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The Infectious Myth Busted Part 4: Is Measles Contagious?

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“A careful search of the literature does not reveal a case in which the blood from a patient having measles was injected into the blood stream of another person and produced measles.”

-Harry Bauguess

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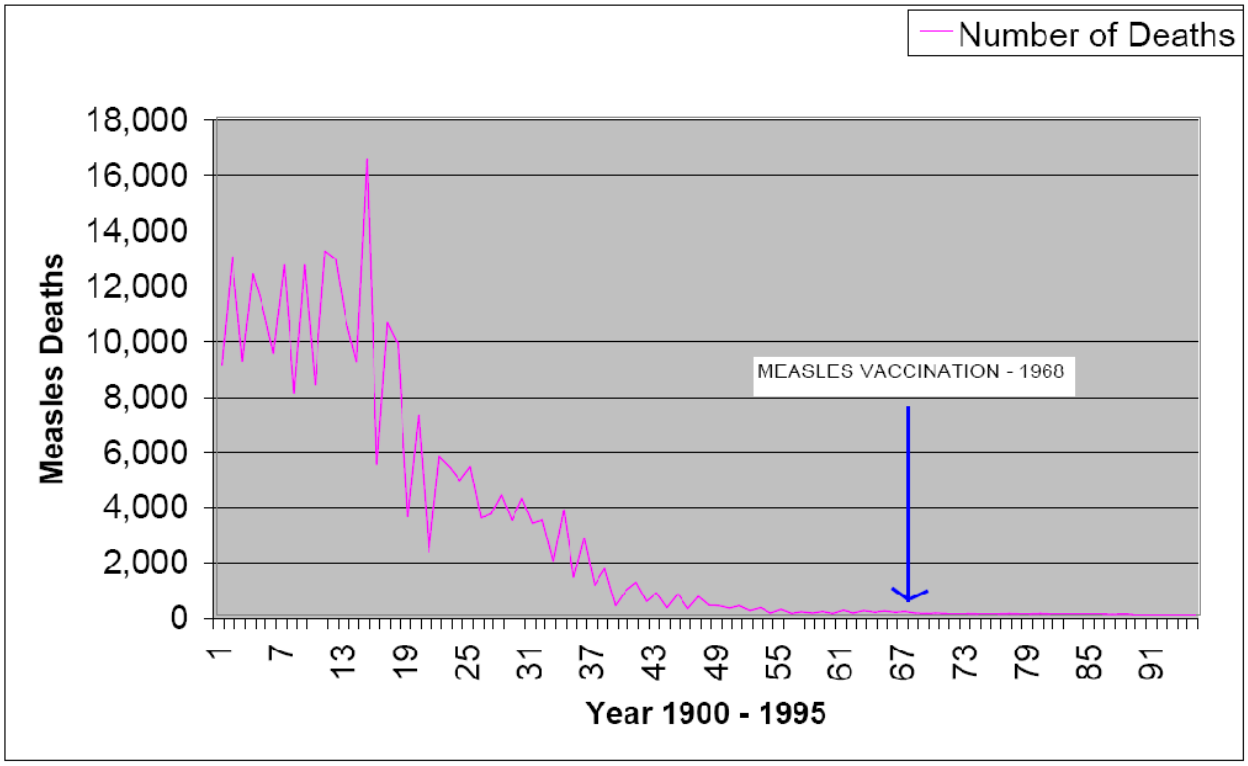
I want to begin by thanking Daniel Roytas of ***Humanley.com <https://www.humanley.com/>*** *for his amazing research skills. I worked from his outline of the measles transmission experiments in order to present the information for this article. He has a gift for finding the studies and reviews that the pharmaceutical cartel does not want people to know about. Please visit his site for excellent podcasts and information.*

Measles is always a hot topic of discussion that continues to divide people. The disease gained notoriety as a killer of children, and anytime children are involved, tempers flare. The pharmaceutical industry has done a remarkable job of convincing the majority that the symptoms known as measles are a deadly disease requiring vaccination in order to protect the children and all those around them, especially the “immunocompromised.” A massive vaccination campaign that began in 1963 created the perception that the vaccine was responsible for a drop in childhood deaths from

the disease, even though the statistics show that it had no such effect as the death rate had plummeted long before vaccines were introduced.



http://whale.to/m/measlesdeaths1.html < http://whale.to/m/measlesdeaths1.html>

In fact, in the past, doctors would regularly speak of measles as a mild childhood disease that did not lead to death or even require medication for recovery. In an 1860 address to the Smithsonian Institute, Dr. R.T. Trail made amazing claims about the benign nature of measles and several other diseases:

“

“I have myself, through Natural Hygiene, over 16 years, treated all forms and hundreds of cases of typhus and typhoid fevers, pneumonia’s, measles and dysentery’s, and have not lost a single patient. The same is true of scarlet and other fevers. No medicine whatever was given.”

-R.T. Trall M.D. **http://www.whale.to/v/trall.htm < http://www.whale.to/v/trall.htm>**

In the 1959 *Vital Statistics* published in the *British Medical Journal,* measles was considered a very mild disease that had few serious complications:

> ‘*In the majority of children the whole episode has been well and truly over in a week . . .* ***In this practice measles is considered as a relatively mild and inevitable childhood ailment that is best encountered any time from 3 to 7 years of age. Over the past 10 years there have been few serious complications at any age, and all children have made complete recoveries.*** *As a result of this reasoning no special attempts have been made at prevention* ***even in young infants in whom the disease has not been found to be especially serious*****.”** — Vital Statistics, British Medical Journal, February 7 1959, p. 381

http://whale.to/m/measles1.html < http://whale.to/m/measles1.html>

In 1962, a year before the measles vaccine was introduced, Dr. Alexander Langmuir, the CDC's chief disease detective who created and led the epidemiology surveillance unit from 1949 to 1970, granting him the title of the "father of infectious disease epidemiology," wrote that measles was an "infection" of short duration, moderate severity, and low fatality:

The Importance of Measles as a Health Problem

> "This self-limiting infection of **short duration, moderate severity, and low fatality** has maintained a remarkably stable biological balance over the centuries."

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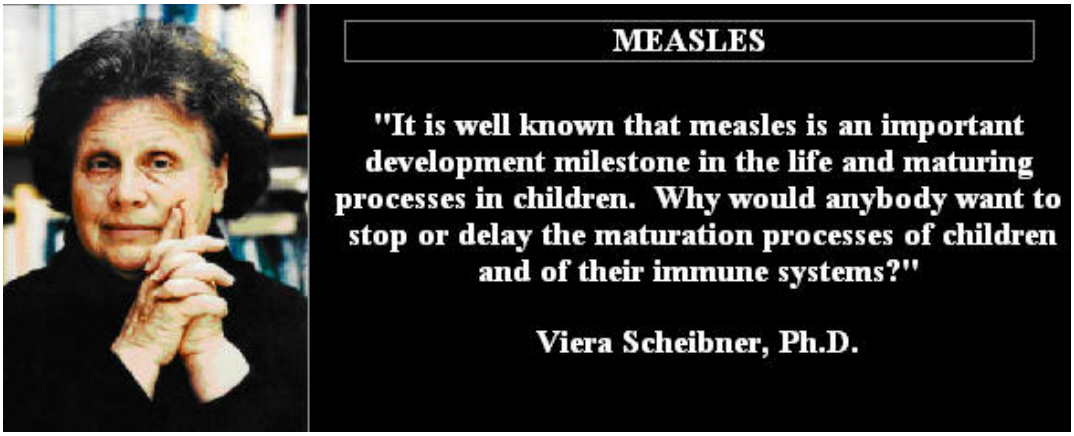
In 1998, **Pamela Dyne,** Associate Residency Director, Assistant Professor of Medicine, Department of Emergency Medicine, Olive View-UCLA Medical Center, stated in an *emedicine.com* article that measles was usually benign and uncomplicated:

Pediatrics, Measles

> "Although a clinically significant viral illness, **measles is usually benign and uncomplicated.** Complications occur more commonly in adults and in children who are undernourished or immunocompromised."

https://web.archive.org/web/19980702034411/http://www.emedicine.com/emerg/topic389.htm < https://web.archive.org/web/19980702034411/http://www.emedicine.com/emerg/topic389.htm>



As is usually the case, the people and sources stating that measles is not a deadly disease were either ignored and/or forgotten. **Studies < https://pubmed.ncbi.nlm.nih.gov/9500320/>** and **whistleblowers < https://www.prnewswire.com/news-releases/cdc-blocks-testimony-of-vaccine-whistleblower-says-world-mercury-project-300347376.html>** that alerted the public to the dangerous and deadly consequences of the vaccines were conveniently swept under the rug. A successful pharmaceutical propaganda campaign has convinced the public that the vaccines save lives and that this highly contagious disease has been largely controlled. Any sudden outbreaks are considered a disease of the unvaccinated and a direct result of their "anti-scientific" ways. The unvaccinated are seen as a walking threat, as "deadly and contagious" as the disease itself.

