the physicians in Marysville will still tell you that there has not been a case of smallpox in that village.

These are fair examples of numerous outbreaks in different communities of this state, where smallpox has languished for weeks and months without any one suspecting its presence.

The disease itself has presented many unusual features. It has been not only very mild, but also very feebly contagious. What has been said would indicate this, but other facts show it. In some instances unvaccinated children have lived in the house where persons went through with an attack of smallpox, associating with them daily, and yet escaped the disease. Persons with the disease have gone into crowded rooms, as into schools, churches, railway cars, etc., and yet no one contracted smallpox from such exposure. Vaccination, even if performed many years ago, has given almost perfect protection.

Where the disease has prevailed in a community for months, masked under some other name, vaccination became the best means for diagnosis. A house-to-house canvass in such cases, with a history of the patients and their families, revealed the fact that with few exceptions the disease had gone through family after family, picking out only the unvaccinated. There was a remarkable instance of this at Marysville. Two families living in adjoining houses in the same yard had the disease. In one family of seven all had smallpox and all were unvaccinated. In the neighboring family of six but one contracted the disease and he was the only unvaccinated member of this family.

The symptoms of the disease were variable. The preliminary fever was in many cases slight and almost unnoticed. Secondary fever appeared in only a small proportion. The eruption in most instances was more superficial than common, involving the true skin less, so that in most cases the pitting was slight. The eruptive period was often much shortened and pursued a somewhat irregular course. While the disease was so very mild several deaths, nevertheless, occurred from hemorrhagic smallpox, and two from the malignant, purpuric form.

In conclusion may be quoted what an old, experienced physician in Wapakoneta said when the character of the disease there was being investigated: "If this disease we are having here is smallpox then the whole subject of smallpox, as given in our text-books, must be rewritten." But when asked if that would not be equally true if the disease were chicken-pox, as it was being called, he said: "I guess that's so, too."

For discussion, see page 1592.

HOW SHALL WE CONTROL VARIOLA?*

BY S. L. JEPSON, A.M., M.D.

CITY HEALTH OFFICER.

WHEELING, W. VA.

A pebble in the streamlet scant

Has changed the course of many a river.

Vigorous sanitation applied at the right time and in the right way will always prevent an epidemic of smallpox. No acute infectious disease is so easily controlled, because: 1. It manifests itself externally and should rarely be mistaken for any other disease; 2, it is greatly dreaded, and hence people are as a rule careful to avoid it; 3, its germs are easily destroyed; 4, we have in vaccination an absolutely certain protection. The last state-

ment may be disputed, but the exceptions are so very rare that I think better to ignore them.

My experience as a sanitary officer has brought to light a very great amount of prejudice against vaccination. This is largely based on the densest ignorance, but not a small part of it is due to the many bad results of careless vaccination—results often caused, not by impure virus, but by vicious methods of introduction or neglect by physicians of the commonest antiseptic precautions. Arms are seldom cleaned prior to the operation. Not rarely absorbent cotton or a cotton rag is bound tightly over the arm; and at least two physicians whom I know apply adhesive plaster after the insertion of the virus, allowing it to remain during the development of the vesicle. The result is a broken vesicle or pustule, an imperfect protection, often an infected and consequently very sore arm, with constitutional disturbance; and, worse than all, a growing prejudice against this most beneficent of all known preventives of disease.

The past year has given several demonstrations of the carelessness, ignorance, or perversity of physicians that are by no means creditable to our profession. In the very enlightened states of Ohio and Pennsylvania have errors been made in the diagnosis of variola and persistently adhered to until the disease spread far beyond the limits of its origin. No man is infallible, and some unusual forms of variola, as the malignant, the hemorrhagic, and some cases greatly modified by vaccination, may mislead for a time the most experienced. But to persist in error in opposition to more enlightened and expert opinions, and thus allow a disease to spread which ruins the business of a community and entails upon it a large expenditure of money, to say nothing of the resulting inconvenience, suffering, disfigurement, and death, is little short of criminal.

