superintendent of Guy's Hospital, and he is unable to throw any light on the statement. So far as he is aware no attempt has been made by the Government of South Australia to induce Guy's men to go out to take the vacant appointments at Adelaide, and no Guy's man is going. We have already stated in previous numbers of the British Medical Journal (April 18th, p. 993, April 25th, p. 1053, and May 2nd, p. 1107), the main grounds upon which the medical staff of the hospital felt compelled to take the extreme course of collective resignation, and that in this action they have had the almost unanimous support of the medical profession in the colony. From a careful consideration of all the facts of the controversy as they have come to our knowledge, we have no hesitation in saying that the medical profession in the Colony has been fully justified by the circumstances, and that members of the medical profession in this country will be well advised to refrain from helping the Government of South Australia out of a difficulty which it has created for itself by a long course of arbitrary conduct.

[Since the above was written we have learnt with regret that Dr. Leith Napier, of London, has accepted one of the vacant surgical appointments at the Adelaide Hospital.]

THE GENERAL MEDICAL COUNCIL.

The summer session of the General Medical Council will commence on Tuesday, June 2nd. In addition to the question of appointing examiners in surgery and medicine for the examinations of the Apothecaries' Hall, Dublin, which has been referred back to it by the Privy Council, there will be on the agenda, we understand, several disciplinary cases, raising important questions of principle for consideration and decision.

ROYAL COLLEGE OF PHYSICIANS.

An extraordinary Comitia of the College was held on Thursday, May 14th, Samuel Wilks, M.D., F.R.S., President, in the chair.

The President announced that Dr. W. Collingridge had been appointed Milroy Lecturer for 1897. The ten members of the College who were elected to the Fellowship at the last meeting were admitted Fellows.

A letter was received from the Head Master of Bury St. Edmunds thanking the College for the gift of an engraving of Sir Thomas Watson.

A communication was received from the General Medical Council to the effect that the terms of office of Sir Dyce Duckworth as representative of the College expired on May 14th, and an election was held in accordance with the statute, when Sir Dyce Duckworth was re-elected by an almost unanimous vote as the Representative of the College in the General Medical Council for five years.

THE ASSOCIATION OF FELLOWS OF THE ROYAL COLLEGE OF SURGEONS, ENGLAND.

A meeting of the Committee of the Association of Fellows of the Royal College of Surgeons, England, was held on May 18th, at 25, Grosvenor Street, W.; Mr. Timothy Holmes, Vice-President, being in the chair.

Mr. Percy Dunn, Honorary Secretary, reported that he had received a reply from the President, forwarded through the Secretary of the College, to the resolution passed at the meeting of the Committee on May 6th.[1] The reply was to the effect that it had appeared to the President that the Committee had misinterpreted or had been misinformed as to the proceedings of the Council at the meeting in February, as no such agreement as that referred to in the resolution had been arrived at by the Council either at the meeting in February or any subsequent meeting.

It was decided that no action should be taken regarding this communication.

With regard to the resolution of the Council of the College in favour of polling the Fellows on the question of the representation of the Members on the Council, the following resolution was unanimously adopted:

The Committee of the Association of Fellows, understanding that the Council of the College of Surgeons have nominated a Committee for the purpose of ascertaining the opinion of the Fellows on the question of the Members' representation on the Council, respectfully suggest the following as the points which should be submitted to each Fellow: (1) Are you in favour of giving to the Members direct representation on the Council? (2) If so, do you think that such representatives should be Fellows only, or would you accept Members as representatives? (3) What number of such representatives would you admit? (4) Should they be in addition to the present Council?

A copy of this resolution was directed to be sent to the Secretary of the College, with the request that it be laid before the Council at their next meeting.

It was also reported that the vacancies on the Council this year would be caused by the retirement of Mr. Cadge, Mr. Bryant, and Mr. Pick. It was understood that the former did not intend to offer himself for re-election, but that the two latter would again come forward. It was pointed out that Mr. Bryant had already served two consecutive periods of eight years each. The Honorary Secretary was instructed to communicate with Mr. Victor Horsley, with a view to ascertain his intention as to becoming a candidate for the Council at the election in July next. A similar instruction was given with respect to a provincial Fellow. A long discussion then followed regarding the action which it would be expedient for the Association to take in the event of certain other candidates coming forward. Ultimately the discussion was adjourned until the next meeting of the Committee.

ROYAL COLLEGE OF SURGEONS.

An ordinary Council was held at the College on May 14th; Mr. Christopher Heath, President, was in the chair.

The minutes of the last quarterly Council were read and confirmed.

Mr. Harold J. Stiles was introduced and received from the President the Walker Prize (£60), together with the document declaratory of its award.

Dr. A. A. Kanthack was also introduced and received the Jacksonian Prize for the past year, together with the instrument declaratory of the award thereof.

The consideration of the report from the Committee on the dental surgery regulations was postponed.

A letter was read from Mr. J. S. Edkins forwarding a memorial signed by various professors and lecturers on physiology in the United Kingdom requesting that certain alterations be made in the present examination in physiology for the Fellowship of the College. It was resolved that Mr. J. S. Edkins be informed that the questions respecting the examination for the Fellowship having been very fully discussed only eighteen months ago, the Council do not see their way to reconsider the matter.

It was announced that the annual meeting of Fellows of the College for the election of members of the Council will be held on July 2nd at 1.30 p.m.

A meeting of the Fellows of the College will be held the same day (July 2nd) at 5 p.m.

Mr. Tweedy proposed:

That a poll of the Fellows be taken respecting the motion passed at the general meeting of Fellows on January 2nd in favour of giving to the Members of the College direct representation upon the Council, and that a committee be appointed to prepare, for the approval of the Council, an elucidatory statement of the subject in question, together with the interrogatories which shall be submitted to the Fellows.

This proposition was carried and a committee was appointed.

Letters were read from the Committee of the Society of

[1] British Medical Journal, May 9th, 1896, p. 1169.

Members and from the Committee of the Association of Fellows respecting the resolution adopted by the Council on the subject of the representation of Members on the Council.

ASSOCIATION INTELLIGENCE.

GRANTS FOR SCIENTIFIC RESEARCH.

THE Council of the British Medical Association desire to remind members of the profession engaged in researches for the advancement of medicine and the allied sciences that they are prepared to receive applications for grants in aid of such research. Applications for sums to be granted at the next annual meeting must be made on or before June 15th in writing addressed to the General Secretary, at the office of the Association, 429, Strand. W.C. Applications must include details of the precise character and objects of the research which is proposed.

Reports of work done by the assistance of Association grants belong to the Association.

Instruments purchased by means of grants must be returned to the General Secretary on the conclusion of the research in furtherance of which the grant was made.

FRANCIS FOWKE, *General Secretary.*

429, Strand, London, May 19th, 1896.

BRANCH MEETINGS TO BE HELD.

EAST ANGLIAN AND CAMBRIDGE AND HUNTINGDON BRANCHES.—A conjoint meeting will be held at Dersingham, Norfolk, on Thursday, June 18th. President, A. R. Manby, M.D., East Rudham. Members desirous of reading papers, etc., will kindly communicate with one of the Secretaries, EDGAR G. BARNES, M.D., Eye; M. BEVERLEY, M.D., Norwich; T. CARR, M.D., Braintree; J. GRIFFITHS, M.D., F.R.C.S., Cambridge.

METROPOLITAN COUNTIES BRANCH: EAST LONDON AND SOUTH ESSEX DISTRICT.—The annual meeting for the election of officers will be held at the Royal Forest Hotel, Chingford, on Thursday, June 11th, at 6 P.M. At 6.30 P.M. the members and their friends will dine together. Dr. F. H. Daly, J.P., Vice-President of the District, in the chair. It is hoped that the dinner will be well attended, and members intending to dine are particularly requested to communicate with the Honorary Secretary as early as possible, but not later than Monday, June 8th, so that adequate arrangements may be made.—HERBERT E. POWELL, Honorary Secretary, Glenarm House, Upper Clapton, N.E.

STAFFORDSHIRE BRANCH.—The third general meeting of the session will be held at the Bell Medical Library, Wolverhampton, on Thursday, May 28th. The President, Dr. G. Reid, will take the chair at 3 o'clock. Dinner at the Victoria Hotel at 6 o'clock, charge 5s. Communications: From General Secretary, enclosing copy of Midwives Registration Bill, as drafted by the Parliamentary Bills Committee. and a copy of the same Bill as amended by the Lancashire and Cheshire Branch, and requesting the opinion of the Branch on the subject. From Dr. Rentoul *re* Midwives Bill Opposition (Repayment) Fund. From Mr. T. F. Raven and Dr. A. G. Welsford *re* adoption of duties of Medical Defence by the British Medical Association. [*Vide* signed statement and leading article in BRITISH MEDICAL JOURNAL of February 8th, 1896.] Report of Council recommending the formation of an Ethical Committee. Mr. W. H. Folker will move the following resolution: "That it is desirable to petition the General Medical Council to take into consideration the case of so-called Medical Aid Societies, and to express a hope that they will declare it infamous to knowingly accept or (having unknowingly accepted) to retain a post under any society trading on the services and skill of qualified medical practitioners." Exhibition of pathological specimens, living cases, new instruments, etc. Papers: Dr. Malet: Notes on Two Cases of Evanescent Abdominal Tumour. Mr. T. Vincent Jackson: A recent case in which a large Uterine Fibroid was successfully removed *per vaginam* from a young female.—F. MILNES BLUMER, Honorary Secretary, Stafford.