According to the **New England Medical Journal, < https://www.nejm.org/doi/full/10.1056/NEJMcp1905181>** measles is one of the most highly contagious pathogens known to man. It states that, in a 100% susceptible population, a single case of measles results in 12 to 18 secondary cases on average. The **WHO < https://www.who.int/news-room/fact-sheets/detail/measles?gclid=CjwKCAjwzJmlBhBBEiwAEJyLu57uydV-4eF-SDYi_J9arCEaDFjQGXMyX1Fi2K3YmvRE7lbtaNyBpxoCMe8QAvD_BwE>** concurs with the *NEJM* in that the measles is one of the worlds most highly contagious "viral" diseases and that it can lead to severe complications and death in the unvaccinated. According to the **CDC, < https://www.cdc.gov/measles/transmission.html>** if one person has the measles, 90% of the people next to that person who are not "immune" will become "infected."

These are some rather scary sounding claims for a "viral" disease that was once considered an inevitable, mild, benign, and uncomplicated disease of moderate severity and low fatality. This raises some very interesting questions. Do the claims of the measles "virus" being a highly contagious disease actually hold up when reviewing the literature? Was this super "infectious" disease able to be successfully transmitted from the fluids of a sick host into either a healthy human or animal subject? Were researchers actually able to recreate the exact same disease experimentally? If we are to judge the "highly contagious" nature of this "virus" based upon the attempted transmission experiments throughout the 19th and 20th centuries involving the use of the blood, tears, nasal mucous, lung fluid, and the discharge from measles scabs, the evidence shows the exact opposite of a "highly contagious" disease. In fact, it shows that measles is not contagious at all.

Human Experiments

In 1905, American pathologist Ludvig Hektoen reviewed the evidence for the experimental transmission of measles throughout the available literature up to that time. What he found during his review is numerous instances of the failure to transmit the disease through the use of the blood, tears, nasal mucous, lung fluid, and the discharge from measles scabs. To start his review, Hektoen cast doubt on the results of the first attempts to transmit measles via inoculation by Francis Hume in 1758. He quoted Erasmus Darwin, a respected physician of the time, who stated that attempts had been made to transmit the disease, yet there was much difficulty in doing so. Hektoen reported that, in 1816, Thomassen A. Thuessin and his pupil C.J. Themmen tried to recreate Hume's experiments and ended up producing entirely negative results in their attempts to transmit the disease to five children using the blood of measles patients. Hektoen then proceeded to look at the experimental results of various other researchers over the 19th century.

- In 1801, Chapman tried to transmit measles using the blood, tears, the mucus of the nostrils and bronchia, and the eruptive matter in the cuticle without any success.
- In 1809, Willan fared the same result when he tried unsuccessfully to inoculate three children with vesicle fluids.
- In 1810, Wachsel attempted to inoculate an 18-year-old with measles, but this was said to be doubtful and was considered a "natural" infection rather than an experimental one based upon the length of time it took for the symptoms to develop.
- In 1822, Dr. Frigori tried to infect six children without success as the symptoms were considered non-specific. Not content with his results, Dr. Frigori attempted to infect himself, also without success.
- That same year, Dr. Negri tried to infect two boys and suffered the same negative results as Dr. Frigori.
- Also, in 1822, Speranza failed in his attempts to infect four boys with measles using similar methods.
- In 1834, Albers attempted to infect four children without success. He quoted Alexander Monro, Bourgois, and Spray (Spry?) as also having made unsuccessful inoculations with saliva, tears, and cutaneous scales.
- Finally, in 1890, Hugh Thompson tried to infect two sets of children on separate occasions, both without success.

Experimental Measles

> "The first attempt at inoculation of measles of which we have any record was made by Francis Home, in 1758."

> "According to his own records Home attempted to inoculate measles in 15 different persons, and he concludes that **in most instances he succeeded in producing the disease in a mild and modified form."**

> "Judging from the following quotation **Erasmus Darwin** was either not familiar or **not favorably impressed with Home's work:**

“. . . . it is probable that inoculation might disarm the measles as much as the small pox, by preventing the catarrh, and frequent pulmonary inflammation, which attends this disease; both of which are probably the consequence of the immediate application of the contagious miasmata to these membranes. Some attempts have been made, but a difficulty seems to arise in giving the disease; the blood, I conjecture, would not infect, nor the tears; perhaps the mucous discharge from the nostrils might succeed; or a drop of warm water put on the eruptions, and scraped off again with the edge of a lancet; or if moistened with a little warm water? Further experiments of this kind would be worthy the public attention.”

“This opinion was greatly strengthened by the wholly negative results of Themmen’s own experiments. He placed blood of measles patients, taken at the height of the exanthem upon small wounds on the arms of two children; cotton saturated with the tears of a measles patient upon a ruptured vesicle on the arm of an infant; in another case a similar experiment was made with cotton soaked in the perspiration of a patient thickly covered with the eruption of measles; and in the fifth experiment he placed cotton soaked in the tears of a patient with measles upon the intact skin of each arm of a girl. **“Though all these things were performed cautiously and in accordance with the precepts of the authorities, yet we saw no effects therefrom, and these five children, although they had not previously been attacked with measles, remained entirely free from this disease,”** says Themmen, who acknowledges, however, that the children were apparently not very susceptible to measles because they all lived in houses in which measles was prevalent and yet remained free from the disease.”

“Willan inoculated three children with the fluid of miliary vesicles in measles but without success. And Chapman in Philadelphia in 1801 tried in vain to inoculate measles by means of blood, tears, the mucus of the nostrils and

bronchia, the eruptive matter in the cuticle, properly moistened." On this account Dewes thought that the contagious nature of measles could be fairly disputed."

"Mr. Wachsel's experiment on Richard Brookes, a lad of 18, reported by Willan (loc. cit.) is stated by Hugh Thompson and others to have been successful, **but this is, to say the very least, exceedingly doubtful.** The boy was inoculated January 6, 1810, with cowpox and with fluid taken from measly vesicles. The cowpock was fully developed on the 15th. On the 22d, coughing, sneezing, and running at the eyes set in with chills followed by measly eruption on the 28th–**22 days after inoculation.** In the light of our present knowledge **the measles in this case must be ascribed to a natural infection received about eight days after the inoculation."**

"In 1822 Speranza of Mantua caused inoculation of measles to be made with results regarded by him as eminently successful and so accepted without reserve by several subsequent writers. Speranza describes these inoculations as follows:

“ “. . . . we invited to perform the operation Dr. Frigori, staff physician of the Workhouse and Convalescent Hospital, where measles was always prevalent among the children. A slight incision was made with the lancet upon a group of the more inflamed disease-spots, and with the point of the instrument charged with the bloody matter several incisions were made on the arm of a healthy person, the wounds being covered at once with a bandage. This operation was performed, with the greatest care and under our observation, upon six boys of different ages. The boys complained, a few days afterwards, of not feeling well; about the fifth or sixth days there appeared very slight traces of cold in the head, with cough and watery eyes, which remained after the appearance of a few exanthematic spots; there was very slight febrile irritation, in some cases a mild diarrhea, and by the ninth or the tenth day after the inoculation the measles had run its course without leaving any trace of secondary malady. **Dr. Frigori, not content with this result, to which he had given close and daily observation, tried the experiment upon himself; the outcome was the same, but still milder, the morbid phenomena being merely a passing catarrhal affection, involving the frontal sinuses, and the pituitary membrane rather than the trachea and bronchi. A similar inoculation performed by Dr. Negri upon two boys had the result, as did our own experiments upon four other individuals, carried out in the same way.** We were not equally fortunate when following the practice of Home, of Horst, and of Ronalds; that is in saturating a little cotton with the blood from an incision upon a group of exanthematic spots, and applying it to the arm before any puncture had been made. **This was attempted in two cases, but the experiment did not fulfil our wishes; no catarrhal phenomena and no exanthematic spots appeared.**

