A discussion on the comparative merits of red and scarlet as pigments for producing shade for the future, with Mr. B. O. F. L. P. D. A. D. (Robertson, Stodd, Bluthmann).
On
The Prophylactic Treatment of Smallpox, and the Various Questions connected therewith.

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[Signature]

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By the term \textit{prophylaxis} we mean the warding off or preventing from a disease \textit{(e.g., smallpox)} which, without this means, might affect the system we protect, but by means of this it is prevented from the possibility, or at least probability, of doing so.

We speak of a \textit{prophylactic} treatment for almost every disease affecting the body; that is, a plan of treatment, which, if carefully followed out, will, in all probability, prevent the occurrence of the disease, if abandoned too late, or prevent its recurrence if it have already manifested itself.

As an illustration of this we may take the case of \textit{tonsillitis} and other acute affections of the air passages. The prophylactic treatment for which in prisons is based upon the subject to such affections.
(1st Edition)
consists in frequent sponging of the neck and throat with cold water, or with a mixture of vinegar and water. Avoidance of excessive changes of temperature and so on.

Of another instance we have perhaps in the case of hydrocephalus, of the prophylactic treatment of which Dr. Watson writes as follows:—

**In families in which recent hydrocephalus has occurred, or which show decided marks of syphilitic diathesis, the earliest attention should be paid to any deviation from the healthy condition of any of the functions.** Washed children in such families should sleep light when a non-fasting, but light can non-stimulating diet, consisting of well-chewed vegetables, farm-mains, subsistences can a moderate proportion of animal food. Particular care should be taken to keep the bowels regular, not that weakening sugars should be given, but the bowels should be fairly relieved, at least once every day. Any disturbance of the digestive organs should be immediately corrected.
"Correctible by antacids, laxatives, changes of diet can sometimes by preemiens as the Arsenic. Such children should be also, if posdible, be brought up in the country and firely exposed to mild and dry air, and in worthy guad and should be taken to have than sufficiently clothed. Exposure to the contagion of small pox, measles, scarlet fever, whooping cough should be sepulchrally guarded against. During the hazardous period of dentition the teeth and gums must be sedulously watched. There is good reason for believing that a seton or iphe in the neck or arm has been very destructive in occurring attacks of the disease. Dr. Hayne mentions some striking instances of the good effect of establishing an artificial irritation at some distance from the brain, whereas has been a disposition to disease in that organ."
A. Such general prophylaxis is not our purpose here to treat, but confining ourselves to a consideration of the prophylactic treatment of one disease only, viz. Variola or Small-Pox, we shall discuss the subject under those two heads:

I. The two methods of prophylaxis for Variola, viz. inoculation and Vaccination.

II. The various questions connected with this subject, such as the origin and nature of Vaccinia, its mode of affecting the constitution, the question of revaccination, &c.

In way of introduction to treatment, let us take a glance at a few points in the history of Small-Pox itself, prior to the discovery of any means of prophylaxis.
This fell disease is said to have been first described with any degree of accuracy by the great Arabian physician, Rhazes, who flourished in the beginning of the tenth century. Many believe it to have been known to the ancient Greek physicians—Hippocrates, Galen, etc.—but no accurate descriptions by these writers can be found. The first recorded case of the disease under the name of Variola occurred in the year A.D. 907, and in the person of Elfrida, the daughter of the English king Alfred. It has been variously described by various writers subsequently; some confusing it with Measles, others describing it both under the name of Anthrax and Carbomole, etc. Indeed from the earliest notices of the malady, until the appearance of the writings of Sydenham—"the father of English medicine" in the 17th century, there is little transition in the history of its progress, prevalence, or treatment, farther than that it was "the most universally diffused, the most frequently disabling, the most fatal, and the most dreadful of all known pestilences."
Our own, compatriot, Sydenham, then was the first who accurately described smallpox as a separate disease, and who introduced a much improved plan of treatment, viz.: the cool regimen, exposing the folly of the previous methods, all of which tended to hurry on the progress of the disease, by application of warmth in various ways. In fact every thing in the way of treatment which could be of any avail was not known, but still this dire malady continued to devastate on all sides. We need not adduce statistics to show the terrible fatality of this most loathsome disease. Long as we do, in days so favored that a case of smallpox is looked upon as something uncommon, when we go about without the slightest dread of such a fearful malady, confident in the protecting power of our antediluvian cure, hardly can we conceive the extreme dread with which this disease was regarded by our forefathers. And we, therefore, unable to appreciate the immense boon conferred upon humanity by the discovery.
7.

Discovery of a prophylactic treatment for it.

To quicken the indication, however of the frightful
nature of the disease, we may remark, that
prior to the introduction of inoculation, one
in twenty of all that were born died of
smallpox, and that of persons of all ages
suffered with smallpox one in every five
died. Such was the frightful mortality of
this disease as estimated all over the
world, but this is not all.

Think of the contagious nature of the disease which
is in this respect without parallel; think
of its dreadful effects in those who recovered
from it, the permanent disfiguration in
some cases, the loss of vision in many,
the induction of many other diseases
in themselves most serious; and lastly,
think of the frequent one may almost
day constant prevalence of the malady in
these days we refer to, its insidious
manner of attack, and the universal
manner of its causes.

Such being the disease itself, let us now consider the wonderful means
by which this plague has been decreased of all
its horrors, and this leads us to speak of the Smallpox Inoculation.