When a disease is so widely prevalent as smallpox has been for several years past, physicians should keep it in mind, and when called to strangers or those who may have been in an infected locality, they would do well to ask themselves the question: "Is this a case of smallpox?" Until this question can be definitely answered in the negative, let the case be isolated and every sanitary precaution be taken. Better quarantine a hundred cases of varicella than to run any risk of starting a smallpox epidemic.

Little less culpable than persistent errors in diagnosis are long delays in making a diagnosis, unless the strictest sanitary precautions are observed while awaiting developments. Some physicians never report a case of variola, even when it is prevailing in a community, until the second or third day of the eruption, free intercourse with the patient being allowed in the meantime, with the result of communicating the disease to one or more persons who, under proper management, would have escaped it. While such a practice is absolutely without excuse, personal experience has taught me that it is by no means uncommon.

The facts here recited lead me to impress these suggestions on the general practitioner:

1. Insist on general vaccination and use your influence in having the best virus inserted with all antiseptic precautions. I use the glycerinized in closed glass tubes.
2. Try to avoid errors in diagnosis. If in doubt, call to your aid the proper health officer or some one more familiar than yourself with smallpox. Do not tenaciously adhere to an opinion that the case is varicella if an adverse opinion is expressed by a physician of larger experience with variola than is your own. The

*Presented to the Section on State Medicine, at the Fiftieth Annual Meeting of the American Medical Association, held at Columbus, Ohio, June 6-9, 1899.

sanitary officer will err, if at all, on the side of the public safety. Such errors are excusable, but mistakes that result in the spread of a vile disease, however unavoidable they may at times be, the public is always quick to condemn. All will recall the erroneous diagnosis in Montreal, which gave to that city 3000 cases of smallpox. Such mistakes are liable to cause the physician making them to have unpleasant reflections. Let no false pride lead any one to postpone reporting a case, lest it develop into some other disease than variola. It is a comfort to divide responsibility with some one, and in the cases referred to the health official is the proper person.

3. Make your diagnosis as early as possible and at once report the case to the health authorities. As soon as suspicious symptoms present, isolate the patient and vaccinate every exposed person.

If these suggestions be carefully followed by all physicians the health authorities will have little trouble with smallpox, and epidemics of this disease will become rare. But, alas for human fallibility and perversity, mistakes will continue to occur and this dread disease will continue to get a good start in some communities, and the health authorities will, though often unjustly, be held responsible for its spread. During the course of an epidemic cases will occasionally occur that are so very mild as to pass unrecognized, no physician being called. I recall five such cases in a somewhat recent experience, one of which gave rise to three and another to eight new cases. The sanitary officer is completely helpless in such cases as these, in which the modifying influence of vaccination becomes a positive source of danger. He is also helpless when cases are concealed, as occasionally happens. Some years ago I found a young man dead from confluent smallpox, to whom a physician had never been called. In the same family were two sisters convalescent from the disease. During the existence of these three cases the father and a son continued at work in a large iron mill, and the female members of the family milked three cows and distributed the milk to the neighbors. The above facts illustrate some of the difficulties with which the sanitary officer has to contend, and enforce the importance of preventing epidemics, which is so much easier than to stop them.

As a result of ten years' experience as a health officer I have formulated these rules for my own guidance in the sanitary management of smallpox, and hope they may be respectfully considered by any who may be called on to control this disease unaided by such complete organization as is provided by the boards of health of our larger cities.

1. Clothed in mackintosh and with the hair covered, promptly visit every reported case and vaccinate every person in the house and in adjoining ones. Make a list of all persons who have in any way been exposed to the patient. Remove the affected one to the hospital, or to an isolated building that may be thus used. If this can not be accomplished put the patient in the most isolated room in the house, with every unnecessary thing, including all domestic animals, removed. Hang a sheet over the doorway, allowing it to touch the floor, and keep it saturated with a bichlorid solution. The nurse, well protected by recent smallpox or recent vaccination, must be confined as strictly as the patient. No nurse who has had smallpox years before should be employed without being vaccinated. I once made that blunder. The nurse contracted the disease again, and from him seven other cases arose. I have succeeded perfectly in vaccinating persons well pitted by a former attack of

smallpox. Vaccinate the nurse daily with different virus until you get a result or are reasonably certain that he is immune.

