OBSERVATIONS
ON
VACCINATION AND SMALL-POX,
MORE ESPECIALLY WITH REFERENCE TO THE
THEORY OF VACCINE INFLUENCE,
AND THE
RELATION SUBSISTING BETWEEN THE CICATRIX AND
THE CHARACTER OF THE CONSECUTIVE VARIOLA.

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THE interest arising from the re-appearance of small-pox as an epidemic in London, and the flattering manner in which my brief notices of the last epidemic (that of 1838) were received by the members of the Society, are the motives which prompt me to submit the following hints to their consideration. As my object is rather to throw out topics for discussion, than to establish any particular doctrine, the loose and somewhat desultory character of the succeeding observations will, I trust, be excused.

The epidemic of 1838 ceased with the frosts of Christmas; and from January 1839 to the end of

September 1840, (a period of 21 months,) the metropolis was remarkably free from small-pox. The admissions into the Small-pox Hospital during the first three quarters of 1840 amounted only to 142, being at the rate of sixteen *per mensem*. In October 1840, a new epidemic began, and 46 patients were admitted in that month. In November the admissions were 64. In December, 75. From the 1st of January 1841, to the present day, (Monday, January 25,) the admissions have been 93, being nearly at the rate of 4 *per diem*—the greatest number ever admitted in one month since the establishment of the hospital in 1746.

Among the 327 patients admitted in 1840, 11 had complaints not proving to be of a variolous nature.* Of the remaining 316, 194 were wholly unprotected, of whom 87 died, or 45 out of every hundred ! 120 had previously been vaccinated, of whom 8 died, being in the ratio of 7 per cent. only. Two were supposed to have previously undergone small-pox.

Of the 316 patients, 47 were under 5 years of age, of whom 28 died ; 45 were between 5 and 15 years of age (inclusive), of whom 9 died ; 224 were adults, of whom 58 died. The total mortality was 95, or 30 per cent. on the gross admissions.

* Viz.—Varicella vera	 4
Lichen febrilis	 3
Rubeola	 2
Febris continua communis	2

One of the cases of supposed secondary small-pox presented some rare phenomena.

CASE.

Phœbe Monk, 24 years of age, was admitted Nov. 30, 1840, being the first day of eruption, and the sixth of illness. She was from the workhouse of St. George's in the East, in which parish small-pox was then prevalent. She reports that she had been *inoculated* in early life at Brentwood. Two good cicatrices are perceptible. The patient was extremely depressed, and after three days the eruption had made so little progress, that its character could not be ascertained. At the end of ten days a papuliform eruption, resembling in its arrangements that of variola, had fully developed itself; but it then died away, and the patient recovered without any fluid secretion from it. A case in all respects resembling this, excepting that the eruptive process was accompanied throughout its entire course with an almost intolerable pruritus, occurred in private practice nearly at the same time, and was attended by myself and Mr. Thomas Porter of Euston Square. The lady, the subject of this latter case, reports that she went through small-pox soon after birth. The variolous origin of the malady was pretty clearly established in this instance, one undoubted case of variola having occurred next door, and one in the same house.

One hundred and twenty cases, I have said, of
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variola succeeding vaccination occurred at the hospital during the past year. My attention had long been directed to ascertain whether any, and what, relation subsisted between the number and character of the vaccine cicatrices, and the intensity of the consecutive variola; and I took this opportunity of investigating the subject. I found, by careful inspection of the arms of those who attended for vaccination, and for re-vaccination, that much caution was requisite in forming any conclusion regarding the original vaccination, by the appearance of the arms in after life. It must always be borne in mind, that the full measure of vaccine influence is received by each individual on the eighth day from insertion. If the disease be subsequently rendered mild, either by art or peculiarity of habit, the cicatrix will be small and fugitive. Even should the vesicle be then destroyed by caustic, or the part cut out, and allowed to heal as a common sore, and no specific scar remain, still the individual would remain *vaccinated*. On the other hand, should the disease be aggravated by neglect or bad management, or a foul or inflammatory state of the child's blood, high secondary inflammation would be set up, and a large, wafery, or otherwise irregular cicatrix would form, which is permanent in after life. The amount of vaccine protection remains however in both instances *the same*, and the probable character of the consecutive variola receives no elucidation from inspection of the arm. The character of the cicatrix, then, depends more on the *accidental* or *secondary*, than

it does on the *primary* or *specific* inflammation, and hence arises the small reliance which can be placed on it as a measure of vaccine protection.