SOUTH-WESTERN BRANCH.—The annual meeting of this Branch will be held on Wednesday, May 27th, at St. Andrew's Hall, Plymouth. Luncheon will be provided, by invitation of the President-elect, at St. Andrew's Hall, at 1 o'clock. After the meeting there will be a steamer excursion around the Breakwater and up the Hamoaze from 4 to 6 o'clock. The annual dinner will be held at the Duke of Cornwall Hotel, at 7 P.M.; tickets, 6s. each (exclusive of wine).—W. GORDON, Honorary Secretary, Barnfield Lodge, Exeter.

BIRMINGHAM AND MIDLAND COUNTIES BRANCH.—The annual meeting of this Branch will be held at the Birmingham Medical Institute, on Thursday, June 11th, at 3.30 P.M., when, after the ordinary business has been disposed of, an address will be delivered by the President-elect, Mr. M. A. Messiter. The annual dinner will take place the same evening, at 6.30 P.M., at the Grand Hotel. Members of the Branch intending to be present should intimate this to Mr. F. Marsh, 34, Paradise Street, Birmingham.—F. MARSH, F.R.C.S., and W. F. HASLAM, F.R.C.S., Honorary Secretaries.

MEDICAL NEWS.

A FOUNTAIN, erected to the memory of the late Dr. McCandlish, of Balfron, was unveiled on May 9th in that town.

DR. G. HUNTER MACKENZIE, Edinburgh, has been elected a corresponding member of the Societé Française d'Otologie de Laryngologie et du Rhinologie.

A NEW lectureship in Ophthalmology at Queen's College, Belfast, has recently been created in accordance with the regulations of the Royal University of Ireland, and the Council has appointed Dr. W. A. M'Keown as the first incumbent of the new office.

MR. TARGETT, Surgeon to Out-patients at the Samaritan Free Hospital, and Pathological Curator to the Museum of the Royal College of Surgeons, has been appointed English Secretary to the International Periodical Congress of Gynæcology and Obstetrics, vacant by the resignation of Dr. Leith Napier, who is proceeding to Adelaide, South Australia. The Congress, it will be remembered, will be held during the first week of next September.

AT a special meeting of the governors of the Chelsea Hospital for Women on May 20th two new rules were adopted, the one giving the Weekly Board the power to suspend a member of the honorary medical staff for a month, the other giving a three-fourths majority of the members present at a Council meeting duly summoned for the purpose power to dismiss a member of the honorary medical staff. The rules, it was stated, had the approval of the existing medical staff.

NATIONAL HEALTH SOCIETY.—Princess Christian distributed at Grosvenor House on May 16th the diplomas, medals, and certificates to the successful candidates at the National Health Society's examinations. The aim of the Society is to diffuse sanitary knowledge among all classes, organise lectures on domestic hygiene, home nursing, first aid to the injured, prevention of the spread of infectious disease, food and cookery, rearing of infants, etc. During the past year over one hundred ladies have been trained as lecturers.

THE PHARMACEUTICAL SOCIETY.—The annual dinner of the Pharmaceutical Society of Great Britain took place on May 19th. The toast of "The Medical Profession," given by the Vice-President, Mr. Harrison, was acknowledged in a humorous speech by Mr. Christopher Heath. The President, Mr. Carteighe, gave from the chair the toast of "Science," to which Sir J. Crichton Browne replied, maintaining in the course of his speech that, great as had been the advance made in the inventions for destroying life in war, the advance in life-saving methods had been greater. The toast of the evening was given by Mr. Robinson, a member of the Society, and acknowledged in a brief speech by the President, who gave also the toast of "The Guests," for which Sir F. Abel and Dr. W. J. Russell, President of the Institute of Chemistry, made reply.

A DEATH FROM WOOLSORTER'S DISEASE.—An inquest was held on May 12th at Cullingworth as to the death of a man aged 37 who had been employed by a firm of worsted spinners and manufacturers at Keighley. According to the report in the *Bradford Observer*, the man was a "taker-off," and had some five or six men under him who opened out the mohair and separated it into different qualities. His business was then to "take them off," and see that the different sorts were made up to a certain quality. The illness commenced on May 1st, when the patient complained of a slight cold. On May 2nd Dr. J. Jackson was called in, and made a diagnosis of woolsorter's disease. The man died on May 7th. A sample of sputum was examined by Dr. Bell, who demonstrated the presence of the anthrax bacillus. It appeared that the men had a separate room for their meals, and washing accommodation was provided. There was, moreover, an extracting fan for every man, and all the "arrangements for working were as good as they could be." Dr. Jackson, who has practised in the district for some time, had seen several cases of woolsorter's disease fifteen years ago, but since then had only observed an occasional case in which the characteristic boils had appeared. He attributed the decreased prevalence to the precautions which were taken.

MEDICAL VACANCIES.

The following vacancies are announced:

BEDFORD GENERAL INFIRMARY AND FEVER HOSPITAL.—House-Surgeon, doubly qualified. Salary, £100 per annum, with apartments, board, lodging, and washing. Appointment for one year, but eligible for re-election. Applications to the Secretary by June 5th.

BOROUGH OF CHESTERFIELD.—Medical Officer of Health. Appointment for one year. Salary, £300 per annum. Applications endorsed "Medical Officer," to be sent to Jno. Middleton, Town Clerk, by June 1st.

BRIDGWATER INFIRMARY.—House-Surgeon. Salary, £80 per annum, with board and residence. Applications to Mr. John Coombs, Honorary Secretary, Bridgwater Infirmary, Bridgwater, by May 29th.

BUCKS COUNTY LUNATIC ASYLUM, Stone, near Aylesbury.—Assistant Medical Officer, unmarried. Salary, £100 per annum, with board and furnished apartments in the Asylum. Applications to Wm. Crouch, Clerk to the Visiting Committee, County Hall, Aylesbury, by June 5th.

BULUWAYO HOSPITAL.—Resident House-Surgeon; unmarried. Salary, £400 per annum, with free board and lodging. Applications to be addressed to "The Chairman, Hospital Board, Buluwayo, Rhodesia," to reach not later than June 30th.

CHARING CROSS HOSPITAL.—Surgical Registrar. Salary, £40 per annum. Applications to Arthur E. Reade, Secretary, by June 8th.

CITY OF BIRMINGHAM.—Medical Superintendent for the City Hospital for Infectious Diseases, Little Bromwich, Birmingham. Must be under 40 years of age, unmarried, doubly qualified. Salary, £200 per annum, rising £20 yearly to £300 per annum, with apartments, rations, and attendance. Applications, endorsed "Medical Superintendent," to be addressed to Mr. J. Keyte, Clerk to the Health Committee, Council House Birmingham, by May 29th.

CITY OF LONDON HOSPITAL FOR DISEASES OF THE CHEST, Victoria Park, E.—House-Physician. Appointment for six months from July 1st. Board and residence provided, and salary at the rate of £30 per annum. Applications to the Secretary by June 11th.

DUNDEE ROYAL INFIRMARY.—Resident Clinical Assistant. Board, lodging, and washing provided. Applications to the Secretary, D. Gordon Stewart, solicitor, Dundee, by May 27th.

GENERAL HOSPITAL, Barbadoes.—Junior Resident Surgeon. Appointment for three years. Salary, £200 per annum, payable monthly, with unfurnished quarters. Passage paid. Applications to the Secretary, Barbadoes General Hospital, by July 8th.

GOVAN DISTRICT LUNACY BOARD.—Assistant to the Medical Superintendent at the Asylum at Hawkhead, near Paisley. Salary, £100, with board and apartments, unmarried, and not more than 30 years of age. Applications to Andrew Wallace, clerk, 7, Carlton Place, Glasgow, by June 10th.

HAMBLEDON UNION.—Medical Officer for the Workhouse. Salary, £70 per annum, with certain extra fees for midwifery cases and vaccination. Applications to Ferdinand Smallpeice, clerk, Clerk's Office, Guildford, by June 2nd.

HAVERSTOCK HILL AND MALDEN ROAD PROVIDENT DISPENSARY, 132, Malden Road, N.W.—Two Medical Officers. Applications to the Honorary Secretary, Mr. Claud Scott, at the Dispensary, by May 27th.

HOSPITAL FOR CONSUMPTION AND DISEASES OF THE CHEST, Brompton.—Resident Assistant Medical Officer. Salary, £50 per annum, with board and residence. Applications to the Secretary by May 27th.

HOSPITAL FOR SICK CHILDREN, Great Ormond Street, Bloomsbury.—House-Surgeon, unmarried. Appointment for six months. Salary, £20, with board and residence in the hospital. Resident Medical Superintendent. Appointment for one year subject to re-election. Salary, £105 per annum, with board and residence in the hospital. Applications, on forms to be provided, to be sent to the Secretary by May 29th.