2. Search out all persons on your list and vaccinate them and keep under observation for sixteen days. As with the nurse and family, I prefer to use both bovine and humanized virus. You have thus two chances of success. Experience leads me to regard the humanized as more certain, more speedy, and less severe in its action. For these reasons I prefer it in emergencies.

3. Guard the premises day and night. I recognize the fact that in exceptional cases, when one has intelligent and honorable people to deal with, a guard is not necessary, but such cases are rare.

4. After the patient's recovery use daily hot disinfecting baths until the skin is entirely free from all of the scales of the original eruption. Pay particular attention to the head, palms, and soles. In case of death, wrap the patient in a sheet saturated with a strong bichlorid solution, put in a tight coffin and bury at once. Let no one assist in the burial who is not well protected against the disease, and see that every sanitary precaution is practiced.

5. After the infected room has been vacated make it as tight as possible; thoroughly steam it by placing a vessel of water over a gasoline stove near the middle of the room. Follow this immediately with sulphur fumigation, and allow the room to be closed for twenty-four hours, examining occasionally to insure thorough burning of the sulphur. Good reports are made as to formaldehyde disinfection, but I have never used it. It may in time displace sulphur. After reopening the room soak in a strong bichlorid solution and afterward boil such articles as can be washed. Remove in a covered cart and burn all others.

6. Send to the house a reliable person well instructed in the art of cleaning. Have the ceiling, walls, floor, wood work, in short, everything that is in the room or a part of it, well washed with bichlorid solution. If a trained disinfecting corps is available this work is much simplified. Having none, my practice has been to select two women for this work and give them much personal supervision until they have learned what is required and how to perform their duties. No family but the most intelligent can be trusted to clean and disinfect their own premises after smallpox. Painful experience has impressed this lesson on me.

No claim is made that any new thing is here presented, but only a modest effort to systematize the health officer's work, that no essential duty may be overlooked. How much easier would his work become if all people would but heed the lessons of experience and universally submit to vaccination and revaccination? The result would simply be a speedy disappearance of this vile disease. I am inclined to agree with Dr. Whittaker, who, in speaking of vaccination, says: "All the contributions to the welfare of mankind made in the whole realms of law and theology do not compare with this simple contribution of medicine." It is too late in the century to present an argument in favor of vaccination, but here are a few facts drawn from Wheeling's 146 cases in 1895. There were sixteen deaths, all of persons never vaccinated. This was 26 per cent. of the unvaccinated. Not a serious case occurred among those who had ever been vaccinated. Many of them took no medicine and were never confined to bed for an hour. Not one case occurred among persons protected by recent vaccination. Two young infants, vaccinated after their mothers were attacked with varioloid, continued to nurse at the ma-

ternal breast without contracting the disease. Nearly all of the patients, including those in the pesthouse, were nursed by persons protected only by vaccination. Not one of these, who had been recently successfully vaccinated, took the disease. Three of our worst cases, one fatal and the others almost so, were second attacks. My experience teaches me to regard a recent good vaccination as a better protection against, and especially against death from, smallpox, than is the disease itself, unless the attack of the latter was recent. Death in second attacks is by no means rare. Marson's statistics—15,000 cases—show a mortality among this class of 19 per cent. I have never seen nor heard of a smallpox death after a recent successful vaccination.

An isolation hospital I regard as next in importance to vaccination in the sanitary management of smallpox. Hence, I fail to comprehend a statement made by Dr. Whittaker¹ that "the maintainance of a pesthouse is a superfluous expense and a reflection on the intelligence of a community," unless he means that were the people sufficiently intelligent to secure universal vaccination such an institution would not be required. In this sentiment I fully agree, but, taking people as we find them, a hospital is safe and economical as compared with home isolation and quarantine. When the health officer gets a patient from the home into a hospital he feels a mighty burden lifted from him, for so long as the patient is at home one can never be certain that the disease will not spread by careless management.