Undoubtedly in the majority of cases wherein the cicatrices are *numerous, normal, and well defined*, the consecutive variola is mild and varicelloid ; again, where the consecutive disease proves severe, there the cicatrices will be imperfectly seen, or altogether wanting. But instances of the converse of these propositions are so numerous as scarcely to be called *exceptions* to a rule. As the profession are probably not so familiar with these latter cases, I have ventured to submit two opposing series to the notice of the Society. The first shows that small-pox after vaccination often proves *severe* where the cicatrices are *normal*. The second points out that the lightest and most truly varicelloid eruptions co-exist with *small and very imperfect* cicatrices.

SERIES I.

Case I.—Ann Spragen, ætatis 24 ; servant. Admitted into the Small-Pox Hospital April 1, 1840 (3rd day of eruption, 5th of illness). Was vaccinated when young at Hexham. *Bears two good cicatrices.* The small-pox proved semi-confluent and severe, commencing with general dingy redness of the skin, petechial spots, and an hæmorrhagic aspect of the conjunctivæ. She recovered, and was discharged, cured, April 24th.

Case II.—Richard Connell, ætatis 24. Admitted

July 7 (4th day of eruption, 7th of illness). Was vaccinated at the National or Sackville-street Institution, Dublin, and bears *one good cicatrix*. The small-pox proved confluent and very severe. He remained a month in hospital, and left it, cured, August 8.

Case III.—Alfred Richardson, ætatis 18. Admitted September 9 (4th day of eruption, 6th of illness). Was vaccinated at Wrotham, in Kent, when young. Bears on the arm *an excellent cicatrix*. Small-pox appeared, at first, full, confluent and formidable. In its progress it became modified and seedy. Discharged, well, Sept. 29. (21 days in hospital.)

Case IV.—Henry Valentine, ætatis 44. Admitted Nov. 20 (4th day of eruption, 7th of illness). Vaccinated 30 years ago in Bedfordshire. His arm exhibits *one most perfect cicatrix*, indented and radiated. The aspect of the disease, on admission, was confluent, threatening danger, but it became modified, and he left the hospital Nov. 30.

Case V.—Carolo Galli (an Italian), ætatis 18. Admitted December 5. Had been vaccinated, when young, in Italy. *Has four excellent cicatrices*. Small-pox proved confluent and severe in the highest degree. A slight trace only of modification was perceptible on certain parts of the extremities. His life was for several days despaired of. He recovered, however, and left the hospital, well, January 2nd, 1841.

Case VI.—Alfred Broadbridge, ætatis 16. Ad-

mitted December 9 (1st day of eruption, 3rd of fever). Was vaccinated, when young, by my friend Mr. Wilks of Charing, Kent. *Has three good cicatrices.* The consecutive small-pox was confluent and severe, with much cellular inflammation. He did well, and was discharged, cured, January 5, 1841.

Case VII.—William Leech, ætatis 25. Admitted August 6 (3rd day of eruption, 5th of illness). Vaccinated, when young, at Wickham-Market. *Four excellent cicatrices are observable.* Small-pox in him proved confluent and very severe, modified only in a trifling degree. He was discharged, cured, August 25.

Case VIII.—John Mitchell, ætatis 39, of intemperate habits. Admitted October 21 (7th day of eruption, 9th of disorder). Was vaccinated, at 8 years of age, at Battle, Sussex, by a medical practitioner. Has on the arm *one perfect cicatrix*, indented and radiated. Small-pox was, in this case, confluent and wholly unmodified. He died October 27, after being one week in hospital.

SERIES II.

Of Cases where, with small and imperfect Cicatrices, the consecutive Variola proved light and varicelloid.

Case I.—Filippo Scarpandi, ætatis 16. Admitted January 3, 1840 (3rd day of eruption, 5th of illness). Was vaccinated, in early life, in Italy, but

the cicatrix is scarcely discernible. He had a varioloid disease of the mildest character, and was discharged, cured, January 14.

Case II.—Sarah Ann Healey, ætatis 20. Admitted May 7 (2nd day of eruption, 3rd of illness). Vaccinated, young, at Wallingford. One small cicatrix. Eruption mild and varicelloid. Left the hospital May 19.