HOSPITAL FOR WOMEN, Soho Square, W.—Assistant House-Physician (non-resident). Appointment for three months. Applications to David Cannon, Secretary by May 26th.

LONDON HOSPITAL, Whitechapel, E.—Medical Registrar. Salary, £100 per annum. Assistant Physician, must be M.R.C.P.Lond. Applications to G. Q. Roberts, Secretary and House Governor, by June 11th.

LONDON LOCK HOSPITAL, Harrow Road, W.—House-Surgeon to the Female Hospital, doubly qualified. Salary, £50 per annum, with board, lodging, and washing. Applications to the Secretary by May 30th.

MANCHESTER CLINICAL HOSPITAL FOR WOMEN AND CHILDREN, Park Place, Cheetham Hill Road.—Honorary Assistant Physician. The selected candidate will not be allowed to hold any other hospital appointments. Applications to Mr. Hubert Teague, Secretary, 38, Barton Arcade, Manchester, by June 6th.

MIDDLESEX HOSPITAL, W.—Assistant Surgeon. Applications to F. Clare Melhado, Secretary Superiutendent, by June 8th.

NATIONAL HOSPITAL FOR DISEASES OF THE HEART AND PARALYSIS, Soho Square, W.—Resident Medical Officer; doubly qualified. Board, residence, laundry, and an honorarium of 10 guineas for the term of office for six months. Applications to the Secretary by May 25th.

NORTH-EASTERN HOSPITAL FOR CHILDREN, Hackney Road, Shoreditch, N.E.—House-Physician. Appointment for six months, at the expiration of which he will be required, if eligible, to serve as House-Surgeon for six months. Salary as House-Physician at the rate of £60 per annum; as a House-Surgeon (the senior post) at the rate of £80 per annum. Must be doubly qualified. Junior House-Physician; doubly qualified. Appointment for six months. No salary, but board and lodging (including washing) provided. Applications to the Secretary at the City Office, 27, Clement's Lane, E.C., by June 8th.

PADDINGTON GREEN CHILDREN'S HOSPITAL, London, W.—Physician to Out-patients, and Surgeon to Out-patients. Applications to the Secretary by May 30th.

PARISH OF GLENELG.—Medical Officer for the Northern Division of Parish. Salary, £110 per annum with free house and garden. Gaelic a recommendation. Applications to D. McLure, Inspector of Poor, by June 30th.

QUEEN CHARLOTTE'S LYING-IN HOSPITAL, Marylebone Road, N.W.—Resident Medical Officer. Appointment for four months. Salary at the rate of £60 per annum, with board and residence. Applications to the Secretary by June 1st.

QUEEN'S JUBILEE HOSPITAL, Earl's Court, S.W.—Aurist and Laryngoscopist and House-Surgeon. Appointment for the latter for six months; honorarium, £100 per annum and rooms. Applications to the Secretary for the former appointments to reach by May 30th.

ROYAL BERKSHIRE HOSPITAL, Reading.—Assistant Medical Officer. Board, lodging, and washing provided. Honorarium of ten guineas will be awarded if the duties are performed satisfactorily. Appointment for six months from July 1st. Applications to the Secretary before June 5th.

ROYAL COLLEGE OF SURGEONS OF ENGLAND.—Hunterian Professors, Erasmus Wilson Lecturer, and Arris and Gale Lecturer for the ensuing years. Applications to Edward Trimmer, Secretary, by June 2nd.

ROYAL EYE HOSPITAL, Southwark.—Surgeons and Assistant Surgeons and Clinical Assisiants. Applications to the Secretary at the Hospital by June 8th.

ROYAL HOSPITAL FOR DISEASES OF THE CHEST, City Road.—House-Physician. Appointment for six months. Salary at the rate of £40 per annum, with lodging and laundry. Applications to the Secretary by May 25th.

ROYAL WESTMINSTER OPHTHALMIC HOSPITAL, King William Street, West Strand.—House-Surgeon and Clinical Assistants. Applications to T. Beattie Campbell, Secretary, by May 30th.

ST. GEORGE'S AND ST. JAMES'S DISPENSARY, 60, King Street, Regent Street, W.—Surgeon; must be F.R.C.S. or M.R.C.S.Eng. Applications to the Secretary by May 23rd.

STAMFORD HILL, STOKE NEWINGTON, CLAPTON, ETC., DISPENSARY, 189, High Street, Stoke Newington, N.—Junior Resident Medical Officer. Salary at the rate of £50 per annum during the first quarter, afterwards at the rate of £75 per annum, with board and lodging. Applications to the Senior Resident Medical Officer by June 3rd.

STOCKPORT INFIRMARY.—Junior Assistant House-Surgeon; doubly qualified. Appointment for six months, with board and residence. An honorarium of £10 given after six months' satisfactory service. Applications to the Secretary by May 26th.

SUSSEX COUNTY HOSPITAL, Brighton.—House-Physician, doubly qualified, unmarried, and under 30 years of age. Salary commencing at £50 per annum, with board and residence in the hospital, and washing. Applications to the Secretary by June 3rd.

UNIVERSITY COURT OF ST. ANDREWS.—Lecturers on (1) Anatomy; Salary, £300 per annum, with class fees. (2) Materia Medica; salary, £200, with class fees. (3) History; salary, £200, with class fees. Applications to Mr. Stuart Grace, Secretary to the University Court, by June 1st.

WESTON-SUPER-MARE HOSPITAL AND DISPENSARY.—Medical Officer to the Provident Dispensary; doubly qualified. Salary, £80 per annum, with board, lodging, and washing. Applications to the Honorary Secretary by May 26th.

MEDICAL APPOINTMENTS.

BOWDEN, Dr. John B., appointed Medical Officer for the Second District of the St. Austell Union.

DEVANE, Thomas Francis, L.R.C.P.E., L.R.C.S.E., appointed Medical Officer to the Linen and Woollen Drapers' Institute for the Districts of Penge, Anerley, and Sydenham.

FRASER, A. Mearns, M.B., D.P.H., appointed Port Sanitary Medical Officer and Medical Officer of Health to the Borough of Portsmouth, *vice* Dr. Mumby, resigned.

FREER, E. Luke, M.R.C.S.Eng., appointed Honorary Assistant Surgeon to Birmingham Royal Orthopædic and Spinal Hospital.

GARSTANG, Thos. W. H., M.A.Oxon., M.R.C.S.Eng., appointed Medical Officer of Health to the Winsford Urban District Council.

GORRINGE, Mr. C. J., appointed Assistant Medical Officer to the Workhouse of the Sheffield Union.

GREEN, John, M.R.C.S.Eng., L.S.A., appointed Medical Officer of Health to the Heath Town Urban District Council.

JAMESON, R. C., M.B., C.M.Edin., appointed Junior Assistant Surgeon to the Huddersfield Infirmary, *vice* E. Whichello, B.A.Camb., M.B., B.C., resigned.

JOHNSON, Dr. J. J., appointed Medical Officer for the King's Sutton District of the Brackley Union.

KAYE, James R., M.B., C.M.Glasg., D.P.H.Camb., appointed Medical Officer of Health to the West Riding County Council, *vice* B. A. Whitelegge, M.D., B.Sc., resigned.

MACGREGOR, D. A., M.B., C.M.Edin., appointed Medical Officer of Health to the Denby and Cumberworth Urban District Council.

MARSHALL, W. L. W., M.R.C.S.Eng., L.S.A., appointed Honorary Surgeon to the Huddersfield Infirmary, *vice* John Martiu, resigned.

MARTIN, J. C., L.R.C.P.I., L.R.C.S.I., L.M., appointed Assistant Medical Officer of Donegal District Asylum, Letterkenny.

MEYER, W. R., L.S.A.Lond., appointed Medical Officer for the Fourth District of the Cuckfield Union.

MORGAN, Thomas, L.R.C.P.I., L.R.C.S.I., appointed Medical Officer for the Forden, Llandyssil, and Llanmerewig Districts of the Forden Union.

MORTIS, H. E., L.R.C.P.Lond., L.S.A., appointed Medical Officer for the Fifth District of the Oswestry Incorporation.

MOYSEY, Lewis, M.A., B.C.Cantab., appointed House-Surgeon to the Paddington Green Children's Hospital.

NITCH-SMITH, Reginald, M.R.C.S.Eng., L.R.C.P.Lond., reappointed Resident House-Physician to the Westminster Hospital.

RIDLEY, N. C., M.B.Lond., F.R.C.S., L.R.C.P., R.N. (retired) appointed Honorary Ophthalmic Surgeon to the Leicester Infirmary *vice* F. H. Hodges, F.R.C.S.Edin. deceased.

ROBINSON, E. Stanley, M.R.C.S., L.R.C.P., reappointed Medical Officer of Health to the Stourport Urban District Council.

SAUNDERS, A. L., M.R.C.S.Eng., L.R.C.P.Lond., appointed Medical Officer for the First South-Eastern District of the Freebridge Lynn Union.

SIBLEY, W. Knowsley, M.A., M.D., M.R.C.P., appointed Medical Examiner to the New York Life Insurance Company.

STEVENS, T. G., M.D.Lond., M.R.C.P., F.R.C.S., appointed Obstetric Physician to the Surrey Dispensary.