Speranza also states that-

> “ **In the year 1806, during the prevalence of an epidemic of measles in Parma, Dr. Rasori, staff physician of the Hospital, inoculated one of his nephews with the disease by introducing with a needle, bloody matter taken from the exanthematic sores of an infected person. The formation of papillae at the point of inoculation, with slight traces of catarrhal irritation,** and immunity from the epidemic then general, **were the result of this salutary operation.**

From the description given by Speranza of the symptoms in the inoculated persons it would seem very doubtful, indeed, if any of them really had measles. And if the symptoms described be accepted as those of “a mild and morbillious affection,” how may natural infection be excluded when we are told that measles was always prevalent among the children in the hospital and when the incubation period is given as five to six days? **Under these circumstances I cannot see how it is possible to read any value into Speranza’s experiments.”**

“In 1834, Albers **without success** inoculated four persons using Home’s method in two, and the method of vaccination in two, the blood being taken on the second day of the eruption. Prom this he **concludes that the blood does not contain the contagion of measles.** He quotes Alexander Monro, Bourgois and Spray (Spry?) as having **made unsuccessful inoculations with saliva, tears, and cutaneous scales,** but no references are given.”

“Hugh Thompson in Glasgow accepts the inoculations of Home Wachsel, Speranza, and Katona as successful. He regards the practicability and the safety of inoculation in measles, as well as its production of a much milder attack than the spontaneous, as definitely established, and recommends that the method

employed be superficial scarification followed by the application of the fluid from blisters on the skin of measles patients. **In two instances however, in which Thompson practiced this method his inoculations failed."**

Ludvig Hektoen doing his darnedest to look busy for the camera.

The rest of Ludvig Hektoen's paper details his own experiments performed in 1905 attempting to infect healthy people with measles. These experiments are considered the definitive proof that measles can be transmitted via the fluids of an "infected" patient. While Hektoen claimed to infect these people with the blood of measles patients, what he used was far more than just the blood. Briefly, two flasks with ascites broth 50 c.c. (peptone broth two parts, ascitic fluid heated to 55° C. for 54 minutes one part) were inoculated with one and three c.c. of blood and incubated at 37° C. for 24 hours. He then made subcultures upon ascites agar, glycerin agar, and Loeffler's serum. These broths were injected into two patients who were recovering from scarlett fever **(a disease said to be mistaken with measles) < https://www.gov.uk/government/publications/scarlet-fever-symptoms-diagnosis-treatment/scarlet-fever-factsheet>** who experienced some non-specific symptoms that were then claimed to be measles. While this experiment is said to be the definitive proof that a measles "virus" was transmitted from the blood of sick patients to those who are healthy, the fact that the "healthy" subjects were patients that had recently suffered similar symptoms of disease, the blood samples were mixed with other substances such as ascites broth, and the subjects only suffered from mild non-specific symptoms of disease, challenges the validity of Hektoen's own findings:

PERSONAL EXPERIMENTS.

"In these experiments special care has been taken to exclude natural infection.

1. **The blood injected was taken from a boy of nine who in the later stages of desquamation after an uncomplicated attack of scarlet fever developed a rather mild but typical attack of measles.** The first symptoms of measles appeared after he had been free from fever for about two weeks. There was headache, coryza, cough, running of the eyes, and mild febrile symptoms. Three days later a papular eruption was noted and on the fourth day a typical rubeolous rash was present, that soon began to fade and was followed by typical branny desquamation.

On the fourth day (see Chart I) four c.c. of blood were withdrawn from the vein at the right elbow after carefully scrubbing the skin with soap and water followed with alcohol. **Two flasks with ascites broth 50 c.c. (peptone broth two parts, ascitic fluid heated to 55° O. for 54 minutes one part) were inoculated 1 at once with one and three c.c. of blood respectively and placed in the incubator at 37° O. for 24 hours.** At the end of this time both flasks appeared sterile, the corpuscles having settled, the supernatant fluid being clear. **Subcultures made at this time upon ascites agar, glycerin agar, and Loeffler's serum and kept under aerobic and anaerobic conditions remained sterile;** and the contents of the flask of ascites-broth containing one c.c. of blood remained permanently sterile. **Four c.c. of the flask of 50 c.c. of ascites-broth mixed with three c.c, of blood and kept in the incubator at 37° 0 for 24 hours were injected under the skin of the chest of a healthy medical student 24 years old, just finishing desquamation after an uncomplicated attack of scarlet fever,** and who readily gave his consent to the experiment. This man was not in the same hospital as the boy furnishing the blood for injection, but had been for 26 days in a different institution, at that time as well as before and afterwards entirely free from measles. So far as could be learned, and careful inquiry was made, the man injected had not had any disease at all resembling measles except scarlet fever.

At no time did any local symptoms appear at the site of the injection. On the 13th day after injection the temperature was 101° F; the next morning it rose to 103 (see Chart II). At nine the following morning he was given a warm bath and immediately afterwards a red, papular, blotchy eruption broke out on the forehead and spread quite rapidly to the face, neck and chest. Dr. James B. Herrick who saw him at this time felt no hesitancy in making the diagnosis of measles. By two o'clock an unmistakably typical full-blown, rubeolous rash was present over the greater part of the body. The temperature remained above normal for two days, when it fell to normal about the same time that the eruption began to fade. An uneventful recovery promptly followed without any complications whatsoever, the desquamation being branny. **There was during the entire illness freedom from respiratory symptoms of all kinds. Even during the pre-eruptive period there were no special local symptoms (morbilli sine catarrho). The patient's subjective condition was not much changed if at all at any time during his illness. The appetite continued unimpaired.**

2. **In this case the blood was furnished by a well-developed Irish servant girl, 21 years old, who passed through an uncomplicated attack of typical measles (Ohart III).** About 30 hours after the earliest appearance of the rash, which still was coming out upon the extremities, 10 c.c, of blood were withdrawn from a vein at the elbow **and distributed equally among four flasks each containing 50 c.c, of broth and 25 c.c, of ascites fluid.** These flasks all remained perfectly sterile so far as bacteria demonstrable by the usual methods are concerned.

After 24 hours at 37° C. five c.c. of **the mixture of blood in ascites-broth were injected subcutaneously in the back of**
M, aged 28, who had not had measles so far as he knew and consented to the experiment.

This patient was also recovering from a mild attack of scarlet fever and had been at the time of inoculation for 24 days the sole occupant of the isolation room of a general hospital in which at that time there were no other cases of measles. There were no local changes at the site of the injection. The temperature and general condition remained normal until the evening of the 11th day when the temperature rose to 99.8° F. and the next day a mild conjunctivitis already suspected a day or so previously became definitely apparent. On the 13th day there was some cough, the tonsils were bright and red, and there was an increased amount of mucus in the throat. In the afternoon the temperature which was rising, reached 103° F. (Chart IV). During the next night a typical rubeolous eruption came out, the first spots being noticed on the nose and then on the forehead, face, scalp, chest, back and abdomen. The rash consisted of pink macules and papules which disappeared readily on pressure, being largest and brightest red over the face. The forehead was quite uniformly red. **The patient was not seriously ill; there was some loss of appetite, but he slept well during the night, having been somewhat restless the preceding night. Recovery was prompt.**

Cultures of the blood on the 13th day (one c.c. of blood in each of three flasks each **containing 50 c.c, of broth and 25 c.c, of ascites fluid)** remained permanently sterile.

CONCLUSIONS.