Case III.—John Dodd, ætatis 22. Admitted June 2 (3rd day of eruption, 5th of illness). Vaccinated, young, at Hexham. One small superficial cicatrix. Eruption varicelloid and trifling. Left the hospital June 16.

Case IV.—Samuel Steel, ætatis 21. Admitted June 8 (5th day of eruption, 7th of illness). Vaccinated, when young, near Ipswich. Has one small cicatrix. Eruption varicelloid. Discharged June 24.

Case V.—Thomas Stodden, ætatis 22. Admitted June 20 (2nd day of eruption, 3rd of illness). Vaccinated, at 14 years of age, at Wingham, in Kent, by Mr. Sankey. Has one small cicatrix. Eruption varicelloid. Remained in hospital 16 days.

Case VI.—George Rixon, ætatis 24. Admitted October 17 (6th day of eruption, 7th of illness). Vaccinated, when 9 years old, at Radnage, a village in Buckinghamshire, in three places. Two vesicles left no cicatrix. One small cicatrix only is perceptible. The eruption, on admission, had reached its crisis, being a true specimen of the light varioloid.

No one can doubt, that if the consecutive variola had proved, in this instance, confluent and severe, the vaccination would have been declared, from the aspect of the arm, defective, and not trustworthy. Yet it proved most efficient. He left the hospital October 26.

Case VII.—Eliza Peel, ætatis 16. Admitted October 21 (2nd day of eruption, 4th of illness). Was vaccinated at Canterbury, when young. Has two small cicatrices. Eruption light and varicelloid. Discharged after a few days' residence in the hospital.

Case VIII.—Charles Dearborn, sailor, aged 28. Admitted October 3rd (4th day of eruption, and 6th of disorder). Was vaccinated, when young, in Liverpool. He afterwards entered the American navy, and from the absence of cicatrix was *re-vaccinated* by the surgeon of the "*United States*," American ship of the line. No effect followed, and *no cicatrix was perceptible on admission*.

The consecutive variola, in him, proved semi-confluent in quantity, but highly modified in character and aspect, running so rapid a course that he was discharged, cured, October 10th, having been only one week in hospital.

It follows, I think, from these cases, that the cicatrix cannot be relied on as affording any certain test of the degree to which the constitution has im-

bibed an anti-variolous influence. Peculiarity of habit, similar to that which rendered certain persons patient of the variolous poison before the discovery of vaccination, and which now makes some patient under the venereal or mercurial poisons, and others irritable under the most minute quantities of those poisons, must probably be looked to as the best means of explaining the diversities in the aspect of consecutive variola.

An impression that the variolous and vaccine poisons are intrinsically the same, has long prevailed. The notion was originally broached by Dr. Jenner, and it was steadily maintained by him to the latest period of his life. He maintained that the vaccine was the *primary*, and the variolous the *secondary* or aggravated form of the virus,—that the process of vaccination was only a milder kind of inoculation,—and, consequently, that the proximate cause, or *theory of vaccine security*, was to be found in that law of the animal economy by which one attack of small-pox affords security against a second.

The doctrine of the identity of the variolous and vaccine poisons has again been brought into notice by the interesting experiments of Mr. Ceely of Aylesbury. The remarkable fact that the mucous surfaces of the cow will receive the poison of small-pox, and convert it, in 8 days, into the vaccine, gives a strong *primâ facie* colouring to the hypothesis, which indeed, by many, is now considered as established beyond the possibility of doubt or cavil.

A doctrine so important as that of the *Identity of the Vaccine and Variolous Poisons*, involving, as it does, such important pathological results, ought not, however, to be received without inquiry. I proceed, therefore, briefly to investigate the grounds on which it stands.

The facts regarding the Origin of Vaccinia, so far as they are yet known to us, are these. The morbid secretions from the cow, which possess the singular properties of transplantation to the human frame, of exciting there a like disease, and subsequently of protecting the human body, to a certain extent, from the assaults of small-pox, may be produced in that animal in four modes.

1. They are generated, spontaneously in the cow, under certain circumstances of soil, season, and locality. Such diseased secretions are often met with in cows soon after parturition, in the spring season, and when feeding upon young grass. But they arise also spontaneously from other and less known causes, and the disorder spreads like other epizootic maladies. It was this form of vaccine disease which Jenner chiefly studied.