STRETCH, Dr. G. S. R., appointed Medical Officer for the Tudhoe District of the Durham Union.

SWETE, E. D. W., M.D.St.And., M.R.C.S., D.P.H., reappointed Medical Officer of Health for the Droitwich Rural District Council.

TROUP, J. Macdonald, B.A.Cantab., L.S.A., appointed House-Physician to the Paddington Green Children's Hospital.

WATERS, Dr., appointed Medical Officer for the Berriew District of the Forden Union.

WEIR, Archibald M., L.R.C.P., L.R.C.S.Edin., reappointed Medical Officer of Health to the Malvern Link Urban District Council.

WOOLLCOMBE, W. L., F.R.C.S.E., M.R.C.S.Eng., L.R.C.P.Lond., appointed one of the Senior Honorary Surgeons to the South Devon and East Cornwall Hospital, Plymouth, *vice* Wm. Square, L.R.C.P.Lond., F.R.C.S.Eng., deceased.

DIARY FOR NEXT WEEK.

TUESDAY.

THE CLINICAL MUSEUM, 211, Great Portland Street.—Open at 2 P.M., Lecture at 4.

ROYAL MEDICAL AND CHIRURGICAL SOCIETY, 20, Hanover Square, W., 8.30 P.M.—Dr. Samuel West: Case of Splenic Anæmia (*splenomegalie primitive*), with an account of the disease. Sir Alfred B. Garrod: On the Use of Guaiacum in the Treatment of Chronic Gouty Affections, and its Value in Warding off Acute Attacks.

WEDNESDAY

LONDON POST-GRADUATE COURSE, Hospital for Diseases of the Skin, Blackfriars, 4.30 P.M.—Dr. Payne: Seborrhœa.

NATIONAL HOSPITAL FOR THE PARALYSED AND EPILEPTIC, Queen Square, W.C., 3 P.M.—Lecture by Dr. Beevor (Paralysis of the Soft Palate).

HOSPITAL FOR CONSUMPTION AND DISEASES OF THE CHEST, Brompton, 4 P.M.—Dr. Biss: Intrathoracic Aneurysm of the Aorta.

THURSDAY

VICTORIA HOSPITAL FOR CHILDREN, Tite Street, Chelsea 4 P.M.—Mr. Pickering Pick: On Operative Interference in Morbus Coxæ.

LONDON POST-GRADUATE COURSE, British Institute of Preventive Medicine, Great Russell Street, W.C., 3.30 P.M.—Dr. Allan Macfadyen and Mr. A. G. Foulerton: Quantitative Estimation of Albumins Present. Central London Sick Asylum, Cleveland Street, W., 5.30 P.M.—Dr. T. Henry Green: Clinical Lecture

FRIDAY.

LONDON POST-GRADUATE COURSE, Bacteriological Laboratory, King's College, 3 P.M.—Professor Crookshank: Tuberculosis and Leprosy. 4 to 5 P.M.—Staining Sputum Sections.

BIRTHS, MARRIAGES, AND DEATHS.

The charge for inserting announcements of Births, Marriages, and Deaths is 8s. 6d., which sum should be forwarded in post office order or stamps with the notice not later than Wednesday morning, in order to ensure insertion in the current issue.

BIRTHS.

ROBINSON.—On May 16th, at 1, Upper Wimpole Street, W., the wife of Henry Betham Robinson, M.S.London, F.R.C.S., of a son.

MARSHALL.—At Simla on May 8th the wife of Surgeon-Captain D. G. Marshall of a son.

MARRIAGES

BRODIE—ARMSTRONG.—On May 15th, at Hove Parish Church, Charles Gordon Brodie, F.R.C.S., of Harley Street, eldest son of Frederick Brodie, of Fernhill, Wootton, Isle of Wight, to Antoinette, eldest daughter of Major-General Armstrong.

BARNARD—ORFORD.—On May 19th, at St. Peter's, Cranley Gardens, by the Rev. Denton Jones, Richard Barnard, M.R.C.S., etc., late Surgeon R.N., youngest son of the late William Barnard, of Harlow, Essex, to Jane, only daughter of the late John Orford, of Brooks Hall, Ipswich.

HOURS OF ATTENDANCE AND OPERATION DAYS AT THE LONDON HOSPITALS.

CANCER, Brompton (Free). *Attendances*—Daily, 2. *Operations*.—Tu. F. S., 2.

CENTRAL LONDON OPHTHALMIC. *Operations*.—Daily,

CHARING CROSS. *Attendances*.—Medical and Surgical, daily, 1.30; Obstetric, Tu. F., 1.30; Skin, M., 1.30; Dental, M. W. F., 9; Throat and Ear, F., 9.30. *Operations*.—W. Th. F., 3.

CHELSEA HOSPITAL FOR WOMEN. *Attendances*.—Daily, 1.30. *Operations*.—M. F., 2.

CITY ORTHOPÆDIC. *Attendances*.—M. Tu. Th. F., 2. *Operations*.—M., 4.

EAST LONDON HOSPITAL FOR CHILDREN. *Operations*.—F., 2.

GREAT NORTHERN CENTRAL. *Attendances*.—Medical and Surgical, M. Tu. W. Th. F., 2.30; Obstetric, W., 2.30; Eye, M. Th., 2.30; Throat and Ear, Tu. F. 2.30 Skin, W., 2.30; Dental, W., 2. *Operations*.—W.,

GUY'S. *Attendances*.—Medical and Surgical, daily, 1.30; Obstetric, M. Tu. F., 1.30; Eye, M. Tu. Th. F., 1.30; Ear, Tu., 1; Skin, Tu., 1; Dental, daily, 9; Throat, F., 1. *Operations*.—(Ophthalmic) M. Th., 1.30; Tu. F., 1.30.

HOSPITAL FOR WOMEN, Soho. *Attendances*.—Daily, 10. *Operations*.—M. Th., 2.

KING'S COLLEGE. *Attendances*.—Medical, daily, 2; Surgical, daily, 1.30; Obstetric, daily, 1.30; o.p., Tu. W. F. S., 1.30; Eye, M. Th., 1.30; Ophthalmic Department, W., 2; Ear, Th., 2; Skin, F., 1.30; Throat, F., 1.30; Dental, Tu. Th., 9.30. *Operations*.—M. F. S., 2.

LONDON. *Attendances*.—Medical, daily exc. S., 2; Surgical, daily, 1.30 and 2; Obstetric, M. Th., 1.30; o.p., W. S., 1.30; Eye, Tu. S., 9; Ear, S., 9.30; Skin, Th., 9; Dental, Tu., 9. *Operations*.—M. Tu. W. Th. S., 2.

LONDON TEMPERANCE. *Attendances*.—Medical, M. Tu. F., 2; Surgical, M. Th., 2. *Operations*.—M. Th., 4.30.

METROPOLITAN. *Attendances*.—Medical and Surgical, daily, 9; Obstetric, W., 2. *Operations*.—F., 9.

MIDDLESEX. *Attendances*.—Medical and Surgical, daily, 1.30; Obstetric, M. Th., 1.30; o.p., M. F., 9; W., 1.30; Eye, Tu. F., 9; Ear and Throat, Tu., 9; Skin, Tu., 4; Th., 9.30; Dental, M. W. F., 9.30. *Operations*.—W., 1.30; S., 2; (Obstetrical), Th., 2.

NATIONAL ORTHOPÆDIC. *Attendances*.—M. Tu. Th. F., 2. *Operations*.—W., 10.

NEW HOSPITAL FOR WOMEN. *Attendances*.—Daily, 2; Ophthalmic, W. S., 9.30 *Operations*.—Tu. F., 9.

NORTH-WEST LONDON. *Attendances*.—Medical and Surgical, daily, 2; Obstetric, W., 2; Eye, W., 9; Skin, F., 2; Dental, F., 9. *Operations*.—Th., 2.30.

ROYAL EYE, Southwark. *Attendances*.—Daily, 2. *Operations*.—Daily.

ROYAL FREE. *Attendances*.—Medical and Surgical, daily, 2; Diseases of Women, Tu. S., 9; Eye, M. F., 9; Dental, Th., 9. *Operations*.—W. S., 2; (Ophthalmic), M. F., 10.30; (Diseases of Women), S., 9.

ROYAL LONDON OPHTHALMIC. *Attendances*.—Daily, 9. *Operations*.—Daily, 10.

ROYAL ORTHOPÆDIC. *Attendances*.—Daily, 1. *Operations*.—M., 2.

ROYAL WESTMINSTER OPHTHALMIC. *Attendances*.—Daily, 1. *Operations*.—Daily.

ST. BARTHOLOMEW'S. *Attendances*.—Medical and Surgical, daily, 1.30; Obstetric, Tu. Th., S., 2; o.p., W. S., 9; Eye, W. Th. S., 2.30; Ear, Tu. F., 2; Skin, F., 1.30; Larynx, F., 2.30; Orthopædic, M., 2.30; Dental, Tu. F., 9. *Operations*.—M. Tu. W. S., 1.30; (Ophthalmic), Tu. Th., 2.