> The results of these two experiments permit the conclusion that the virus of measles is present in the blood of patients with typical'measles sometime at least during the first 30 hours of the eruption; furthermore that the virus retains its virulence for at least 24 hours **when such blood is inoculated into ascites broth** and kept at 37° C. This demonstration shows that it is not difficult to obtain the virus of measles unmixed with other microbes and in such form that it may be studied by various methods.

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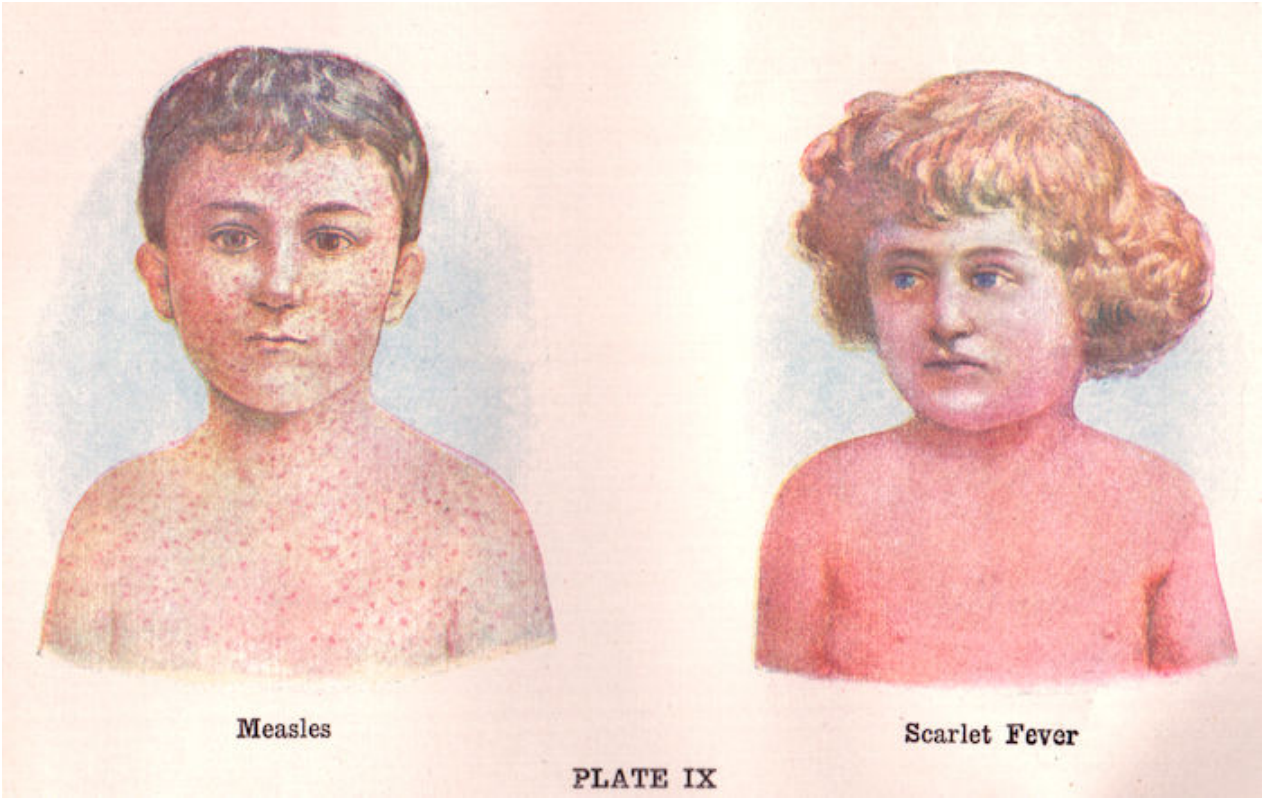

While Hektoen's findings are questionable on their own, the work of Andrew Sellards a

little over a decade later further destroyed the credibility of Hektoen's claims. During the winter months of 1918 to 1919, Andrew Sellards attempted to recreate the results obtained by Hektoen. To do so, he inoculated the blood of measles patients in 8 healthy volunteers without a prior history of measles exposure. Sellards utilized the same methods as Hektoen and carried out a series of progressively more intense injections of blood. He started with just the blood of a patient obtained 12 hours after eruption that was mixed with 9 parts of isotonic salt solution and then inoculated subcutaneously into a volunteer. No symptoms followed.

In the next series, the blood of a measles patient obtained 12 hours after a rash was either incubated in ascitic broth or defibrinated. Both preparations were injected into 2 volunteers subcutaneously. However, no symptoms occurred in these series of experiments. Thus, more intensive injections took place. Blood was taken in citrate from 2 pre-eruptive measles cases, mixed together, and then injected both subcutaneously and intramuscularly into 2 more volunteers. Twenty-four hours later, the same process was repeated with the same volunteers. However, no symptoms occurred. After 3 weeks, these same volunteers were exposed to an early measles case and had secretions inoculated into their mucus membranes. The volunteers continued to remain symptom free.

After these failures, a final intense injection was attempted using the whole blood of a measles patient that was inoculated subcutaneously and intravenously into another volunteer. This volunteer also remained symptom free. Sellards concluded that his 8 successive failures to transmit measles through successive injections of blood cast doubt on Hektoen's results, which supposedly showed the transmission of measles via injections of blood. Sadly, I could not copy and paste the highlights from this study for some reason, thus we have to rely on my excellent cropping and underlining skills:

A Review of the Investigations Concerning the Etiology of Measles

During the winter of 1918 to 1919, the writer (8) inoculated a series of volunteers with blood from early cases of measles in an effort to confirm Hektoen's results. In working with such a common infectious disease, considerable difficulty was experienced in obtaining susceptible adults. Eight volunteers were eventually accepted who, as far as could be determined from correspondence with their families, had never been exposed to measles. These men

were injected in various ways with blood but no symptoms developed in any instance.

The description of these injections may be summarized as follows: For the first inoculation, blood was taken from a patient twelve hours after the eruption appeared. The serum was separated by centrifugalization and diluted with nine parts of isotonic salt solution. One individual was given 5 cc. of the diluted serum subcutaneously.

For the next series of inoculations, a specimen of blood was taken from a case of measles twelve hours after the rash appeared. A portion of this specimen (4 cc.) was incubated in ascitic broth (50 cc.) according to Hektoen's technique and another part was defibrinated. The latter was injected at once subcutaneously in 2 cc. quantities into each of 2 men. The portion in ascitic broth was incubated for one day and 10 cc. quantities were injected subcutaneously into 2 individuals.

Since no symptoms followed the preceding inoculations, some more intensive injections were carried out. Blood was taken in citrate from 2 cases of measles in the pre-eruptive stage, six hours before the rash appeared in 1 patient and thirty hours before its appearance in the other. These citrated specimens were mixed and the equivalent of 3 cc. of blood was injected into each of 2 individuals, part of the injection being given subcutaneously and part intramuscularly. Twenty-four hours later each of the 2 volunteers received a second injection from these 2 patients in the same manner. One of the measles cases was now in the eruptive stage and in the other the rash appeared six hours later. One of these two volunteers gave an unusually clear history of susceptibility to measles. He was the sixth of 8 children and had always lived on an isolated farm in West Virginia. According to the statement of the mother and eldest sister, measles had never occurred in the household. But several members of the family had left home and eventually had contracted measles. Of the older brothers and sisters, 4 out of 5 developed the disease away from home. Of the two younger children, one, a brother, enlisted in the army and developed measles at Camp Shelby, Miss.

Neither of these 2 individuals receiving intensive injections from patients in the pre-eruptive and eruptive stages developed any

symptoms. After an interval of three weeks, they were exposed to an early case of measles and also inoculated on the mucous membrane with secretions from this case in the pre-eruptive stage, four days before the rash developed. The volunteers remained free from symptoms. This result, therefore, suggests that they were immune to measles at the time this final test was made. It is not possible to determine definitely whether their immunity may have been due to some previous unremembered or undiagnosed attack of the disease, or whether it resulted from the injections of measles blood which they received. Certainly the evidence of their susceptibility at the beginning of these injections is more concrete than the generalization that few adults have escaped an attack of the disease in childhood.