It is impossible with any degree of certainty to fix the period at which this mode of prophylaxis for smallpox was first practised, and equally impossible is it to assert with regard to any one country, that there was the birthplace of the discovery. It is believed to have been known from time immemorial to the Chinese, the Mahommedans, and other nations in Asia, and the South-Eastern parts of Europe, various writers of the 17th and 18th centuries, as Josepah de Meus, Fontonnel Prince, &c., making statements to that effect. It is, however, certain, that the practice of inoculation or "artificial variolation" was first brought under the notice of the medical profession in England in 1714 by Dr. E. Jenner, of Constantinople, and by Mr. Hedges, an English surgeon, who had seen it practised in Turkey. Little attention was paid to it at this time, notwithstanding these efforts.
And it was not until introduced some years afterwards by an English lady—Lady Mary Montagu, that it at length became a practice in our country. It is therefore to the noble patriotism and indomitable courage of this lady that we are indebted for the introduction of this first mode of prophylaxis. In travelling with her husband, the English Ambassador at the Ottoman Court, she learned in Turkey the efficiency of this method. She described it in a letter to one of her friends in England, which we shall transcribe at some length as it will suffice for a description of the operation. Can

Extract

"A cup of distemps I am going to tell you a thing that will make you wish yourself here. The singlepoze, so fatal to general amongst us is her entirely harmless by the nourishment of ingrafting, which is the name they give it. There is a set of old women who make it their business to perform the operation every autumn in the month of September."
"September, when the great heat is abated. People send to one another to know if any of their family has a mind to have the smallpox; they make parties for this purpose, and when they are met (commonly fifteen or sixteen together) the old woman comes with a mortar full of the matter of the best sort of smallpox; and asks what man you please to have opened. She immediately opens open that you offer her with a large needle, which gives you no more pain than a common scratch, and shoots into the vein as much matter as can lie upon the head of the needle, and after that binds up the wound, with a hollow bit of shell; and in this manner opens forty or fifty veins. The Greeks have commonly the inspiration of opening one in the middle of the forehead, one in each arm, and one on the breast, to mark the sign of the cross. But this has a very ill effect, all the wounds leaving little scars, and is not done by those who are not superstitious. who choose to have them on the legs or on that part of the arm which is concealed."
The children or young patients play together all the rest of the day, and are in perfect health up to the eighth. Then the fever begins to seize them, and they keep them beds two days - very seldom above 20 or 30 in their places, which never reach, and in eight days time, they are as well as before their illness. Where they were wounded, there remain burning sores during the distemper, which I do not doubt is a great relief to them. Every year thousands undergo this operation. The French Ambassador says pleasantly that they take the smallpox here by way of division, as they take the waters in other countries. There is no example of any one that has died in it; and you may believe I am well satisfied of the safety of this experiment since I intend to try it on my dear little son. I am8 patriot enough to take pains to bring this useful invention into fashion in England, and I should not fail to write to some of my doctors very particularly about it. I know any one of them that I thought had
"Captive enough to destroy such a considerable branch of their revenue for the good of mankind. But that diesther is too beneficial to them not to rejoice to all their resentment the harshly might that should undertake to put an end to it. Perhaps if I live to return I may however have courage to engage near with them." Yes. Yes.

She did live to return to England in 1721 and in that year introduced the practice into our country by having her own daughter inoculated. Mr. Matland who had travelled with the Ambassador as Surgeon first introduced endeavors to establish the practice of it in London, and was encouraged by her patronage. In 1721, acute precautions had been much agitated amongst scientific men, an experiment, to be sanctioned by the College of Physicians was allowed by Government. Five patients under condemnation willingly encountered the danger with the hopes of life. Upon four of them the complaint appeared on the fourth day, the fifth was a woman on whom it never appeared but she confessed that she
she had it when an infant. With so much ardor did Lady Mary embrace this salutary innovation among the mothers of her own rank, that as we find in her letter—much of her time was in part, dedicated to various consultations, and in superintending the success of her plan. In the following year the Prince of Wales submitted successfully her own daughter to the new process, and this was inoculation established in Britain as the grand antidote to Smallpox. "No efficacy," says Dr. Watson, "in mitigating the severity and danger of the disease, in saving life, and in preventing deformity, was signally great. The mortality in natural Smallpox was estimated at one in five. This really higher. Sir Hawtrey inferred from the records of the Smallpox hospital that natural Smallpox destroys about one third of all whom it attacks. And Barrow Stn. Dale, a great inoculator, declared that not one in six hundred died of the augerfish disease. The Brothers Sutton professed to have inoculated 20,000 persons without losing one. But these data have been treated exaggeratedly..."
From Dr. Browman's poem, "Infancy."
statements. Dr. Gregory says the average number of deaths at the inoculation hospital was only three in a thousand. The National Vaccine Board speaks decidedly as 1 in 300 as the proportion of the inoculated that will nearly die from the operation.

Such was the first mode of prophylactic treatment for smallpox; the improvement being the production of the same disease in a very much milder form by means of inoculation with varicella matter. This means the protection of the inoculated for the future from an attack by the disease. That it was a grand improvement we cannot doubt, and today that it has conferred immortality on the name of the illustrious lady who risked so much to introduce it is but to say the truth. The following extract from a poetical publication of the period will indicate how the innovation was then appreciated:

* * *

"The triumph was reserved for female hands.

"This was the deed, accomplished Montaigne!

"What physic ever conquered what described

"By Pilarini, by Simone sketched.

Signed
Seemed to philosophy an idle tale
Of curious only. She, by patriot love
Revived, and England rising to her view
Moved as a truth, she proved it on her son!
A manly mind, whose reason dwelt Supreme
War has; the little terrors of her sex
Defying, by maternal tenderness arrayed,
Yet bold, whose confidence had stable ground:
How far superior to the turban'd race
With whom she joined—formidable weak!
Yet this is the whom fate's illiberal race
 Hath dared to converse with malice's spleen
And meansly coward soul.
She hath been the cause
Of heartfelt joy to thousands, thousands live,
And little shall live, through her.