2. The very same malady, developing the very same morbid secretion, is often observed to spread *by contagion*:—that is, by the application of the diseased secretion, thus generated, to the teats of healthy cows, differently circumstanced, by the hands of the milker.

3. The same morbid secretion, possessed of the same qualities, may be, and frequently has been,

generated in the teats of the cow by the application to them of the matter formed by the heel of the horse, when affected with the disorder called by farriers *The Grease*. This *greasy* matter may also be transplanted to man directly, without the intervention of the cow, proving that the anti-variolous property does not depend on any peculiar change which the virus undergoes while passing through that animal.

4. The same morbid secretion may be excited artificially in the cow by applying to the teats, or the mucous surfaces of the vagina, vaccine lymph from the arm of a child, even though 20 years had elapsed since that lymph had been humanized or assimilated to the human constitution.

This curious fact was first determined at Paris, in 1836, by M. Bousquet, the intelligent chief of the National Vaccine Establishment of France. The researches of Mr. Ceely have fully corroborated the truth of this statement, and I have frequently seen, both at Paris and at the Small-Pox Hospital of London, this species of lymph, the *Retro-Vaccine*, or *Vaccine Renouvelée*, as it is called, in use, and producing the most satisfactory results.

To these four modes of exciting that kind of morbid secretion in the cow, which we call Vaccinia, (one constitutional and three artificial,) the labours of Mr. Ceely have now added a fifth. He has shown that the very same object may be obtained by applying to the mucous surfaces of the cow the matter of human small-pox. The vessels of the part are thereby ex-

cited to the production of a fluid or humour, identical in all its properties with that which arises from a constitutional and febrile disturbance in the cow's system, from contagion, from the matter of *Grease*, or the long-humanized vaccine virus.

When we consider that five modes of producing this morbid secretion in the cow are now known to exist, it is not unreasonable to suppose that others may hereafter be discovered. In this state of our knowledge, then, surely we cannot be justified in assuming the fifth and the last discovered of the whole, as the most important, and as affording the true clue to the mystery of vaccine protection. We should reflect that Mr. Ceely's experiments have entirely set aside Dr. Jenner's notion that vaccinia was the original or primitive poison, which time and fortuitous circumstances had aggravated into the malignant or secondary form, which we call small-pox. They have proved (if indeed they have *any* bearing on the intimate nature of these poisons) that small-pox is the *primary*, and cow-pox the *secondary* form. But when we further reflect on the absence of a contagious principle in Vaccinia, and the remarkable fact that febrile disturbance is not essential to its perfect development, we shall probably be nearer the truth in saying that the vaccine is a poison *sui generis*; that its relation to variola is still hypothetical; that the real and intimate nature of the protection which it affords is still unknown to us; and that a thorough acquaintance with its anti-variolous powers must be derived, not

from analogy, but from an extended and careful observation of facts, continued through a long series of years.

It is worthy of record, that among the 120 cases of variola occurring at the hospital in 1840, subsequent to vaccination, eleven only were under 16 years of age.* The youngest person admitted under such circumstances was of the age of 7. The first occasion on which I have ever known a child under 5 years admitted with small-pox after vaccination, occurred last week. The case is as follows :—

William Andrews, aged 2 years and 8 months. Admitted Jan. 20, 1841 (2nd day of eruption, and 4th of illness). This child was vaccinated by Dr. Epps, at the station in Holborn, in July (or August) 1838, when two months old. Two good vesicles arose. No lymph was taken from them. Two small cicatrices remain. The small-pox proved of the light varicelloid kind. The child is rapidly convalescing, and will leave the hospital Jan. 25.

Before concluding this paper, I would wish to call the attention of the members to a fact of great

* Viz. :—At 7 years of age, admitted			1
10	_____		2
11	_____		1
12	_____		1
14	_____		3
15	_____		3
Total under 16 years			11

importance in the police of hospitals. When stating the occurrences of 1838, I was under the painful necessity of announcing the deaths of several patients by Erysipelas, Typhus, Malignant Cynanche, and other formidable consequences of "*Hospital Miasm.*" To remedy this defect in our establishment, a wing for vaccination was built in 1839, and the whole of the old building devoted to the reception of small-pox cases. The result has been most satisfactory. By spreading the same number of cases over double the extent of surface, we have hitherto escaped the fearful evils of superadded fever. No case of a typhoid character has occurred during the present epidemic, and only one of erysipelas.