Finally, an injection was made in 1 volunteer with whole blood taken from a patient six to twelve hours after the rash appeared. Immediately after withdrawal, without the use of citrate, 0.5 cc. was given subcutaneously and 1.5 cc. intravenously. He remained free from symptoms.

These 8 successive failures indicate that measles cannot be transmitted by the injection of patient's blood as readily as would be expected from the results of the 2 cases reported by Hektoen. Moreover, a thorough analysis fails to suggest any simple or definite explanation of these divergent results. Except in 2 cases, the technique which I followed differed from that of Hektoen, the blood from the measles patient being injected directly without preliminary incubation. At the time these experiments were conducted, it was thought that the direct injection of a moderate amount of blood would be more likely to infect than the use of a minimal quantity after twenty-four hours incubation. Hektoen used approximately 0.1 cc. of patient's serum. However, it is theoretically possible that multiplication of the virus of measles may have occurred during the incubation. If such development did take place, then the preliminary incubation would surely enhance the possibility of reproducing the disease.

One must consider the possibility of producing a fever and rash by toxic constituents contained in the media which was injected. The writer has carried out injections of ascitic broth incubated with normal blood in a series of 20 individuals. Only minor reactions

developed and they could not in any way be confused with the symptoms of measles.

The evidence presented by Hektoen indicates that the fever and the accompanying rash, developing after a period of two weeks constituted true infections with the virus of the disease. Careful precautions were taken to guard against accidental infection during the period of experimentation. Although the resulting symptoms did not conform fully with the naturally acquired disease, it is not to be expected that the injection of a virus under highly artificial conditions would reproduce, in detail, the usual symptoms of the natural infection. The absence of a pre-eruptive rise in temperature, the rapid spread of the rash over the body, the lack in 1 case of inflammation of the mucous membranes, and the very moderate degree of malaise might readily be accounted for by the artificial mode of inoculation.

It is perhaps natural to feel that the blood of a measles patient taken early in the disease would either consistently fail to infect or else regularly reproduce the disease upon injection in a susceptible individual. Such an assumption, however, is not justifiable as a general conclusion. Indeed, the blood of an active case of pneumonia or of typhoid fever, during the stage of bacteriemia, might give very inconstant results upon injection into susceptible individuals. The failure in my own work to produce measles in volunteers by the injection of the blood of patients cannot, in my opinion, be explained merely on the supposition that the apparently susceptible volunteers were in reality immune on account of some previous attack of this disease. It is entirely possible that the blood of measles patients, even though the virus be present, would not consistently infect susceptible men. Hektoen's successful results are very important in demonstrating that the virus is present in the blood and that infections can be produced in man by the subcutaneous route even though the normal portal of entry is by way of the mucous membranes. It would be extremely important to know whether the likelihood of successful infection is increased by the preliminary incubation of the patient's blood in ascitic broth as practised by Hektoen. Unfortunately, the results of my experiments throw no light on this question.

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In 1919, Alfred F Hess M.D. sent a letter to the editor *Journal of the American Medical*

Association in response to Sellards experimental results. In it, he compared both Sellard's failure to transmit measles to humans with the blood and mucus secretions with his own failure to do so with chickenpox. Hess admitted that the artificial transmission of man was not as nature intended. Sadly, instead of admitting that the "viral" hypothesis is wrong, Hess felt that they were either failing to carry over the "virus" or that there was a different route of infection that was unknown to researchers:

Need of Further Reaserach on the Transmissibility of Measles and Varicella

> **"It is remarkable that Sellards was unable to produce this highly infectious disease by means of the blood or the nasal secretion of infected individuals.** Not long ago, however, I had a similar experience with varicella (Am. J. Dis. Child. 16:34 [July] 1918). **Thus we are confronted with two diseases—the two most infectious of the endemic diseases in this part of the world—which we are unable to transmit artificially from man to man.** The result was most surprising in regard to chickenpox, and if the same rule holds good for measles it would seem as if a basic principle must be involved. **Evidently in our experiments we do not, as we believe, pursue nature's mode of transmission; either we fail to carry over the virus, or the path of infection is quite different from what it is commonly thought to be."**

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Animal Experiments

After decades of unsuccessfully trying to prove the infectivity of measles in humans with many different experiments, scientists moved on to trying to infect monkeys. We can find out quite a bit about these experiments by returning to Andrew Sellards 1919 paper. Starting off, Sellards admitted that the results of these animal experiments varied rather remarkably. In the first experiments discussed, Sellards began by looking to the work of Anderson and Goldberger in 1911. Unfortunately, much of the vital information from these experiments was missing and/or not available. The researchers used 3 different species of monkeys in their experiments that experienced only very mild symptoms, with many experiencing no symptoms at all. Two monkeys were inoculated on the mucous membrane with material taken from measles patients 24 hours after symptoms developed, and neither monkey suffered any symptoms. In experiments with subcutaneous injections of patient materials into the monkeys, 4 of 6 attempts were considered unsuccessful.

Inoculation of monkeys. Experiments upon the transmission of measles to lower animals have been carried out extensively with monkeys, principally those of the genus *macacus*, the injections having been made with blood and mucous secretions of measles patients. Following Hektoen's work with volunteers, Anderson and Goldberger (9) reported the successful inoculation of monkeys in a manner analogous to the production of typhus fever in lower animals. Subinoculation through a series of monkeys produced mild symptoms which these authors interpreted as a reaction to the virus of measles. Confirmation of this work has been reported by several observers though the results of the individual investigators vary rather markedly. One would hardly expect that the typical clinical features of measles could be reproduced in monkeys with sufficient clearness to permit a diagnosis from the symptoms alone. It would be sufficient to produce a perfectly definite reaction which, by the exclusion of other factors, may be proved to be caused by the virus.

There are in all six signs or symptoms which have been reported in monkeys; namely, (1) fever, (2) rash, (3) Koplik spots and other forms of enanthem, (4) leucopenia, (5) conjunctivitis and rhinitis, and (6) evidence of malaise.

Anderson and Goldberger employed three species of monkeys, namely, *M. rhesus*, *M. cynomolgus*, and *M. sinicus*, using in all, more than 100 animals. Apparently these three species were equally satisfactory, though the symptoms were very mild and many individual animals failed to react. The authors summarize the results of the inoculation of blood of early cases as follows: ". . . . at least 50 per cent of the animals react in a characteristic manner. After a variable incubation period of not less than five days there is a more or less marked rise in temperature with or without catarrhal symptoms referable to the respiratory passages, such as sneezing and cough, and with or without an exanthem."

In the subinoculation of the virus in monkeys, the maximum incubation period was twenty-one days. Such irregularity complicates the interpretation of the data and increases considerably the difficulties of practical work. Unfortunately many details of the work are not available at present. In the majority of instances, the temperatures of the inoculated animal are not stated, since the com-

plete report of the work has not yet appeared. The character of the exanthem was extremely variable. Sometimes only an erythematous blush was noted. Frequently the rash was copper-colored from the beginning. Occasionally discrete pink macules and papules were observed which disappeared on pressure and were followed by a branny desquamation. These rashes occurred at very irregular intervals after inoculation; they developed most commonly on the face and chest but appeared sometimes on the thighs and abdomen. Rhinitis, coryza, and malaise were sometimes noted but these were not striking symptoms. No observations are recorded concerning leucocyte counts or examinations for Koplik spots.

Several strains were subinoculated from monkey to monkey. One in particular was passed rapidly through a series of 6 monkeys in forty-four days, but no evidence was noted of any alteration in its virulence. Experiments were also conducted to determine the infectivity of the blood for monkeys after infiltration, and after exposure to unfavorable conditions. Four specimens of blood were passed through a Berkefeld filter. Negative results were obtained with the first three; with the fourth specimen, 1 of 2 animals developed an exanthem twenty-one days after inoculation. Subinoculation of blood from this animal produced a slight febrile reaction in 1 of 2 monkeys. The authors conclude that the virus of measles is capable of passing through a Berkefeld filter.