We must not however allow ourselves to fall into
the error of taking only a one sided view of
this matter. Enough has been said of the
advantages of this method of treatment of
malevolence; it has also its disadvantages:
And in consequence of these can of the fact that
the have now as much superior expedient
in Vaccination, the practice of inoculation has been entirely abandoned, being both unnecessary and dangerous. Yet the great objection to it is that although by means of it the individual inoculated is protected from smallpox, the seeds of the disease are thus kept continually in circulation, to the great risk of the community. While by inoculation, the smallpox is rendered safer and milder to the persons inoculated, it is of necessity thus more extensively propagated from its extremely contagious nature, and "its fomites kept alive and active for ever." We shall therefore, find dismissing inoculation for the present with the remark that in 1840 the practice of it was declared illegal by Act of Parliament, let us turn to the other and far superior mode of Vaccinization.
2nd Vaccination.

If we were asked to sketch to the greatest, the noblest, the numberless triumphs of our noble art, whether we look? Should we hesitate a moment in precisely pointing to the discovery of the immortal Jenner, as the nec plus ultra, the chef-d'œuvre of the Triumphs of Medicine?

If the grand aim of our profession is to prolong the average of human life, and to lessen the sum of human woe, surely we have here the discovery which has, above all others, fulfilled this aim of all alike!

"Physicians," writes Prof. Simpson, "may point proudly to this discovery alone as a victory of medicine over disease and death, unexcelled in its greatness and importance by any of the ingenuities discovering that have been made, though the whole past century in any of the physical arts, of practical sciences. As itself alone, Vaccination has already extended the average sum of man's life upon earth some three or four years."

Looking far back into the career of Jenner, we find the first faint traces, the earliest indication of what was soon to form so
Grand a discovery, and to immortalize its discoverer, in the humble surgery of a Surgeon & Apothecary, in Sadlery, near Bristol, with whom Jenner — then about 18 years of age — was apprenticed. One day a young woman called at the shop of his master to seek advice, the subject of Smallpox was mentioned in her presence, when she exclaimed: "I cannot take that disease for I have had Cowpox." This incident riveted the attention of Jenner, for although the notion as to the protective power of Cowpox was by no means an uncommon one, it was then for the first time brought under his notice in such a way as forcibly to fix his attention upon it. That moment was the happy birth-moment of the discovery! He read of how he often meditated on what might be the result of that observation — of how he looked far forward into the long gestation of years before him, caught sight of the glimmerings of the hidden future, of how he, beyond the twilight, who had just entered upon the fraternity of the study of that art of which he was destined to become such a brilliant star, contemplated the removal from the long
list of human maladies of the most, if not the most fatal of them all... from the catalogue of human ills one of the most dreadful stemps which Deciduous had been pleased to inflict. 

Fair would we follow, step by step—for it was a step by step, uphill progress, the progress of this discovery... and gazed with wonder and admiration at the insurmountable difficulties surmounted, and the almost crushing opposition in... Contented and borne down, as it vanished, like Truth itself, onward and upward to its full development; and with joy turned we glancing... on the final appreciation of its life-giving power by people of every nation... the realization of its unique importance... the Conferring of inestimably laurel-wreaths on the brow of its immortal discoverer! And this is neither the time nor the place for such indulgence, and therefore we at once proceed to the more practical points noticeable in the gradual establishment of Vaccination. 

By Vaccination then we mean the transference of a disease from the cow to man.
man, by which the latter is protected from smallpox, or more properly the production in man of a modified form of the same disease (smallpox), which modified form incurs against an attack of the more severe. We have said, a modified form of the same disease, for so Cowpox or Vaccinia has most unquestionably been joined to be, as was long ago assisted by the discovery of its virtues. To that point we shall refer hereafter (p. 34).

We have already remarked how the belief in the virtues of Cowpox in warding off smallpox was quite a common one among the peasants of Gloucestershire, long before it became under the notice of Jenner. As soon however as it had been made known to him, he set himself carefully to ascertain whether or not this popular faith was well founded. He formed from actual experiments in 1795, that most of those who had thus had Cowpox were really protected from smallpox. This was a grand point settled. But he found at the same time that others who had also had what was equally called Cowpox were not so protected. She was a great blow to the fabric which was being reared.
Careful investigation, aided by wonderful sagacity soon made it evident, however, that what was popularly known as Cowpox, was not the true varicella;—that the Cow's udder, on which the eruption appears, was subject to four or five eruptive diseases, all of which were communicable to the hands of the milkers, and all capable of forming sores; and that these sores—no matter what particular eruption produced them—were all termed Cowpox. Discrimination therefore was necessary, between the true and opinions cowpox, the former being the only debilitating one, and this latter, a pretended disea:

This much settled then, another and greater difficulty now arose viz.: That instances were known in which milkers although they had undoubtedly had the true cowpox, afterwards took Smallpox. Can we fancy how Jameson must have felt as this frightful difficulty appeared, hearing the words 'to the achievement of his designs? Did he give up in despair as many would have done at such a rude shock to all his fondest hopes?
No! 'Resistance can only augument his energy. Can he regain his balance with redoubled zeal.' The result was the complete clearing up of the apparent mystery - the entire removal of the doubt. He found that only mice in a certain stage of the eruption could the virus be applied with producers effect - that if might produce sores. At all times and thus mislead the observer, but never leave in a certain stage of the vesicle did it affect the constitution in such a way as to render the individual insusceptible of Smallpox.

To insure success the virus must be communicated while still a clear and limpid fluid, i.e. in an early stage of the vesicle. Are not as thick purulent matter, late in its progress, which, although producing a severe local sore, does not affect the system. What more do we want to complete the discovery?