ST. GEORGE'S. *Attendances*.—Medical and Surgical, M. Tu. F. S., 12; Obstetric, M. Th., 2; o.p., Eye, W. S., 2; Ear, Tu., 2; Skin, W., 2; Throat, F., 2; Orthopædic, W., 2; Dental, Tu. S., 9. *Operations*.—M. Tu. Th. F. S., 1.

ST. MARK'S. *Attendances*.—Fistula and Diseases of the Rectum, males S., 3; females; W., 9.45. *Operations*.—M., 2; Tu., 2.30.

ST. MARY'S. *Attendances*.—Medical and Surgical, daily, 1.45; o.p., 1.30; Obstetric, Tu. F., 1.45; o.p., M. Th., 1.30; Eye, Tu. F. S., 9; Ear, M. Th., 3; Orthopædic, W., 10; Throat, Tu. F., 3.0; Skin, M. Th., 9.30; Electro-therapeutics, M. Th., 2.30; Dental, W. S., 9.30; Children's Medical, Tu. F., 9.15; Children's Surgical, S., 9.15. *Operations*.—M., 2.30.; Tu. W. F., 2; Th., 2.30; S., 10; (Ophthalmic), F., 10.

ST. PETER'S. *Attendances*.—M. 2 and 5; Tu., 2; W., 5; Th., 2; F. (Women and Children), 2; S., 4. *Operations*.—W. F., 2.

ST. THOMAS'S. *Attendances*.—Medical and Surgical, M. Tu. Th. F., 2; o.p., daily, 1.30; Obstetric, Tu. F., 2; o.p., W. S., 1.30; Eye, Tu. F., 2; o.p., daily, exc. S., 1.30; Ear, M., 1.30; Skin, F., 1.30; Throat, Tu. F., 1.30; Children, S., 1.30; Electro-therapeutics, o.p., Th., 2; Mental Diseases, o.p., Th., 10; Dental, Tu. F., 10. *Operations*.—M. W. Th. S., 2; Tu. Th., 3.30; (Ophthalmic), Th., 2; (Gynæcological), Th., 2.

SAMARITAN FREE FOR WOMEN AND CHILDREN. *Attendances*.—Daily, 1.30. *Operations*.—W., 2.30.

THROAT, Golden Square. *Attendances*.—Daily, 1.30; Tu. F., 6.30. *Operations*.—Th., 2.

UNIVERSITY COLLEGE. *Attendances*.—Medical and Surgical, daily, 1.30; Obstetrics, M. W. F., 1.30; Eye, M. Th., 2; Ear, M. Th., 9; Skin, W., 1.45, S., 9.15; Throat, M. Th., 9; Dental, W., 9.30. *Operations*.—Tu. W. Th., 2.

WEST LONDON. *Attendances*.—Medical and Surgical, daily, 2; Dental, Tu. F., 9.30; Eye, Tu. Th. S., 2; Ear, Tu., 10; Orthopædic, W., 2; Diseases of Women, W. S., 2; Electric, Tu., 10; F., 4; Skin, F., 2; Throat and Nose, S., 10. *Operations*.—Tu. F., 2.30.

WESTMINSTER. *Attendances*.—Medical and Surgical, daily, 1; Obstetric, Tu., F., 1; Eye, Tu. F., 9.30; Ear, M., 9; Skin, W., 1; Dental, W. S., 9.15. *Operations*.—Tu. W., 2.

LETTERS, NOTES, AND ANSWERS TO CORRESPONDENTS.

COMMUNICATIONS FOR THE CURRENT WEEK'S JOURNAL SHOULD REACH THE OFFICE NOT LATER THAN MIDDAY POST ON WEDNESDAY. TELEGRAMS CAN BE RECEIVED ON THURSDAY MORNING.

COMMUNICATIONS respecting Editorial matters should be addressed to the Editor, 429, Strand, W.C., London; those concerning business matters, non-delivery of the JOURNAL, etc., should be addressed to the Manager, at the Office, 429, Strand, W.C., London.

AUTHORS desiring reprints of their articles published in the BRITISH MEDICAL JOURNAL are requested to communicate beforehand with the Manager, 429, Strand, W.C.

CORRESPONDENTS who wish notice to be taken of their communications should authenticate them with their names—of course not necessarily for publication.

CORRESPONDENTS not answered are requested to look to the Notices to Correspondents of the following week.

MANUSCRIPTS FORWARDED TO THE OFFICE OF THIS JOURNAL CANNOT UNDER ANY CIRCUMSTANCES BE RETURNED.

IN order to avoid delay, it is particularly requested that all letters on the editorial business of the JOURNAL be addressed to the Editor at the Office of the JOURNAL, and not to his private house.

PUBLIC HEALTH DEPARTMENT.—We shall be much obliged to Medical Officers of Health if they will, on forwarding their Annual and other Reports, favour us with *duplicate copies*.

☞ *Queries, answers, and communications relating to subjects to which special departments of the* British Medical Journal *are devoted will be found under their respective headings.*

QUERIES.

Dr. George T. Woods (Killinghall, Ripley, Yorks) asks for advice as to the best place for a patient to be sent to for a time who is suffering from hysterical paraplegia.

Books on Treatment.

A Young Practitioner asks for information as to the best books to read on the treatment of diseases.

*** The following books deal with the treatment of disease: *A Manual of Medical Treatment and Clinical Therapeutics*, by Dr. Burney Yeo, 2 vols. 4th edition, 21s., Cassell and Co. *A Textbook of General Therapeutics*, by Dr. Hale White, 8s. 6d., Macmillan and Co. There is a much larger work edited by Professor Hare, and entitled, *A System of Practical Therapeutics*; it is published by Young J. Pentland.

Death by Suggestion.

Rosa asks if there is on record, and if so where, the case of a man condemned to the guillotine in France who was, by the consent of the authorities, given over to a body of doctors. One of whom impressed upon him that he was about to give him a painless death by bleeding, and that in five minutes he would be dead. He then scratched his foot without drawing blood and placed it in warm water, whereon the man died.

*** We are unable to trace the incident to which our correspondent alludes. Similar ones, however, have happened at all times and in all countries, for, as Sir Benjamin Ward Richardson has lately pointed out, there is in every community a class which he calls the "morituri," who, from one cause or another, are ready to die under unfavourable circumstances. The most classical instance is that recorded by Johannes Capistranus, appointed a judge by King Ladislaus about 1320. "He having examined a certain earl accused of treason by torture, condemned him to lose his head, as also the son of the earl, by the King's order, had the same sentence, but yet with this purpose only—that, stricken with fear, he should betray some of his father's counsels, if possibly he had been partaker of them, but if he was found innocent that then he should be spared. They were therefore both led to the place of execution, where, when the son had seen his father beheaded, and verily believed he was destined to the same puuishment, seized with an extraordinary fear, he fell down dead;" with whose unexpected fate the judge was so vehemently affected that, according to the superstition of that age, leaving a secular life, he betook himself to a monastery.

ANSWERS.

J. D.—An assistant is morally, if not legally, bound by his agreement, whether stamped or not.

Treatment of Sprue.

Surgeon-Captain C. Birt (Meerut, India) writes: In answer to "Sprue," a friend of mine who was reduced to a skeleton by this disease attributes his recovery to an exclusively leguminous diet, composed at first of revalenta food, for which he afterwards substituted lentils, or Indian *dholl*. A paper by Bovet abstracted in the Epitome of the British Medical Journal, August 10th, 1895, on leguminous alimentation in diseases of digestion is of interest on this point.

NOTES, LETTERS, Etc.

Erratum.—In the answer to "G. W. I." on Tests for Albumen in the British Medical Journal of May 16th, p. 1243, line 1, for "adoption" read "addition."

Sugar in Urine of very Low Specific Gravity.

Dr. Edward O. Daly, M.D.Oxon. (Hull), writes: As is well known, it is not safe to infer from a low specific gravity alone the absence of sugar. I have lately seen a lady in consultation, the specific gravity of whose urine was found to be only 1002, and yet the presence of sugar was distinctly shown by Fehling's solution. The urinometer used is known to be accurate, and the Fehling's solution was freshly prepared, and the mixture boiled before adding the urine. I should not have tested for sugar in this case had not the ordinary medical attendant told me that sugar had been present at times for some months.