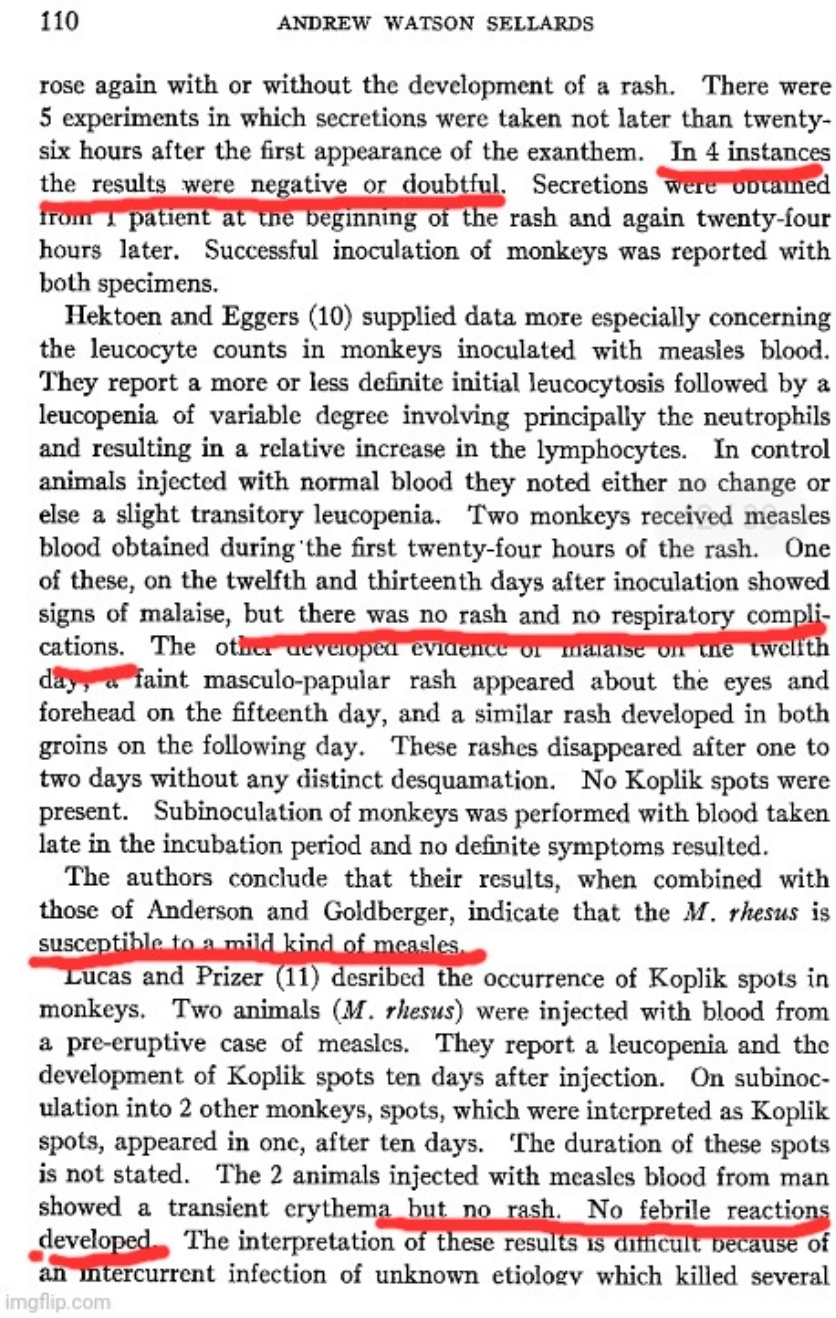
Additional experiments were made concerning the effect of drying, heating, freezing, and of age upon the virus. They draw the following conclusions: "The virus in measles blood may resist desiccation for twenty-five and one-half hours, lose its infectivity after fifteen minutes at 55°C., resist freezing for twenty-five hours, and possibly retain some infectivity after twenty-four hours at 15°C."

Anderson and Goldberger also inoculated monkeys with mucous secretions of measles patients. Two monkeys inoculated on the mucous membrane with material taken twenty-five hours after the rash appeared, developed no symptoms. Subsequent work was carried out by subcutaneous injection of secretions. The contaminating bacteria produced a prompt rise in temperature and a local abscess. The latter was usually incised and some drop in temperature usually occurred. In some animals the temperature subsequently

Hektoen and Eggers inoculated two monkeys with the blood taken 24 hours after the rash appeared. No rash or respiratory complications were observed in either monkey. The researchers claimed that their results, when combined with those obtained from Anderson and Goldberger, indicated that monkey's were susceptible to a "mild kind of measles."

Lucas and Pfizer had two monkeys injected with the blood of a measles patient. No rash nor any febrile reactions occurred in either monkey. Sellards stated that any

interpretation from their experimental results was difficult as several control monkeys died after inoculation as well as some of those inoculated with the “virus” two weeks after the injection of measles blood.



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rose again with or without the development of a rash. There were 5 experiments in which secretions were taken not later than twenty-six hours after the first appearance of the exanthem. In 4 instances the results were negative or doubtful. Secretions were obtained from 1 patient at the beginning of the rash and again twenty-four hours later. Successful inoculation of monkeys was reported with both specimens.

Hektoen and Eggers (10) supplied data more especially concerning the leucocyte counts in monkeys inoculated with measles blood. They report a more or less definite initial leucocytosis followed by a leucopenia of variable degree involving principally the neutrophils and resulting in a relative increase in the lymphocytes. In control animals injected with normal blood they noted either no change or else a slight transitory leucopenia. Two monkeys received measles blood obtained during the first twenty-four hours of the rash. One of these, on the twelfth and thirteenth days after inoculation showed signs of malaise, but there was no rash and no respiratory complications. The other developed evidence of malaise on the twelfth day, a faint masculo-papular rash appeared about the eyes and forehead on the fifteenth day, and a similar rash developed in both groins on the following day. These rashes disappeared after one to two days without any distinct desquamation. No Koplik spots were present. Subinoculation of monkeys was performed with blood taken late in the incubation period and no definite symptoms resulted.

The authors conclude that their results, when combined with those of Anderson and Goldberger, indicate that the *M. rhesus* is susceptible to a mild kind of measles.

Lucas and Prizer (11) desribed the occurrence of Koplik spots in monkeys. Two animals (*M. rhesus*) were injected with blood from a pre-eruptive case of measles. They report a leucopenia and the development of Koplik spots ten days after injection. On subinoculation into 2 other monkeys, spots, which were interpreted as Koplik spots, appeared in one, after ten days. The duration of these spots is not stated. The 2 animals injected with measles blood from man showed a transient erythema but no rash. No febrile reactions developed. The interpretation of these results is difficult because of an intercurrent infection of unknown etiology which killed several

In 1911, Nicolle and Conseil claimed that they had confirmed the work of Anderson and Golderg. However, when one monkey was injected with the blood taken from a measles patient, no symptoms developed beyond a rise in temperature. Blood from this monkey was injected into another monkey that remained entirely normal.

In 1920, the same researchers reported on results from experiments conducted in 1913 where the transfer of measles was attempted from a child to monkeys, re-inoculated into a child, and again into the monkeys. This resulted in the monkeys experiencing no symptoms other than a febrile reaction. No normal baseline temperature ranges for the monkeys were reported, nor were any of the symptoms experienced by the child described. Sellards felt that it was inadvisable to draw any conclusions from these results as such important information was missing.

Tunnicliff inoculated the blood of a measles patient into a monkey that resulted in no definite febrile reactions, no rash, no Koplik spots, nor any other indication of measles in the “infected” monkey.

control monkeys and also some of the inoculated ones about two weeks after their injection with measles blood.

Nicolle and Conseil (12) in 1911, reported confirmation of the work of Anderson and Goldberger. One monkey (*M. sinicus*) was injected with blood taken from a case of measles twenty-four hours before the rash appeared. The animal developed no symptoms except very slight malaise and a rather transient rise in temperature, most noticeable on the eleventh and twelfth days of the incubation period. Blood taken on the eleventh day was injected into a very young monkey (*M. sinicus*) but the animal remained entirely normal. The authors conclude that they have confirmed the work of Anderson and Goldberger.