We have seen that vaccinia undoubtedly can protect from Smallpox. Are we have seen the conditions necessary for successful vaccination. But seeing that the disease exists only at certain times in the cow, can we not be
St. Barons Life of St. Jerome — Vol. 5.
Since for a number of years successfully and been what is termed the true protecting substance is with difficulty distinguished; we must conclude, that were not some means of perpetuating the protecting matter found, the discovery would have had but poor and narrow results. Here then was the grand point to be settled: Is this disease Cow-pox capable of transmission from individual to individual, as well as from the cow to the human being; is it possible to propagate the infection from one human being to another by artificial inoculation? On the 14th May 1796 this question was determined by Dr. Jenner. On that day — which is termed the "Birthday of Vaccination" — writes Dr. Barron, "milk was taken from the hand of Sarah Nelmes, who had been infected by her mistress' cows, and instilled by two superficial incisions into the arm of James Philips, a healthy boy of about four years old. He went through the disease in a regular and satisfactory manner, but the most vagabond part of the trial yet remained to be performed.
It was needful to ascertain whether he was
seem from the contagion of smallpox.
This point not only of anxiety to Dr. Jenner,
was fairly put to rest on the 1st of the
following July. Variolous matter immediately
stained from a suppository was carefully infused
by digital incisions, but no disease followed.
Such was the grand event of the discovery
of vaccination. Further there is no need to go.
It was the completion of the discovery of a
prophylactic treatment for one of the deadliest
maladies afflicting the human race; infallible
we had almost said as the Seraphim Angel
of Moses, and as such an emanation from
Divine Majesty, as such an exemplification
of Divine Goodness and Mercy in the one
case as in the other, as no one was
more ready to acknowledge than the illustrious
discourser himself.

During the next two
years the researches of Dr. Jenner were inter-
rupted owing to the sudden disappearance of
Cowpox from the dairies, but in 1798 it
again appeared, and Jenner, after careful
repetition...
Elm't. Monthly Journal of Medical Science
Sept. 1847
...portion of his experiments, announced the discovery of vaccination in a small pamphlet published in June of that year. The discovery was now fairly before the world, and we may easily conceive what sort of reception it had. It may quote a few sentences from a paper written by Dr. Jenner in 1847, which gives us an idea of how this, like all similar great discoveries in medicine or any other science, are at first opposed and attempted to be beaten down, but how in the end they triumph over every opposition... At the time of Jenner's first public announcement of vaccination in 1798, and for many years subsequently, the proposal of substituting vaccination for variolous inoculation was met with incredulity and ridicule, and drained and determined opposition. He measured by which he taught medical science to save annually from death thousands of human lives in England. ...
and its own safety and prosperity strongly and
shamefacedly called in question.

Dr. Squibb earnestly and publicly supplicated
his Majesty George the Third to suppress the des-
strucive practice of vaccine inoculation throughout his
dominions. "If ought," observed Dr. Monro of
Edinburgh, "is prohibited by act of Parliament,
the College of Physicians have" exclaimed Dr.
Moseley, "a duty to perform, and I trust this
business will not escape them." Others deplor-
ing the interference on the part of the King,
Parliament, or Colleges, appealed to the people
themselves. "It would," said Dr. Brown, "indeed
only be downright madness to imagine that
will condescend to encourage it." The Anti-
Vaccinarian Society called upon the public "to
second their efforts in supporting the cause
of humanity against cowpox injuries" and le-
ought their aid to suppress the cruel, despo-
lthramy of forcing cowpox vaccine on the innocent
babies of the poor — a gross violation of religion
morality, law, and humanity." Yc. Yc.

In short, Vaccination was opposed
and denounced on a variety of grounds.
was alleged to be occasionally fatal in its consequences, to be liable to exist various diseased actions or predispositions; to produce diseases new to the human constitution; to be "injurious, misthinking, scrofulous, and irrational; to be an innovation neither established on the basis of reason, nor supported by the foundation of truth." "The vaccine" exclaimed one surly to coarse inoculation, was the damnedest thing ever proposed; he wished the inventors were all hanged, and he would give his word for its being done. "In many families, wrote another author, there will be none to attend the sick, nurses will quit their patients for their own safety, and servants fly from their master's houses to shun the pestilence. Then we shall experience a horrid scene of public and private calamity - brought on by a medical experiment, embraced without due consideration, extended by a rash transgression over the bounds of reason; and after the fullest conviction of its inutility, destituteness, continued by the most degrading collapse of philosophy that ever disgraced a civilized world."
The history of cow-pox is certainly calculated to teach us this one lesson, that in relation to
the truth of any novel doctrine or practice, such as vaccination or otherization, adumbral opinions are few;
judgments are, however strongly entertained, a however strongly expressed, not in themselves adequate.
As some, as the present time, would seem to believe, to decide the whole matter in dispute, either
in one direction or another. And the moral is obvious — that while minds anxious to form new
and probable inquiries should not be intimated and deterred from their pursuit by such prejudice;
judgments on the part of others, those who are, on the contrary, anxious to suppress them, should
not entice to base their opposition upon mere
insinuations or mere opinions only.
This first part of our subject we shall conclude with a brief account of the
of the disease Vaccinia in the human constitution.
It is now generally believed that the best instrument for the performance of the operation is
that invented by Dr. Graham, Vis. of Edinburgh.
In using it, a crucial scratch is made with the needle points, and the matter applied by the little curved knife. At the other end of the instrument. A common plaster or a needle will do—well enough, but the vaccinator of this is considered by many who have had much practical experience in the matter to be the most convenient. The scratch is then made, so as to expose the chorion, taking care that the blood does not flow, which might wash off the vaccine matter. The wound is then allowed to dry up. For the first 24 or 48 hours in some cases, nothing is noticeable around the point of application of the matter, but on the 2nd or 3rd day an inflammatory edema is noticed, which continues until the 5th day, when a distinct vesicle—gelatinous at the center containing a clear fluid—is formed over the skin. The vesicle enlarges, still having the inflammatory edema around it until the 8th or 9th day. If the edema now spreads more widely around the vesicle, it is termed the areola, while the vesicle becomes centrally umbilicated. At the ninth day, the vesicle is at its full development, and consists of a number of cells containing the clear
clear fluid virus. Can at least not later than this must the fluid be removed for purposes of vaccination. Mr. Marson's rule for this is as follows: "Lymph for use is in its best state on the seventeenth day of the progress of the vesicle it is taken from — the day week from the vaccination. Under no circumstances should it be taken for use later than twenty-four hours after the vesicle has begun to form." After the ninth day (sometimes even earlier) the fluid in the vesicle begins to become opaque and puriform, owing to the suppuration of the chorion which takes place; the vesicle now also begins to fade; a hard, brown crust forms, which becomes detached about the fourtieth day, leaving a white crater: - slightly depressed - of about the size of a sixpence - having a distinct border containing numerous little pits or minute depressions - corresponding to the cells of the vesicle. The characters of a good vaccine mark are important, aid it is a fair test as to whether the vaccination has been complete or abortive, and is taken in the army as a test for the necessity or not of re-vaccination. 
Such is the process of vaccination as the cause of the disease induced. Let us now take up the second division of our subject which includes the various questions connected with the modes of prophylaxis we have described.