LETTERS, COMMUNICATIONS, Etc., have been received from:

(A) Alpha; Dr. J. L. A. Aymard, Ipswich. **(B)** Messrs. Baillière, Tindall, and Cox, London; Mr. W. Berry, Wigan; Mr. W. G. Black, Edinburgh; Messrs. Bruckner, Lampe and Co., Berlin; F. B. Blumer, M.B., Stafford; Dr. E. G. Barnes, Eye; Dr. J. Barr, Liverpool; Mr. W. D. Betenson, London; Messrs. Brady and Martin, Newcastle-on-Tyne; J. R. Bibby, M.B., Gloucester. **(C)** Mr. B. Clark, London; Dr. A. H. Carter, Birmingham; Mr. M. Cahill, Ellesmere; Mr. W. D. Calvert, Brighton; T. Caverhill, M.B., Edinburgh; Mr. F. G. Carrington, London; Mr. W. Campbell, Sunderland. **(D)** Dr. T. Dutton, London; Dr. H. Drinkwater, Wrexham; Dr. E. O. Daly, Hull; Mr. G. W. Dickinson, London; J. S. Dick, M.B., Manchester; J. Dunlop, M.B., Gateshead-on-Tyne; D.P.H. **(E)** J. H. Ewart, M.B., Edinburgh; Mr. T. B. F. Eminson, Scotter; Messrs. Evans, Lescher and Webb, London. **(F)** Mr. G. P. Field, London; Messrs. J. S. Fry and Sons, Bristol; Mr. E. L. Freer, Birmingham; Mr. A. M. Fraser, Portsmouth; Mr. A. Fraser, London; Mr. P. Furnivall, London. **(G)** Messrs. R. W. Greeff and Co., London; Dr. J. Gairdner, Crieff; L. D Gamble, M.B., Abergavenny. **(H)** Mr. K. M. Hunter, London; Dr. F. T. Heuston, Dublin; Dr. T. W. Hime, Bradford; Dr. A. Haig, London; Dr. McLane Hamilton, London; Mr. T G. Horder, Cardiff; Dr. R. D. Helm, Carlisle; Miss M. Hawtrey, London. **(I)** Mr. J. V. Ingram, Philadelphia; Mr. F. E. Image, Bury St. Edmund's; Mr. W. E. Ironside, Nottingham. **(J)** Mr. H. H. Jennings, London; Sir George Johnson, London; J. H. Joyce, M.B., Canterbury; Mr. F. W. Jordan, Heaton Chapel. **(K)** Mr. A. Kitson, London; Dr. R. Kirk, Glasgow; Mr. A. F. S. Kent, London; Dr. J. R. Kealy, Gosport; Dr. A. Kerr, Birkenhead. **(L)** Mr. R. Lyddon, Deal; Dr. C. Latter, Folkestone; Mr. T. Laffan, Cashel; Dr. Lahausen, Munich; Mr. A. Lendon, London; R. C. Lucas, M.B., London. **(M)** M.B.; Mr. F. C. Melhado, London; Mr. B. F. Meadows, Hastings; Dr. C. H. May, New York; J. Marr, M.B., Greenlow; Mr. J. C. Martin, Letterkenny; Dr. H. Mackenzie, Edinburgh; Member; M.D.; Dr. J. T. J. Morrison, Birmingham; Dr. M. A. Messiter, Dudley; M.R.C.S.; Mr. T. S. Manford, London. **(N)** Mr. R. Nitch-Smith, London; Mr. W. H. Nash, Dublin. **(P)** Mr. L. Porri, Grimsby; Mr. W. H. Pearse, London; Messrs. Parke, Davis and Co., London; Persevere; Dr. T. F. Pearse, Southsea; Practitioner; Mr. H. C. Powell, London. **(R)** Dr. R. R. Rentoul, Liverpool; Mr. J. G. Robertson, Ashwell; Mr. J. A. Raye, Banbury; Row; Dr. J. Rust, London; Mr. J. Rankin, Kilmarnock; Dr. A. Routh, London; Mr. J. Ritchie, London. **(S)** Dr. A. Smart, Edinburgh; Dr. J. C. Simpson, Tunbridge Wells; Mrs. E. Stuart, Eastbourne; Mr. J. Simpson, Sherborne; R. M'C. Service, M,B., Glasgow; Dr. J. Solis-Cohen, Philadelphia; Mr. A. Salter, London; Dr. H. Stanley, Ashford; S. Stephenson, M.B., London; Mr. P. Smith, Birmingham; Mr. G. A. G. Sampson, London; Dr. W. K. Sibley, London; Dr. T. G. Stevens, London; Mr. N. Stanhope, London; Mr. L. M. Smith, London. **(T)** Dr. J. H. Thompson, Bolton; Mr. W. Tibbles, Nottingham; Mr. J. L. Thomas, Cardiff. **(W)** Mr. G. M. Weatherley, Bath; Mr. C. H. Wells; London; Mr. W. L. Woollcombe, Plymouth; Mr. R. M. West, Leicester: Mr. A. Winkfield, Oxford. **(Y)** Young Member of the B.M.A.; Mr. P. M. Yearsley, London; Mr. N. E. Yorke-Davies, London; etc.

BOOKS, Etc., RECEIVED.

Southall's Organic Materia Medica. Fifth and enlarged edition. By J. Barclay, B.Sc. London: J. and A. Churchill. 1896. 6s.

Mountain, Moor, and Loch, illustrated by Pen and Pencil, on the Route of the West Highland Railway. Second edition. London: Sir Joseph Causton and Sons. 1895.

The Co-Education of the Sexes. By Mabel Hawtrey. London: Kegan Paul, Trench, Trübner and Co. 1896.

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*** In forwarding books the publishers are requested to state the selling prices.

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Is charmingly situated in a healthy and retired neighbourhood, midway between Liverpool and Manchester, about 2 miles from Newton-le-Willows Station on the London and North Western Railway. It is a comfortably-furnished Country Mansion, especially adapted for the care and treatment of persons of unsound mind.

Besides the use of the general sitting-rooms, &c., patients of both sexes can have private apartments and special attendants at moderate rates of payment. Information as to terms, &c., may be obtained on application to the Resident Medical Superintendent, CHARLES T. STREET, L.R.C.P.Lond., M.R.C.S.Eng., who attends at 49B, Rodney Street, Liverpool, on Thursday from 2 to 4.

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WONFORD HOUSE HOSPITAL for the INSANE, near EXETER.—A Registered Hospital for the UPPER and MIDDLE CLASSES.—This Institution is situated in a beautiful and healthy locality, within a short distance of the City of Exeter. There is comfortable accommodation at moderate rates, both in the Hospital itself and at Plantation House, Dawlish, a seaside residence on the South Devon Coast, affording more privacy, with the benefit of sea-air and a mild and salubrious climate. Private rooms and Special Attendants provided if required. Voluntary Patients or Boarders also received without certificates. For terms, &c., apply to P. MAURY DEAS, M.B., M.S.Lond., Resident Medical Superintendent.

WEST MALLING PLACE, KENT, for MENTAL DISORDERS, an easy distance from London, between SEVENOAKS and MAIDSTONE, a commodious country residence, beautifully situated in a retired position on its own ample grounds, in one of the healthiest localities in England. Old-established, reconstructed, most modern nursing and other requirements, home-like. Resident physician, formerly Phys.-Supt. Crichton Royal and Metropolitan Institutions. London Address, 64, Welbeck St., Cavendish Sq. W. (Wed. morn.). Voluntary boarders received. Telegraph Address: "Physician, West Malling."

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A private Asylum for Ladies and Gentlemen mentally afflicted. Voluntary boarders are received. The grounds are very extensive, and various amusements are provided. — For terms apply to F. MURCHISON, M.A., M.B. resident proprietor.

Springfield Lodge, Ilkley, Yorkshire.—Mrs. W. BELL THOMSON (Certificated Nurse), receives (non-infectious) Patients, Invalids, and Convalescents. Special arrangements for Maternity cases. References, leading Leeds doctors, &c. Patients select their medical man. A vacancy for a permanent visitor at reduced terms. Prospectus on application.

THE RETREAT, FAIRFORD, GLOUCESTERSHIRE.

An hour from Oxford, G.W.R., 12 miles from Swindon. Est. 1822. A Licensed Home for the care and treatment of Ladies and Gentlemen mentally afflicted. Special accommodation and carriage exercise provided. Pleasantly situated, with extensive grounds. Terms most moderate.—Address, O. ILES, Res. Med. Proprietor.

"GLENDOSSILL," HENLEY-IN-ARDEN, WARWICKSHIRE.—Dr. S. H. AGAR, who has for 15 years conducted an Asylum for both sexes at BURMAN HOUSE, Henley-in-Arden, has relinquished that Establishment as being unsuited to the requirements of the Insane at the present day. Dr. Agar has purchased an ample site in a most salubrious and attractive situation outside Henley-in-Arden, and has built "Glendossill" expressly for the receipt and treatment of a limited number of Upper and Middle-class Insane persons of both sexes. No pains or expense have been spared in designing and constructing, both internally and externally, "Glendossill" for its purpose, in accordance with the most modern and enlightened views, of what is necessary for the comfort, safety and treatment of patients suffering from any form of Insanity. Telegraph and postal address, Henley-in-Arden, Warwickshire.

NORTHWOODS HOUSE,

WINTERBOURNE, near BRISTOL.

PRIVATE ASYLUM for LADIES and GENTLEMEN.

Situated in a large park in a healthy and picturesque locality, easily accessible by rail viâ Bristol, Patchway, or Yate stations. Voluntary Boarders can now be received.—For further information see Medical Directory, page 1937; and for terms, &c., apply to DR. EAGER, Resident Physician.

City of Birmingham.

The Corporation of Birmingham require a MEDICAL SUPERINTENDENT for the CITY HOSPITAL FOR INFECTIOUS DISEASES, Little Bromwich, Birmingham.

Candidates must be under 40 years of age, unmarried, must possess medical and surgical qualifications, and be duly registered. They must have had experience in the treatment of small-pox, scarlet fever, and other infectious diseases, and preference will be given to a candidate who has held a similar appointment.

The Medical Superintendent will be required to devote the whole of his time to the duties of the office, which include the general administration of the Hospital under the direction of the Health Committee.