In 1920, Nicolle and Conseil reported very briefly the results of some experiments conducted in 1913, concerning the transfer of measles from a child to monkeys (*M. sinicus*), re-inoculated successfully into a child, and again in monkeys. No symptoms other than a febrile reaction were observed in the monkeys; the temperatures are given for only a short portion of the incubation period. It is, therefore, inadvisable to draw any conclusions without knowing the normal temperature for these animals. As regards the child injected with blood from a monkey, there is no description of the symptoms, such as the respiratory involvement, Koplik spots, leucopenia, or glandular enlargement. There is no description of the rash, nor any reference to subsequent desquamation. It is certainly very important to know whether the course of the disease resembled the spontaneous infections, or whether some of the modifications occurred which were noted by Hektoen. This information is particularly desirable since there is no description of the precautions which were taken to avoid contact infection with measles.

Tunnicliff (13) inoculated one animal (*M. rhesus*) with blood from a measles patient taken at the end of the first twenty-four hours of the rash. There was no definite febrile reaction. The temperature at the time of inoculation was 104°F. It rose from 102.6°F. on the seventh day to 103.5°F. on the eighth day and then fell slightly. Tunnicliff considered that this rise may have been caused by the virus of measles. A protracted leucopenia developed, the count remaining relatively low, for fifteen days, a period which is much

In 1914, Jurgelunas tried to produce measles in monkeys using inoculations of the blood and mucus secretions from measles patients as well as by exposing the animals to patients in measles wards. He concluded that all of his results were negative.

One monkey injected with defibrinated blood ultimately formed a rash and died 11 days after injection. However, Jurgelunas considered that the rash did not conform to that seen in measles, and therefore, measles was not the cause of death. Another monkey was injected with blood aquired 24 hours after the rash appeared in the

measles patient, and no symptoms developed. A third monkey, injected with blood taken from the second day after the rash appeared, also developed no symptoms.

Two monkeys were exposed to patients in the measles wards, spending five days with acute patients and two days with covalescent patients. Neither developed any symptoms. Several other experiments were carried out in other monkeys with mucous secretions from measles patients, which all yielded negative results.

longer than other observers have recorded in monkeys inoculated with measles; it is also much in excess of the duration of the leucopenia occurring in human cases. There was neither rash nor Koplik spots, nor other indication of measles.

Jurgelunas (14) endeavored to produce measles in monkeys by inoculation of blood, of mucous secretions, and by exposure of animals in a measles ward. He concludes that his results were negative.

One monkey (*Pavian*) was injected with defibrinated blood from a patient showing Koplik spots at that time; the rash appeared on the following day. Ten days after injection, the animal developed small rose colored spots over the abdomen. There was no rise in temperature. Death occurred on the following day. The autopsy failed to reveal the cause of death. The liver and spleen were enlarged. Cultures from the blood and various organs showed no growth. Jurgelunas considers that the rash did not conform to the exanthem of measles and that measles was not the cause of death in this animal. He injected one other monkey (*M. cynomolgus*) with the blood from an active case of measles, the specimen being taken during the first day of the rash. No symptoms developed. A third monkey injected with blood showed no symptoms, but it should be noted that the specimen was not taken till the second day of the rash.

Two monkeys were exposed to natural infection in a measles ward, being five days among acute cases and two days with convalescent patients. Neither developed any symptoms of measles; one, however, died of an acute streptococcus peritonitis two weeks after the last exposure in the ward.

Several experiments were conducted with mucous secretions, all of which were negative. One animal (*M. cynomolgus*) was injected subcutaneously with specimens taken on the day preceding the appearance of the rash. In another (*M. cynomolgus*), the mucous membranes of the mouth were rubbed with secretions from a patient showing Koplik spots but no exanthem. Another monkey (*M. rhesus*) was inoculated in the same way with specimens taken during the first day of the eruption. Lastly, the secretions from another case taken during the first day of the rash were rubbed into the scarified mucous membrane of the mouth of a *M. rhesus*.

In 1921, Blake and Trask claimed that they had successfully infected 8 out of 10

monkeys with measles, thus "confirming" the work of Anderson and Goldberger, Hektoen and Eggers, and Lucas and Pfizer. However, the rash that appeared did not differ from rashes that occur in monkeys without measles, and febrile reactions only occurred in those animals that were inoculated with contaminated materials.

Jurgelunas made no comments concerning leucocyte counts and Koplik spots, relying apparently on the temperature and an exanthem for indications of an infection.

Blake and Trask (15) have reported the successful infection of monkeys (*M. rhesus*). Ten monkeys were inoculated with the mucous secretions of early cases and 8 are regarded as having developed symptoms of measles. The authors confirm the occurrence of a rash, the febrile reaction and the malaise noted by Anderson and Goldberger, the leucopenia first noted by Hektoen and Eggers and occasionally found Koplik spots as reported by Lucas and Prizer. Many of their animals developed more or less conjunctivitis but none showed any rhinitis nor bronchitis. The filterability of the virus of measles was also confirmed. In 2 instances, mucous secretions of patients were passed through a Berkefeld N filter. The filtrate upon injection into monkeys, produced an exanthem and an enanthem but no fever developed.

The evidence of leucopenia as recorded in the charts is not particularly constant nor striking. However, the authors state that they do not regard the temperature and leucocyte counts as evidence of successful inoculation, but merely as additional data.

The characteristic enanthem in the monkey as noted by Blake and Trask consisted usually of a bright erythematous discrete or granular rash occurring most commonly on the labial mucous membrane and the gums. In one instance whitish lesions occurred resembling the Koplik spots of human cases. Histologically the cellular reaction of the enanthem and exanthem occurring in monkeys conformed to the description of the human lesions as given by Mallory and Medlar. Apparently no examinations were made for the Gram-positive coccoid bodies found by Mallory and Medlar in measles. These histological studies would be considerably strengthened in case the picture of these lesions proved to differ sharply from that of the spontaneous maculopapular rashes which often occur in monkeys.

The authors stress emphatically the very close resemblance of experimental measles in monkeys as compared with the human disease. The two differ significantly, in their opinion, only in the inconstant febrile reaction and the absence of rhinitis and bronchitis. To this I would add the usual absence of typical Koplik spots in monkeys and the inconstancy of a definite leucopenia.

The usual immunity tests were carried out, employing 6 monkeys which had shown a reaction to the virus of measles and 2 control monkeys. The 2 controls developed symptoms but the 6 which had previously reacted remained negative. The data concerning the temperature and leucocyte counts are not given.

Subinoculations from monkey to monkey were carried out, using either blood or the ground skin and mucous membrane of inoculated monkeys. The authors consider that the early transfers gave successful infections but that after repeated passage (8 to 12 transfers) a strain eventually dies out. In the inoculations made directly from patients and also in the subpassages, no febrile reactions developed except in those animals injected with contaminated material. In the course of the subinoculations, whitish areas resembling Koplik spots were noted in the enanthems which developed in 2 of 12 or more animals.

Four monkeys were injected intravenously with blood and all of these developed conjunctivitis. This result in a rather refractory species stand out in more or less contrast to the observation of Hektoen. It will be recalled that 1 of 2 volunteers, injected subcutaneously, escaped any signs of involvement of the mucous membranes and in the other only a mild conjunctivitis and some cough developed.

In the beginning of their work Blake and Trask applied the procedure of intratracheal injection for the inoculation of the virus in monkeys but they appear to have obtained satisfactory results with equal ease by rubbing infective material on the mucous membranes or by the injection of blood. Their experiments, however, were not designed to test the relative value of the various methods of inoculation.

Kawamura (16) took blood from a measles patient sixty hours before the appearance of the eruption and injected rather less than 1 cc. of blood into each of 3 monkeys (*M. fuscatus*). After an incubation period of eight or nine days, a fever, leucopenia, rash, conjunctivitis and rhinitis developed. Koplik spots were noted in 1 animal. Two successful subpassages were obtained by the injection of blood. Histologically, the rash in monkeys appears to have resembled both the cellular reaction seen in measles and also that of Japanese flood river fever.

In 1918 and 1919, Sellards and Wenworth inoculated 3 monkeys in various ways, including intensive injections of blood from measles patients. The animals remained well without any evidence of measles, even under favorable conditions meant to bring about the disease.