I. 

Origin and Nature of Vaccinia.

It cannot fail to strike us with astonishment that the transference of a disorder affecting one of the lower animals to man, should produce such a powerful and beneficial effect as that of which we have been treating. So what growth are we to seek for a resolution of the apparent anomaly?

The very fact of the influence of the one upon the other indicates some connection or analogy. Jenner himself was the first to advance the idea that cow-pox and smallpox are kindred to common origin—were only varieties of the same distemper, and that in employing vaccination we only produced, in its mildest form, the same disease which
we should produce in a much more secure form, were we to employ small-pox inoculation. This theory he supported by many experiments. He supposed the disease as manifested in the cow to have its origin from the horse, when the latter animal was affected with what was termed "the grease," i.e. an affection in which the heels of the animal became edematous; cracks form in them, and in these cracks vesicles are formed with distinct areolae. It may be remarked that it has, subsequently to Jenner's time, been found, that this vesicular disease manifests itself on other parts of the horse than the heels (and is not necessarily connected with "the grease," although usually a concomitant of it.) Jenner supposed this vesicular affection in the horse and that of theudder of the cow to be the same disease from the invariably simultaneous occurrence of the two, the disease being communicated, as he supposed by the milking. The truth of this supposition he afterwards proved by direct inoculation of a child with matter taken from the vesicles on the horse's heel.
My only authority for this quotation is in Gomme's Thesis - Edin. University 1857.
Produced abstract vaccine vesicles as did matter from the cow. He also produced the disease in the cow by inoculation from the horse. It was soon after became apparent that the horse and cow were not the only animals affected with this disease, but that the sheep, goat, and camel are subject to it, and that veins taken from any one of these was successful as a prophylactic. "If affined" says a recent writer, "all this subject," that in the province of Lux, muckers are subject to a malady termed "photo-shoot," the smallpox of the camel, a cuticular disease affecting the hands and arms of the muckers — which is derived from a similar affection on the udder of the camel closely resembling that on the udder of the cow. No one is ever known to die from this disease, and it is remarked by the natives that those who have been subject to this camel pox are invariably free from the smallpox, which occasionally prevails in that district.

In short by various experiments and observations similar to those we have mentioned inoculations of the human subject with
Baron's Life of James Vol. II. 2
Virus taken from each of these animals can inoculate the animals themselves with virus taken from the vesicles of others, it has been unquestionably shown that these affections in all the animals we have mentioned were the same disease — \textit{vaccinia}. first noticed in the cow. But the analogy between cowpox and smallpox had not been demonstrated in order to explain the wonderful influence of the one upon the other.

As we have already said, Jenner advanced the view of the sameness of the two diseases — the one being a milder form of the other — but during his time it could only be considered a theory, not being proved. So as to place it in the catalogue of facts, now however it has been demonstrated most satisfactorily. The first acknowledgment in proof of the similarity of the two diseases is recorded in a letter from Dr. Waterhouse of Massachusetts who was to adopt the practice of \textit{vaccination} in America to Dr. Jenner in 1801, in which he states the following curious fact: \textit{At one of this year's inoculations} (i.e. smallpox inoculations) which
Occurs once in eight or nine years. Several persons drove their cows to a hospital near Aulonaki village, in order that their families might have the daily benefit of their milk. These cows were milked by persons in all stages of smallpox; the consequence was that the cows had an eruptive disorder on their teats and udders, similar to the smallpox pustule that every one in the hospital — as well as the physician — declared the cows had smallpox.

Since the cowpox has been talked of, this story has been revised and credited. Have you found anything like this in England?"

The next experiment in support of the fact we are engaged with was that of Dr. Jenner in 1796, who succeeded in producing vaccinia in the cows by means of smallpox fomites, i.e., blankets etc., taken from the bodies of patients affected with the disease.

In 1836, Dr. Basil Thiele of Russia produced the disease in many cows by smallpox inoculation. But the question has been permanently settled by the experiments of Mr. Leech of Elyesbury...
In 1840, recorded in the Transactions of the Royal Medical and Chirurgical Society for that year.

The Cocks produced the vaccine disease in the cow, both by direct inoculation with smallpox matter, and by operating on the mucous surfaces of the mouth, and from cows so affected, vaccinated children with the most complete success.