The salary will be £200 per annum (rising by £20 per annum to £300 per annum) with apartments, rations and attendance.

The appointment will be subject to three months' notice on either side.

Applications, stating age, qualifications and experience, accompanied by copies of testimonials and endorsed "Medical Superintendent," must be sent in by the 29th May, 1896, addressed to Mr. J. KEYTE, Clerk to the Health Committee, Council House, Birmingham.

Personal canvassing is strictly prohibited and will be deemed a disqualification.

E. O. SMITH,
Council House, Town Clerk.
Birmingham, May 12th, 1896.

Assistant Medical Officer and DISPENSER, LAMBETH WORKHOUSE.

The Guardians of the Poor of the Parish of Lambeth intend to appoint an ASSISTANT MEDICAL OFFICER and DISPENSER for their Workhouse, Renfrew Road, Lower Kennington Lane. He must possess the medical and surgical qualifications prescribed by the Local Government Board, and will be required to reside in the Workhouse and devote his whole time to the duties of his office under the superintendence of the Chief Medical Officer, and in conformity with the orders of the Local Government Board and the regulations made and hereafter to be made by the Guardians. He will be required also at such times as the Guardians may direct to act as Assistant Medical Officer and Dispenser at the Infirmary adjacent to the said Workhouse and also at the Workhouse in Princes Road. Salary £100 per year, rising after two years' service to a maximum of £125 per year, with board, apartments and washing at Renfrew Road Workhouse.

Printed form of application is to obtained at this office. Application for the appointment is to be made by means of such form and in no other manner and must be sent to me on or before Saturday the 30th instant. Applicants who are required to attend will receive due notice to that effect. None others need attend.

Personally canvassing the Guardians is strictly prohibited and will be deemed a disqualification.

By order of the Guardians,
W. B. WILMOT,
Guardians' Board Room and Clerk.
Offices, Brook St., Kennington Rd., S.E.
13th May, 1896.

London Hospital, Whitechapel, E.

MEDICAL REGISTRARSHIP.

The term of office of the present Registrar having expired, the House Committee invites applications for the appointment of Medical Registrar from July 1st, 1896. The salary of the Medical Registrar is £100 per annum. Applications accompanied by copies of testimonials to be delivered at the Hospital not later than June 11th at 4 p.m. Full particulars of the duties can be obtained from the undersigned. In addition to the ordinary duties of the office, the Registrar will be required to undertake part of the duties of the outpatients' department in the months of August and September, and also on emergency at other times.

Extract from § xxiii, paragraph 1 of Bye-Laws:—"Candidates for the Medical Registrarship must be either graduates in Medicine of a recognised British University, Licentiates of a recognised College of Physicians or Members of the Royal College of Surgeons, England.

By order,
May 18th, 1896. G. Q. ROBERTS,
Secretary and House Governor.

Sussex County Hospital, Brighton.

Notice is hereby given, that a Special Meeting of the Committee of Management will be held in the Board Room on Wednesday, the 17th day of June next, at 1 p.m., for the purpose of electing a HOUSE PHYSICIAN, in the room of C. R. Crawford, Esq., who has resigned that appointment, and such Special Meeting of the Committee of Management is hereby convened accordingly.

No person is eligible for the office unless he have a Medical and Surgical Qualification of the United Kingdom, and be duly registered under the Medical Acts. He must be unmarried, and when elected under thirty years of age.

Candidates must send in their applications, with testimonials and certificates of registration, addressed to the Secretary at the Hospital, at or before noon on Wednesday, the 3rd June next.

The emoluments are board and residence in the Hospital, with washing, and a salary commencing at £50 per annum.

By Order of the Committee of Management,
W. H. ORTON, M.A.,
13th May, 1896. Secretary.

City of London Union.

MALE IMBECILE and GENERAL ATTENDANT.

Wanted at the Infirmary of the City of London Union, a Male Imbecile and General Attendant. Candidates must not be less than 25 nor above 40 years of age, and single or widowers without encumbrance. The salary will be £30 per annum, increasing £1 annually to £35, with board, lodging, washing, and a suit of uniform once a year, with an allowance of £4 per annum in lieu of beer at option. Only those who have had experience in the nursing and management of the Insane need apply. Apply personally to the Medical Officer, at the Infirmary, Bow Road, with certificates of competency and character, between the hours of 12 and 2 p.m. on Thursday next. The appointment is subject to the approval of the Local Government Board.

F. W. CRANE.
Clerk to the Guardians.
No. 61, Farthoiomew Close, E.C.
May 13th, 1896.

Metropolitan Asylums Board.

—An ASSISTANT MEDICAL OFFICER is required at the Fountain Fever Hospital, Lower Tooting, S.W. Salary, £160 during the first year, £180 during the second year, and £200 during the third and subsequent years of service, with board, lodging, attendance, and washing. Candidates must be unmarried, must not exceed thirty-five years of age, and must be qualified by law to practice both medicine and surgery in England.

Forms of application may be obtained at the offices of the Board, Norfolk House, Norfolk Street, Strand, W.C., where such forms duly filled up, and accompanied by copies of not more than three testimonials, are to be delivered not later than 2.30 p.m., on Monday, 1st June, 1896.

Selected Candidates will be written to. Canvassing is strictly prohibited.

Chief Offices, By Order,
Norfolk House, T. DUNCOMBE MANN,
Norfolk St, Strand, W.C. Clerk to the Board.
20th May, 1896.

Stockport Infirmary.

Wanted, a JUNIOR ASSISTANT HOUSE SURGEON. He must be doubly qualified and duly registered. The appointment will be for six months, with board and residence. An honorarium of £10 will be given after six months' satisfactory service.

Applications with testimonials should reach the Secretary not later than Tuesday, 26th May.

C. TYLER, Major,
Secretary.

London Lock Hospital, Harrow Road, W.

The post of HOUSE SURGEON to the Female Hospital, will shortly be vacant. Applications, with copies of testimonials, must be sent to the Secretary, not later than the 30th May. Salary, £50 per annum, with board, lodging, and washing. Candidates must possess legally qualified registered diplomas, in Medicine and Surgery.

Royal Eye Hospital, Southwark, or ROYAL SOUTH LONDON OPHTHALMIC HOSPITAL.

SURGEONS AND ASSISTANT SURGEONS.

The Council invite applications for either of the above mentioned positions from persons duly qualified in accordance with the following law:—

"The Surgeons and Assistant Surgeons shall in all cases be Fellows of the Royal College of Surgeons of England, Edinburgh, or Dublin; or Graduates in Surgery of either Cambridge or London University."

Applications, with copies of testimonials, to be addressed, on or before June 8th, to the Secretary, at the Hospital, from whom full particulars can be obtained.

Legally qualified Medical Men are also invited to apply as above for Clinical Assistantships (unsalaried); also Senior Students for appointment as Junior Assistants or Pupils

Bucks County Lunatic ASYLUM.

An ASSISTANT MEDICAL OFFICER is required at this Asylum, situate at Stone, near Aylesbury. Salary £100 per annum, together with board and furnished apartments in the Asylum.

Applications (stating age) with testimonials (limited to six in number) from duly qualified persons, are to be sent to me on or before Friday, 5th June next.

The officer to be appointed must be a single man, and he will be required to enter upon his duties on Wednesday, the 8th July next.

Any information required by applicants will be supplied by the Medical Superintendent at the Asylum.

County Hall, WM. CROUCH,
Aylesbury. Clerk to the Visiting
18th May, 1896. Committee.

Hambledon Union, Surrey.

APPOINTMENT OF WORKHOUSE MEDICAL OFFICER.

The Guardians of the Hambledon Union intend at their meeting, to be held on the 4th day of June next, to appoint a Medical Officer for the Workhouse of the Union subject to the approval of the Local Government Board.

The salary is £70 per annum with certain extra fees for midwifery cases and vaccination.

Applications, accompanied by testimonials of recent date and stating qualifications, must be sent to me on or before Tuesday, the 2nd day of June next.

Clerk's Office, By order of the Board,
Guildford, FERDINAND SMALLPEICE,
15th May, 1896. Clerk.

Manchester Clinical Hospital for WOMEN and CHILDREN, Park Place, Cheetham Hill Road.

The Committee of Management are desirous of receiving applications for the appointment of HONORARY ASSISTANT PHYSICIAN to the Hospital. Candidates must be Members of one of the Royal Colleges of Physicians of the United Kingdom, or hold the degree of M.D., granted after examination by a University recognised by the General Medical Council. The selected applicant will not be allowed to hold any other Hospital appointment

Applications, with testimonials, to be sent to Mr. HUBERT TEAGUE, Secretary, 38, Barton Arcade, Manchester, on or before Saturday, June 6th.

City of London Hospital for the DISEASES of the CHEST, Victoria Park E.

Applications, with testimonials, for the post of HOUSE PHYSICIAN, are invited to be sent to the Secretary, not later than 11th June.

The appointment will be for six months, from 1st July, 1896. Candidates must be qualified. Board and Residence provided, and salary at the rate of £30 per annum.

Information as to duties, &c., can be obtained on application to Secretary, by letter or personally.

T. STORRAR-SMITH.
Secretary.

London Hospital,
Whitechapel, E.