In conclusion I would urge two lessons as especially important. One is that which Captain Miles Standish so well learned after a very painful experience, viz.:

If you would have a thing well done,
You must do it yourself, you must not leave it to others.

Not less important is this: *Obsta principiis!* Resist the beginnings! Stop the disease, if possible, at the first case, at any cost of energy or money. The most unwise economy is that which seeks to stop the progress of smallpox by cheap methods. It must be fought like fire in its inception. This I believe to be the truest economy.

DISCUSSION OF PAPERS OF DRS. PROBST AND JEPSON.

DR. AMAND RAVOLD, St. Louis, Mo.—I would like to speak of our experience with an outbreak of smallpox which occurred in St. Louis last winter, and the valuable lessons it taught us. The first case came to us from New Mexico, November 15, 1898, in the person of a traveling man who had been selling goods in that Territory. He was sick and came to his home in St. Louis, in a Pullman car. He called in a general practitioner, who diagnosed his malady as chicken-pox, but not feeling sure about it, called to his aid a dermatologist who has had an extensive experience with smallpox, and is especially skilled in the diagnosis of that disease. Both physicians agreed in the diagnosis of chicken-pox, the patient made a rapid recovery, and in a few days went back to New Mexico, traveling all the way in Pullman cars. On November 29, fourteen days after he reached his home, another member of his family, a man, was taken sick. The same physicians saw this case and pronounced it chicken-pox. About the same time, however, a child, 3½ years old, was also taken sick and soon showed unmistakable evidence of smallpox. Two other cases of smallpox also developed in this household. The physicians promptly acknowledged their mistake, and the patients were sent to quarantine. These teach two important facts: 1, the necessity of a most careful scrutiny and isolation of all cases of chicken-pox, and 2, of a most rigid and thorough disinfection of all Pullman cars at the end of a long run. Some days later, a negro walked into the city dispensary with an eruption of smallpox on him, and, following this case, the disease spread rapidly among the poorer negroes

of our city. Now, although we have no laws compelling vaccination, the Health Department vaccinated the whole male negro population of the city and as many of the women as could be captured. During cold weather, negro men congregate and sleep in what are known as "barrel houses." In these low, filthy saloons they sleep on the floor as thickly crowded together as the floor space will permit, sometimes more than a hundred in a room. It is well known that the negro objects strenuously to vaccination, and it is interesting to record that a great number of primary vaccinations were made on full-grown men. Our vaccinators, protected by a number of policemen, would suddenly, at night, enter a barrel house and compel every man to bare his arm, and, if he could show no recent scar, vaccinate him. It was only in this high-handed manner that the Health Department finally stamped out the disease among the negroes. Another patient who forcibly demonstrated the crying need that a thoroughly efficient method of disinfection for railroad coaches be at once adopted by the Pullman Co., came into our city from the west in a Pullman car. The disease was quickly diagnosed, and sent to quarantine. The car was disinfected according to the Pullman method, by spraying sheets hung upon the bell rope, with formol, and then closing the car for three hours. The car was then scrubbed and cleaned by a negro porter, who had not been near the car before its disinfection. Within the proper incubation period, fourteen days, this porter developed smallpox, and was sent to quarantine, where he died. At the request of Health Commissioner Starkloff, we afterward carried out a series of experiments for the purpose of ascertaining the value of the disinfection method employed by the Pullman company, and found it, as used by them, absolutely unreliable.