Mr. Smith, in the Government Report on "History and Practice of Vaccination," 1857, states the matter as follows: - Researches subsequent to Jenner's he says, "have made it matter of almost familiar experiment that the infection of smallpox may by inoculation be communicated from man to the cow; that its cause is an eruption of vesicles presenting the physical characters of Cowpox; that the lymph from these vesicles, if implanted in the skin of the human subject, produces the ordinary local phenomena of vaccination; that the poison so vaccinated diffuses no atmospheric infection, that the lymph, burned by him, may be transferred with reproducing powers to other unprotected persons, and thus on the conclusion of this artificial disorder, neither..."
Unarmed vaccination, nor inoculation with smallpox, nor the closest contact and cohabitation with smallpox patients will occasion him to become any eminent of insusceptibility to infection. We conclude this point from subject with the following summary of facts in proof of the identity of vaccinia and variola by Prof. Jenner:

1. The prevalence at the same period of cowpox among cattle, and smallpox among men.

2. The transmission by contagion of the smallpox to cattle and the consequent development of cowpox in these animals.

3. The transmission by inoculation of the smallpox to cattle and the resulting development of cowpox in these animals.

4. The transmission by inoculation of the cowpox to man, and the development thereby of a pustule similar in character to the vaccinia pustule of the cow.

5. The transmission by inoculation of the cowpox to man, and the consequent development of a pustule similar, if not identical, with smallpox.
The next question we take up is the Manner in which the Vaccine Virus affects the constitution, so as to protect it from Smallpox and from subsequent infantile paralytic fever. This is a question in medical science which has been as yet by no means settled. Many able pathologists consider the mode of action of ataxia, and of other analogous poisons introduced into the bodies of innumerable individuals, a mystery in which the efforts of the old humoral pathologists, adopting the old humoral pathology, assign the entire effect to changes produced in the blood. Others, on the contrary, adopt a more materialistic view of the matter. Dr. Anderson, Professor of Mental Pathology, is one of the latter. He says* "The probability is that all these poisons act primarily upon the solids of the body which they prevent from being again infected. How they affect the solids we know not." We have no decided facts on this subject to-day. Held as they are of the whole
the theory which has received most support is that of Mr. Simon, which we may state briefly thus: The poison introduced into the body meeting in the blood with these matters upon which the susceptibility to smallpox depends, causes a change in the blood, and bringing it of all these matters, thus taking away the susceptibility. In an attack of smallpox, he holds, that these matters are got rid of by means of the eruption, and thus the blood cleared of them, and the poison removed from subsequent attacks. But in inoculation there is no such eruption over the body by which the virus can be eliminated. Mr. Simon therefore holds that in inoculation these matters are got rid of just as they are fermented by means of the lungs and intestines, and do not accumulate in the blood as they do during the period of incubation of smallpox or before the appearance of the eruption by which they are eliminated. Many objections have been brought against this theory, which although widely supported is by
* Prof. Henderson's Lectures - Dec. 1860.
no means generally described. Dr. Henderson cites the following case as an objection, and in support of his own view of the solids of the body being first affected. A child was vaccinated on a certain Saturday, and on the following Saturday the vaccine vesicle had almost attained its height, when febrile symptoms came on, and next day a distinct eruption of smallpox appeared. The child had been exposed to the infection of smallpox a fortnight before it manifested itself, the usual stages of inoculation and a week prior to the application of the vaccine virus yet the vaccine apparatus was usual, producing its vesicle, so that during the week of advance it is inferred the smallpox poison must have been acting on the solids and not by its supposed fermentative action in the blood or by the secretions of the matter on which the susceptibility depended.

It is curious to find that early in the 10th Century Thomas Hall held ideas closely resembling those now held by Mr. Simon respecting this fermentative change in the blood for he
wrote:—"Now the smallpox arises when the blood entices certain fermentations so that the superficial eruptions are thrown out of it as it is changed from the blood of infants, which is the most into the blood of young men which is like fire perfectly refined, and the smallpox itself may be compared to the fermentation and the hissing noise which takes place in must at that time; and this is the reason why children especially males, rarely escape being saved with the disease, because it is impossible to prevent must from changing into the state which happens after it, making a hissing noise and its fermentation."

Mr. Laughr believes with regard to this matter, that by vaccination some impression is made on the entire constitution of the blood in some unexplained way, and that this impression is lasting even ineffacable. In the first volume of his "Medical Pathology" we find the following passage regarding this:

"Inhaled once in almost infinity small quantity, yet by multiplying itself, or otherwise affecting all the blood it may..."
after it once for all. For measurable as the changes of effect may be, inconceivably minute as the difference must be between the blood before and the blood after vaccination, yet in some instances that difference is perceptible, in nearly all it is long retained. By assimilation the attached model is precisely imitated, and all the blood thereafter formed is insusceptible of the action of the vaccine virus. — "To all these things he continues "we have proof of the surpassing precision of the formative process: a precision so exact, that a trace may be discerned as a mark once made upon a particle of blood, at least is not for years effaced from its substratum."

III. Posing from this we next take up the

Question of Revaccination.

This question involves many points of utmost importance practically, and we shall endeavor briefly to mention them all. Dr. Jenner had fondly hoped that by means of vaccination every individual might be permanently protected from smallpox, and that thus with the Universal
adoption of the prophylactic, the disease might finally be eradicated altogether. It is now
not too evident that these hopes have not been realised, nor that vaccination has not proved
in every case a permanent protection. Farther it
from us to underrate the value of vaccination,
which has proved to save a host of lives yearly,
saving thousands of human beings which but for it
would have been sacrificed at the
shrine of its evil antagonists. Yet let us not shut
our eyes, and indeed we cannot close the
fact so evident as this:--that vaccination does
not in every case afford complete and permanent
protection from smallpox.
If we ask ourselves--Is vaccination competent
finally to extinguish the susceptibility to smallpox?
we find an apparently negative reply in the
evidently increased prevalence of smallpox among
us of late years. But while some have main-
tained that this increase is owing to the impor-
tant nature in many cases of the protection of
vaccination--others hold it to be owing to the
influence of the less extensive and general adoption
of the practice of vaccination now than formerly,
Especially
*Brattle's Principles of Practice of Medicine p. 945.