There will shortly be a vacancy in the position of ASSISTANT PHYSICIAN to the Hospital.—Applications and testimonials must be delivered at the House Governor's Office, not later than 4 p.m., on Thursday, June 11th.

Extract from § xiii of the Bye-Laws:—

"No person shall be eligible for the office of Assistant Physician to the Hospital unless he be a member of the Royal College of Physicians in London."

By order,
G. Q. ROBERTS,
May 18th, 1896. Secretary and House Governor.

North-Eastern Hospital for
CHILDREN, Hackney Road, Shoreditch, N.E.

The Committee invite applications for the post of PHYSICIAN to Out-patients. Candidates who must be fellows or members of the Royal College of Physicians of London, should send in their applications, with copies of not more than four testimonials to the Secretary, on or before Wednesday, 10th June, and must be prepared to take up the duties on 22nd June. All candidates will be required to attend before the General Committee, at 27, Clement's Lane, E.C., on 15th June, at 5.30 p.m.

Office. T. GLENTON-KERR,
27, Clement's Lane, E.C. Secretary.
18th May, 1896.

North-Eastern Hospital for
CHILDREN, Hackney Road, Shoreditch, N.E.

HOUSE PHYSICIAN required on 1st July, 1896. The appointment is made for six months, and at the expiration of this term the House Physician will be required, if eligible, to serve as HOUSE SURGEON for a further period of six months.

Salary as House Physician at the rate of £60 per annum, and as House Surgeon (the senior post) at the rate of £80 per annum.

Candidates, who must possess a Medical and Surgical qualification must send in their applications, with copies of not more than four testimonials, to the Secretary at the City Office, on or before Monday, 8th June.

City Office: T. GLENTON-KERR,
27, Clement's Lane. Secretary.
Lombard Street, E.C., 6th May, 1896.

North-Eastern Hospital for
CHILDREN, Hackney Road, Shoreditch, N.E.

JUNIOR HOUSE PHYSICIAN required for six months, commencing on July 1st.

Candidates must possess a Medical and Surgical qualification. No salary, but board and lodging (including washing) will be provided.—Applications, together with copies of not more than four testimonials, must be sent to the Secretary, at 27, Clement's Lane, E.C., not later than Monday, 8th June

T. GLENTON-KERR,
May 6th, 1896. Secretary.

Weston-Super-Mare Hospital
AND DISPENSARY.

The post of MEDICAL OFFICER to the Provident Dispensary attached to the Hospital being vacant, the Committee are prepared to receive applications for the appointment. Candidates must possess a recognised Medical and Surgical qualification, and be registered under the Medical Act.

Salary £80 per annum, with board, lodging and washing.—Applications, stating age, with testimonials, to be sent to the Honorary Secretary not later than 26th May.

The duties will begin on 1st July next.

Stamford Hill, Stoke Newing-
ton, Clapton, etc. Dispensary, 189, High St., Stoke Newington, N. Wanted a JUNIOR RESIDENT MEDICAL OFFICER. Salary at the rate of £50 per annum during the first quarter, afterwards at the rate of £75 per annum. Board and lodging is also provided.

Applications and testimonials to be sent on or before Wednesday June 3rd to the Senior Resident Medical Officer, from whom particulars as to duties, etc. may be obtained.

The Middlesex Hospital, W.

Notice is hereby given, that consequent on the appointment of A. Pearce Gould, Esq., F.R.C.S., M.S., to the office of Surgeon to this Hospital a vacancy is thereby created for an ASSISTANT SURGEON.

Candidates who must be Fellows (or have passed the qualifying examination for the Fellowship) of the Royal College of Surgeons of England are requested to forward their applications, together with testimonials and diplomas, to the undersigned on or before Monday 8th June at 12 o'clock noon.

By order of the Weekly Board,
F. CLARE MELHADO,
19 May, 1896. Secretary Superintendent.

Bedford General Infirmary
and FEVER HOSPITAL.

Wanted a HOUSE SURGEON, duly registered and qualified to practise both medicine and surgery. Salary £100 a year, with apartments, board, lodging, and washing.

He shall be elected for one year, shall be eligible for re-election and his whole tenure of office shall not exceed three years.

The appointment will be made by the Committee of Management. Testimonials (limited to six) and applications to be sent to the Secretary not later than Friday, June 5, 1896. Canvassing directly or indirectly will disqualify.

Queen Charlotte's Lying-in
HOSPITAL, Marylebone Road, N.W.

RESIDENT MEDICAL OFFICER required. He must be registered. The appointment is for four months.

The salary is at the rate of £30 per annum with board and residence.

Applications, with copies (not originals) of not more than three testimonials, will be received by the Secretary up to the 1st June.

Duties to commence on 1st July.

By order,
ARTHUR WATTS,
19th May, 1896. Secretary.

The Royal Hospital for
DISEASES OF THE CHEST, City Road.

There is a vacancy for a HOUSE PHYSICIAN. Appointment for six months from June 1st. Salary at the rate of £40 per annum, with board, lodging and laundry.

Applications, with copies of testimonials, to be sent to the Secretary, from whom all information can be obtained, not later than Monday, May 25th.

JOHN HARROLD,
Secretary to the Council.

Bridgwater Infirmary.

HOUSE SURGEON wanted on 6th July, 1896. Must be a duly qualified man. Will have to give lectures to probationers at certain periods of the year. Salary £80 per annum with board and residence.

Applications, with copies of testimonials, stating age, to be sent to Mr. JOHN COOMBS, Honorary Secretary, Bridgwater Infirmary, Bridgwater, on or before the 29th day of May, 1896.

Dated Bridgwater, 7th May, 1896.

Dundee Royal Infirmary.

RESIDENT CLINICAL ASSISTANT required. Qualified. Board, Lodging, and Washing provided. Particulars from Medical Superintendent.

Applications, with testimonials, to be lodged with the Secretary, D. GORDON STEWART, Solicitor, Dundee, against 27th May, 1896.

Wanted, a Medical Officer
for the Northern Division of the PARISH OF GLENELG. Salary £110 per annum, with free house and garden. Gælic a recommendation. Applications, with testimonials, to be lodged with D. MCLURE, Inspector of Poor, before 3rd June next.

9th May, 1896.

Haverstock Hill and Malden
ROAD PROVIDENT DISPENSARY,
132, Malden Road, N.W.

The Committee of this Institution, will proceed at their meeting on Friday, May 29th, to elect two MEDICAL OFFICERS. Particulars of the appointments and copies of the rules of the Dispensary, may be obtained from the Secretary. Applications with testimonials, should be sent to the Hon. Secretary, CLAUD SCOTT, Esq., at the Dispensary, not later than May 27th. Candidates must be already in practice in the immediate neighbourhood.

The Hospital for Women,
Soho Square.

There will be a vacancy for an ASSISTANT HOUSE PHYSICIAN (non-resident) on 1st June. The duties are to assist the House Physician in his work and attend to the clinical records. The appointment is for three months. Candidates must be fully qualified. Application, with copies of testimonials, to be sent in by the 26th May to

DAVID CANNON,
Secretary.

Charing Cross Hospital.

The appointment of SURGICAL REGISTRAR is vacant. Salary £40 per annum. Candidates, who must be qualified to practise under the Medical Registration Act, are invited to send their applications with copies of not more than six testimonials to the undersigned, on or before Monday June 8th, next, from whom further particulars may be had on personal application.

ARTHUR E. READE,
May 20th, 1896. Secretary.

Assistant Medical Officer.

Wanted, by the GOVAN DISTRICT LUNACY BOARD for their Asylum at Hawkhead, near Paisley, a duly qualified medical man as Assistant to the Medical Superintendent. Salary £100, with board and apartments. Applicants must be unmarried and not more than 30 years of age. Applications, with testimonials, to be lodged with the undersigned, on or before 10th June, prox. No canvassing of the members of the board allowed.

7, Carlton Place, ANDREW WALLACE,
Glasgow, Clerk.
19th May, 1896.

The Queen's Jubilee Hospital,
Earl's Court.

AURIST and LARYNGOSCOPIST required at the above Hospital. Applications in writing stating qualifications and experience to be addressed to the Secretary by May 30th.

By order of the
COMMITTEE OF MANAGEMENT.

The Queen's Jubilee Hospital,
Earl's Court.

HOUSE SURGEON required at the above Hospital. Appointment for six months. Honorarium £100 per annum and rooms. Application in writing stating qualifications, experience, and three recent testimonials to be addressed to the Secretary.

By order of the
COMMITTEE OF MANAGEMENT.

Paddington Green Children's
HOSPITAL, London, W.

There is a vacancy for the office of PHYSICIAN to out-patients. Candidates who must be Fellows or Members of the Royal College of Physicians of London, are invited to send their applications, with copies of testimonials, to the Secretary by 30th May.

Paddington Green Children's
HOSPITAL, London, W.

The post of SURGEON to out-patients is vacant. Candidates who must be Fellows of the Royal College of Surgeons of England, are invited to send their applications, with copies of testimonials, to the Secretary by 30th May.

Printed and published by the British Medical Association at their Office, No. 429, Strand, in the Parish of St. Martin-in-the-Fields, in the County of Middlesex.