The death of a child from tetanus following vaccination brought up another important question, and that is, which is the best and safest virus to use? Lymph spread on the point of a quill or ivory point, or glycerized vaccin? Personally, I use glycerized vaccin only, because I know from several trials which I have made that glycerin kills all non-spore-forming bacteria put into it in the course of several weeks, and therefore, in a degree makes use of glycerized vaccin that much safer, but whether or not it kills the spores of the tetanus bacillus I do not know. It is a question worthy of careful study. The case in point is as follows: A boy about 12 years of age, together with a number of other children, was vaccinated, on the same day, at school, by a physician from the Health Department. The physician is a middle-aged, extremely careful, conscientious man. The virus used by him came from the Higgins' vaccin farm, and was spread on pointed ivory slips. After having been vaccinated on the arm, and while standing near a radiator waiting for the wound to dry, the boy fainted. He soon recovered and, on reaching home, his mother bandaged up his vaccinated arm with a dirty cloth. The arm was quite sore on the seventh day, an ulcer formed, and later a scab grew over it. On the twenty-second day the scab fell off the wound, leaving a large, ragged ulcer below. On this day he complained of some stiffness of the vaccinated arm, and of a slight rigidity of the jaws, and seemed to be "grinning all the time," his mother said. He was treated by Dr. F. E. Chase, who, at my request, wrote a history of the case and published it in the *Medical Review*, St. Louis, in May. Although a bacteriologic examination of the wound was not made, I am nevertheless convinced that the doctor was not mistaken in his diagnosis of tetanus. From the history of the case, however, I am positive that the bacillus of tetanus was not invaccinated, but sown in the wound by the dirty methods employed in the treatment of the ulcer, on an uncleanly child, by an ignorant mother. Further, of all the other children vaccinated that day, not one developed the disease or showed an untoward symptom. Nevertheless, the Health Department was threatened with a law suit by the parents of the child. I am confident that if glycerized vaccin had been used we would have felt more comfortable. The lesson taught by this experience emphasizes the fact that vaccination is a surgical procedure in every sense of the word, and should be carried out with the very strictest regard to aseptic surgery. We can not too emphatically impress our patients with the fact, and remember it ourselves, that from the inception of the wound until its complete healing first, last, and all the time, perfect

¹ Lancet-Clinic, Nov. 26, 1898.

cleanliness, as near as we can attain it, is the essential thing.

DR. C. O. PROBST, Columbus, Ohio.—There is one question brought up by Dr. Ravold. We have had two deaths reported in our state from tetanus following vaccination, one in Cleveland and one in the city of Columbus; and it has done a very great deal to delay the vaccination of our people. Tetanus developed in from three to four weeks after vaccination. We have with us an eminent bacteriologist, and I want to propose the question to Surgeon-General Sternberg as to the incubation period of tetanus. Is it not a fact that if tetanus should be introduced at the time of the vaccination, it would develop in less than twenty-one days?

SURGEON-GENERAL GEO. M. STERNBERG, Washington, D. C.—I can not tell you exactly the period of incubation in tetanus. My knowledge of bacteriology does not fit me to answer that question offhand any better than the others here who have had an opportunity of studying and observing tetanus following a wound. That is where you get your best evidence. My impression is that at any time from six to seven days up to a longer period, fifteen to sixteen days, perhaps, tetanus may develop. I would not want to speak in a positive way without looking up the records a little. But with reference to tetanus following vaccination, I should say that the great probability is that tetanus is due to an infection subsequent to the operation of vaccination; that it is due to dirt getting into the ulcer rather than to tetanus spores introduced at the time of vaccination. It is true that if there is neglect on the part of those who collect the vaccin, there is a possibility of tetanus spores being present if the calf has not been properly cared for; and if the abdomen where it has been scarified and where the vaccination pustules develop has been soiled by earth, you would expect to have tetanus spores there; this should be borne in mind carefully. The glycerinated lymph is certainly a great improvement, because of the fact that most bacteria very soon die out in the glycerin, but as to the tetanus spores, they are very resistant, and I doubt very much whether they would quickly die out in glycerin. All non-spore-bearing micro-organisms do perish within a short time in the glycerinated lymph, while the vaccin infectious material, whatever it be, preserves its full power for a long time, but tetanus spores would probably retain their vitality in glycerin for a considerable time. I think that is a matter well worth looking into, and which some of our bacteriologists ought to determine by experiment.

INFECTIOUS ULCERATIVE STOMATITIS.*

BY JOHN S. MARSHALL, M.D.,
CHICAGO.