*Simpson's Aesthetic Memoirs Vol. II. £ 479.
especially among the poorer classes. On this point Dr. Strutt writes thus: *The cause very little doubt the smallpox is again becoming prevalent among us, a circumstance which some have attributed to deterioration of the vaccine lymph. That this cause does chiefly to a certain extent is very probable; but for my own part, I have been led to the conclusion that the terror for the disease which formerly prevailed among the public, has, though the precautionary discovery of Jenner, and the energy with which vaccination was originally pressed, via great measure declined, and that this is the principal cause. As scanty multitudes of the lower orders no longer have their children vaccinated, and hence why our hospitals are so frequented, incumbered with cases of which we have just witnessed. We have no remedy for this but underrating vaccination in practice by penal enactments as is done in some continental States." Dr. Simpson would seem to go even farther, and assign all to the neglect of vaccination, for in 1849 before the Edinburgh Medical-Chirurgical Society he declared talking of the present annual mortality from smallpox in Britain
* Prof. Henderson's Lectures. Nov. 1860.*
Britain - that he believed "that this number of
saves (8,000 or 10,000) would lastimes be saved
annually if the legislature would adopt a means
of ensuring vaccination in all.
In belief however, the latter explanation is not
adequate of itself to account for the increase of
smallpox, but that the former - the temporary
protection of vaccination in many cases - must
also be admitted. In part of this case have the
increased number of cases of smallpox after vac-
cination, or as it is termed, varioleoid or post-vaccinal
disease, in countries such as Norway and Sweden
where vaccination is compulsory on everyone,
where no one is allowed to marry or be admitted
as a member of the Church without a certificate
of having been vaccinated. In Copenhagen there
was no case of post-vaccinal smallpox from 1800
to 1804, in 1804, 2 cases; in 1805, 5 deaths;
in 1824, 257 cases; and in 1834, 898 cases.
Different causes have been taken in attempting
to account for this increased occurrence of post-
 vaccinal smallpox. Some assert that
vaccination can be perfectly performed in
protecting from smallpox, but in time, and that
in proportion as it means out the liability to smallpox increases—except insofar as this liability is modified by age. A more probable hypothesis is that the cause is to be found in the deterioration of the vaccine virus itself. Various facts such as experiments support this opinion. In 1831, M. Yard inoculated 10 cows with the matter then in use without being able to produce vaccinia. He then inoculated some of the cows with fresh matter from another cow with complete success.

The result of experiments made in Glasgow on this subject was, that of 43 cases vaccinated with primitive virus not one failed, whereas of 43 cases vaccinated at the same institution and sometime with old virus that were 10 cases of complete failure and 9 of spurious vaccinia. Admitting a deterioration of vaccine virus, can consequently ales of primitive vaccinia, the question arises: What is the cause of this deterioration? And again, in answer, we have two opinions, viz. 1st that the deterioration of the virus is a necessary consequence of its transmission from individual to individual through
through a series of years. I hold that the

degeneracy is by no means a matter of necessity
but owing entirely to the careless selection of
matter. The careless selection of matter is
no doubt a cause, and a great one, of the
degeneracy of the virus; but we fear the
other idea cannot be thoroughly denied, notwithstanding the testimony of the National Vaccine
Board whose members express the opinion that
the "vaccine lymph does not lose any of its
prophylactic power by a continued transit
through successive subjects."

The opinion that the virus does become deteriorated by long transmission is supported by
Sir Jenner, who adduces many cogent arguments
and statistics in support of his view. But into
these we cannot enter here.

We must admit, then, whatever the inconstancy
be owing to, that there is an inconstancy of protection in certain cases of vaccination.
And hence the necessity for the adoption,
in all cases, of revaccination. We
know that in some cases the protection
afforded is imperfect — although permanent protection
Protection is the general rule. Can we
not as well know in whom the effect may last
for a long time? Revaccination should be the rule for
those who have already been vaccinated.
Revaccination by its successfulness in
so many cases gives a strong proof of the necessity.
Is this the adoption of revaccination supposed to
make a person immune to another attack of smallpox
if it is not able to protect from
smallpox? But does revaccination in-
crease the protection against smallpox?
This is proved beyond a doubt that it does.
We need only point to the report of Mr. Mason
on this matter. Mr. Mason recommends
that all persons vaccinated in infancy
should be revaccinated. Mr. Mason
states that this measure
is more especially requisite for those who,
though vaccinated, have no evidence remaining.
At the time of my writing just half a century has elapsed since the discovery and introduction of vaccination; and after a quarter of a century had most huma...
Lastly, we take up the question of the comparative merits of the two methods of prophylaxis of which we have been treating. Strange as it may appear, it has been proposed to do away with vaccination altogether and reinroduce inoculation as the legal prophylactic measure.* In the previous part of this paper we have mentioned that inoculation was in 1840 declared illegal by Act of Parliament. Those who would reinstate it do not surely sufficiently estimate its frightful concomitant evils, evils which informed days were found in some countries (as Russia) to counterbalance its virtues, for as we have already said, while it afforded protection to the individual it helped to spread the dreadful disease, and thus immensely augmented the danger to the community. Nothing can elucidate this fact more significantly than the following statement made by the committee of the Epidemiological Society regarding the relative mortality of smallpox epidemically in London:

Before inoculation as 14.2;
Spring inoculation as 5.4;
During vaccination as 14.
Contrasting the two methods of prophylaxis, we have in one the production of a most loathsome disease, extensively contagious, often proving in the individual himself extensively severe, having a mortality of one in a hundred. In the other, a very mild disorder, producing little and often no inconvenience, not contagious, with the development of but a single vesicle, can with no mortality at all. Isn't this a criterion? "Vaccination does not afford permanent protection? Now we know that as a general rule, it does — that the cases in which this is not permanent are exceptional, and that by vaccination we protect even those. In Denmark, scarola had at one time disappeared before the defensive influence of compulsory vaccination. Could we ever hear of such a result from inoculation? Impossible. We cannot overestimate the benefits of Jenner's discovery and the incomparable blessings by it conferred on the human race. Could we expect Vaccination to afford in every case absolute and infallible protection, when we know that an attack of smallpox itself does not give such assurance?
* From Dr. Anderson's Lectures Nov. 1860.
 assured? We know that secondary smallpox does occur, and is proportionally almost as common as smallpox after vaccination. More than this, we know from abundant statistics that the mortality in secondary smallpox is much greater than in the post-vaccinial disease. The following table shows the comparative mortality.

<table>
<thead>
<tr>
<th>Author</th>
<th>Secondary smallpox</th>
<th>Post-vaccinial smallpox</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cases</td>
<td>Deaths</td>
</tr>
<tr>
<td>Thomson</td>
<td>71</td>
<td>3</td>
</tr>
<tr>
<td>Chelsea</td>
<td>26</td>
<td>3</td>
</tr>
<tr>
<td>Klein</td>
<td>39</td>
<td>14</td>
</tr>
<tr>
<td>Bouguer</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>Gilgong</td>
<td>9</td>
<td>2</td>
</tr>
</tbody>
</table>

Now we may remark that smallpox inoculation is allowable only when infected persons are unavoidably exposed to the contagion of smallpox, and that is no vaccine matter at hand. In such a case inoculation is not only warranted but demanded.

It must also have occurred that it has been asserted that since the quality diminished prevalence of smallpox, owing to vaccination, other
* First on Diseases of Children $2.10$.
  (4th Edition)

† Baron's Life of Jenner [2].
Epidemic diseases have become more common and severe. "Experience" says Dr. That has proved the truth of what calm reflection might have suggested; that with the diminution of the frequency of smallpox, there has been an increase, though not to an equal extent, in the prevalence of measles and scarlatina. *

That more need we say in behalf of vaccination? Truly it needs no advocate! From its birth it has gone on from great to greater achievements, triumphant over disease and checking the cold hand of death.

She was in verdant vallies born Vaccinia high,
A curios, wizard sage, who, at some would part
On mordons things, from plants abseme to night
The goodly wanders to his cavern there.
Long way she ran, nor 2 woul speech, but watch'd.

Philosophy, to this wise sage long known,
Pry'ed him, for this wondrous most softly hushed
Her fears, and aroun' thought's things to own
She activist, she said, "If I am of love"

Prominent after, though might is said in song
Methinks jealous for we had dome her tone
Infant disguise amid the horrid wrong.
The angry sire exclaimed—"Be thou divine—
The power of ill fall Variola me thine!"

We may conclude with the following sentences from the pen of Dr. Simpson, pointing out the moral taught us by this successful establishment of a prophylactic treatment for one of the deadliest maladies afflicting humanity, can indebtedness from it, encouragement to those who may be engaged in the indigent to establish truth, although encountering the most discouraging difficulties in their path, and giving hope of still more advance, in the way of prophylaxis for some of the diseases at present considered the most fatal among us:—

"The most formidable and fatal diseases of Sydenham's time sustain the pre-eminence of their formidable and fatal character no longer. And may we not hope that a people of centuries hence, the very same fact may hold true of some of those diseases that are at present most destructive and deadly in their effects upon our population? Does not that history—"
history of the past suffice to convinced us in the
belief that, perhaps in half a century or a century, hence, our present most fatal diseases
may, by the advancement of hygienic and medical
means, be our most fatal diseases no longer.
For one Theo, that I cannot but entertain.
An almost universal belief that medical science may yet
develop means, prophylactic, perhaps, rather than
cures, to stay the great destruction of human
life, prevailing amongst us now, for example,
scutis. Perhaps a more advanced technology
and chemistry may yet the long furnish us with
more enlightened views of pneumonia and other
inflammatory disorders than we yet possess, can
be used with more success @ the present.
Inoculations are resonces against.
We have from the experience of the last few
years, every reason to hope that the whole
relief of infective diseases will be greatly sub-
divided, in intensity and violence, when
the investigation of the physical causes proceeds
faring to them. Actualy occuring them.
"Besides, if vaccination during infancy,

medicine..."
medicine has devised prophylactic means to arrest the ravages of smallpox. May it not yet devise some amiable means also to arrest the ravages of regular fever, cancer, meagles, hoofing cough, and typhus fever? Perhaps of the whole class of non-recurring diseases, by artificially producing these several diseases in a mild and safe form by inoculation, and imitative medication or otherwise? And even if we fail to arrest them, we may find out for the baffling animal poisons producing these diseases, antitoxins as certain as quinine is cresyic, or antitoxins against the poison of marsh fern.

"Let us not at least sit indolently down and cause ourselves into the belief that it is impossible to attain such results. The conquest of smallpox seemed too remote for fathers a hundred years ago as impossible as the conquest of these maladies can look to any one now. Can we yet we all know that the subjugation of smallpox was effected by the arm of one man, and the devotion of one mind to its accomplishment."

"The happy results of Jenner's
labours — besides their own intrinsic and inestimable worth — deserve to be stamped with a precious lesson from him of hope and perseverance under alleged impossibilities; for these results preach longly to the prospect in all time to come that we should never cease any apparent improbabilities to prevent us from going always onwards in earnest search for possible means of conquering featuring diseases even of the most formidable and fatal kind.