Stomatitis is an inflammation of the mucous membrane of the mouth. All inflammatory conditions which involve the gums, the inner surfaces of the cheeks, the lips and the tongue are usually included under the general term, "stomatitis." The affections which are thus included are, with few exceptions, confined to the period of infancy and childhood. Adults seldom suffer from these affections except as manifestations of some other morbid condition. The forms of inflammation of the mouth which are most common are stomatitis simplex, stomatitis catarrhalis, stomatitis aphthosa, stomatitis parasitica and stomatitis ulcerosa.

A clinical study of the inflammatory affections of the mucous membranes of the mouth will reveal in certain features a close resemblance to the inflammatory affections as they appear in the skin, while in other points they will present features which are common to inflammatory conditions of the mucous membrane in general. It has frequently been noticed, that "in measles a spotty or macular eruption appears upon the oral mucous membrane, and in scarlatina punctate or diffuse scarlet eruption," while "in smallpox,

chickenpox, herpes, pemphigus, and in foot-and-mouth disease"—an infection from cattle—"there are eruptions of vesicles and pustules, which pass through the same stages as those of the skin." (Ziegler.) Erysipelas of the face not infrequently presents an inflamed condition of the oral and nasal mucous membrane, with phenomena similar to those of the skin, while syphilis and scurvy are accompanied by characteristic oral symptoms. Diphtheria is not always confined to the tonsils, pharynx, uvula and velum palati, but may likewise involve other portions of the mouth. Certain drugs, also, such as mercury and iodine and the mineral acids, often produce inflammatory conditions of the oral mucous membrane and of the gingivæ.

Stomatitis Simplex is the mildest form of stomatitis, and is generally expressed in a more or less intense redness of the surface of the mucous membrane of the cheeks, the lips and the gums, in the form of rose-red elevated patches, and is due to a localized hyperemia of the parts. It is usually found in infants and young children, and is generally associated with some form of gastric or intestinal derangement. It rarely persists for more than a few days, and as a rule disappears with the subsidence of the gastric or intestinal disturbance. It is rarely seen in the adult. Occasionally it may persist, and gradually pass into a severer type of the disease known as stomatitis catarrhalis.

Stomatitis Catarrhalis, or follicular stomatitis is an affection which is often a symptomatic expression of some more grave constitutional malady, such as inflammatory conditions of the alimentary and respiratory tracts, etc., though it may be induced by the local irritation of erupting teeth. It is common among children living in unsanitary districts, but is rarely seen in adults. The disease is characterized by a diffuse inflammation, spreading over the cheeks, lips and gums, and appearing upon the hard palate as streaks and patches. The papillæ of the tongue are affected, many of them appearing as prominent tubercles. The mucous glands become swollen and prominent, and can be readily felt by passing the finger over the surface of the membrane. Later they appear as "grayish or grayish-red elevations of the surface, surrounded by a reddened areola." (Ziegler.) Tiny crypts sometimes develop, which are caused by the retention of the secretions. Swelling of the tongue, lips, cheeks and gums often occurs, accompanied by fetor of the breath, heat and dryness of the mouth, followed by an excessive salivary secretion. In the severer cases the gums become soft and spongy, and bleed upon the slightest provocation. Fissures form at the angles of the mouth and upon the lips, with exudation and the formation of crusts. The constitutional symptoms are fever, diarrhea, thirst, loss of appetite and sleeplessness.

Stomatitis Aphthosa, or canker sore-mouth, is by some authorities thought to be a peculiar form of stomatitis catarrhalis, for the reason that the aphthous patches occur upon the oral mucous membrane during a catarrhal condition. The disease is most common in sickly children during the periods of dentition, and occasionally later in life in those who are debilitated from illness or debauchery. It often occurs in women during menstruation, in pregnancy, and during the puerperal period. Occasionally it is associated with pneumonia, bronchitis, diphtheria, exanthematous diseases, ague, whooping-cough and tonsillitis. The dis-

*Presented to the Section on Stomatology, at the Fiftieth Annual Meeting of the American Medical Association, held at Columbus, Ohio, June 6-9, 1899.