In a separate experiment, blood from measles patients was injected simultaneously into 2 men and 2 monkeys. Both men remained symptom-free. One of the two monkeys developed symptoms that were not suggestive of measles, and as the two

men remained healthy, Sellards concluded that the monkey was not suffering from a measles "virus." Sellards also mentioned that his own experiments using mucous secretions only resulted in negative findings and that the injection of the blood from measles patients has not conclusively demonstrated measles infection.

In the course of their work on the inoculation of rabbits with measles, Nevin and Bittman (17) had occasion to inject 2 monkeys. One of these monkeys was injected intratracheally with mucous washings from an early case of measles; the other received blood of 2 patients taken early in the eruptive stage. The animals developed more or less leucopenia, an exanthem and an enanthem but no fever. In some later work these authors inoculated a third monkey with patient's blood under similar conditions and obtained a similar result.

In 1918 and 1919, Wentworth and the writer (18) carried out some experiments upon the inoculation of monkeys with measles. In a preliminary experiment 3 animals (*M. rhesus*) were used for blood injections. The first (A) was given 10 cc. of blood from a patient eighteen hours after the rash appeared. In transmitting typhus fever to monkeys, Ricketts and Wilder (19) recommend dilution of the blood. Accordingly this quantity of 10 cc. was diluted with 40 cc. of isotonic salt solution, defibrinated, and injected intraperitoneally. The animal remained well and there was no evidence of any rash or Koplik spots. The temperature and leucocyte count did not fluctuate beyond the normal limits.

A second animal (B) was injected with blood from a patient within six to twelve hours after the onset of the rash; 10 cc. were diluted with an equal volume of isotonic salt solution, defibrinated, and injected intraperitoneally. This animal was kept under observation for ten days before injection. During the early part of this period, a marked erythema with a few macules was present over the face and eyebrows. This rash practically disappeared during the first week of the incubation period, and then increased very slightly ten days after inoculation. Two months after the last injection it was more marked than at the beginning of the experiments. Otherwise, the findings in this animal were negative.

Very frequently, an animal which fails to respond to an injection with blood from a case of typhus fever may subsequently react typically to a similar injection. Accordingly these 2 animals (A and B) and a third young adult monkey (C) were given rather intensive injections of blood from measles patients. They were injected on three successive days with blood taken from 3 cases of measles

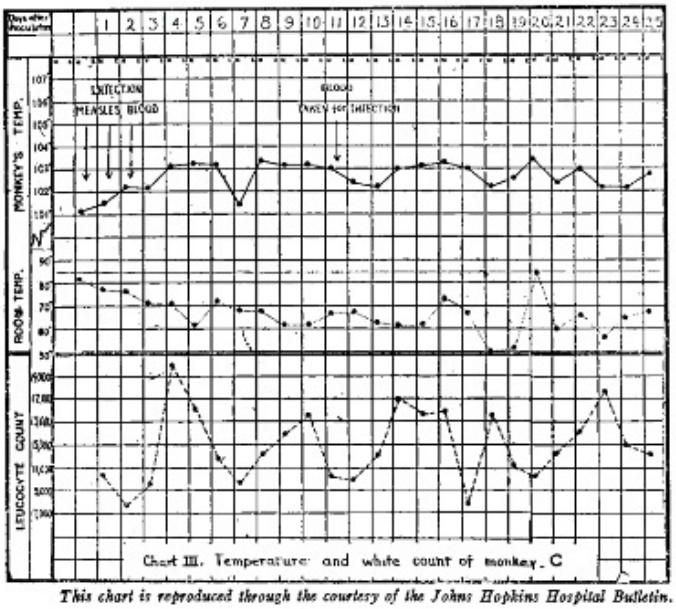
in the early stage of the exanthem. On the first day, blood was obtained from a patient four to five hours after the rash appeared; on the second and on the third day, from patients in each of whom the rash had started about twelve hours previously. The blood for these injections was either defibrinated or collected in sodium citrate.

There was no evidence of any reaction in these 3 monkeys. On the eleventh day after the first of the three injections, 3.5 cc. of blood was withdrawn from monkey C and injected subcutaneously in a susceptible volunteer. There was no change in his temperature or leucocyte count and no symptoms developed.

The leucocyte counts and the temperatures of these monkeys are given in charts I, II, and III. As an additional control, the room-temperature is also included since the body temperature of monkeys is sometimes influenced by this factor. These charts represent very clearly the disappointing type of reaction that may commonly be expected in monkeys even when inoculated under favorable conditions.

In a continuation of this work (20) some rather interesting results were obtained from an experiment in which portions of the same specimen of measles blood were injected simultaneously in 2 volunteers and in 2 normal monkeys (*M. rhesus*). As already described neither of the 2 men developed any symptoms; 1 of the 2 animals showed a suggestive reaction. In the interpretation of this result it must be recalled that 1 of these 2 volunteers gave exceptionally clear evidence of never having been exposed to measles. Blood was obtained from 2 patients for these injections, specimens being taken on 2 successive days. For the sake of convenience, the description of these cases will be repeated here. On the day of the first injection both patients were in the pre-eruptive stage. Pooled specimens of blood taken in citrate solution were injected at once. Each of the volunteers received the equivalent of 3 cc. of blood, the first portion being injected subcutaneously and the remainder intramuscularly. Each of the two monkeys received the equivalent of 2 cc. of blood, part of which was injected subcutaneously and the remainder intraperitoneally. One of the 2 measles patients developed a rash six hours after withdrawing the first specimen of blood. On the next day the patients were seen again; one was still in the pre-eruptive

stage but the rash appeared about six hours later. Blood was taken from both patients, the specimens were pooled and all of the injections were repeated as on the preceding day, employing the same quantities. The 2 monkeys varied somewhat in their reaction. One (D) showed a low leucocyte count on the ninth and again on the eleventh and twelfth days after injection. There was no febrile reaction, no respiratory nor constitutional symptoms, and no exanthem nor Koplik spots. The other animal (E) developed a leucopenia



This chart is reproduced through the courtesy of the Johns Hopkins Hospital Bulletin.

CHART III

beginning on the sixth day after his first injection, and persisting for three consecutive days. On the twelfth day, a faint rash developed over the face, neck, and uppermost part of the chest. This was principally a diffuse erythematous blush but there appeared around the eyes and nose discrete red macules 1 to 2 mm. in diameter from which the color could be readily expressed. On the next day, the rash faded almost completely leaving behind only slightly pigmented areas. These disappeared on the following day, and they were not followed by desquamation. On the first day of the rash a moderate

degree of malaise was noted. These symptoms were not accompanied by any febrile disturbance. There was no rhinitis and no Koplik spots were found at any time. On the fifteenth day after injection a well marked pneumonia developed.

On the seventh day of the incubation period, when the leucopenia appeared, 3 cc. of blood were withdrawn and injected subcutaneously

TABLE 1

DAYS AFTER FIRST INOCULATION	RHESUS D			RHESUS E			ADDITIONAL OBSERVATIONS ON RHESUS E
	Temperature		White count per cubic millimeter	Temperature		White count per cubic millimeter	
	a.m.	p.m.		a.m.	p.m.		
	°F.	°F.		°F.	°F.		
1		101.2	18,900		101.8	13,900	
2	99.0	102.0	11,100	100.4	102.2	10,700	
3	99.4	101.8	10,100	101.8	101.0	18,500	
4	101.0	102.4	11,800	102.0	102.0	10,000	
5	101.2	102.0	12,500	100.6	102.0	11,800	
6	100.8	102.2	14,900	102.2	102.8	5,500	
7	101.6	101.8	8,300	102.4	102.0	5,200	Bled for inoculation of volunteer
8	100.8	101.2	9,500	101.2	101.8	6,400	
9	100.8	102.4	4,700	101.6	102.0	7,900	
10	101.6		7,400	101.2		9,900	
11	101.4	101.8	4,400 4,900	102.8	103.6	11,110	
12	101.2	102.6	5,700	101.0	101.4	12,600	Slight rash
13	101.6	102.9	7,800	101.0	102.0	8,200	Slight rash
14	100.9	102.2	9,200	100.0	101.0	6,400	
15	101.4	102.0	8,900	100.0	100.0	6,000	Early signs of pneumonia
16	100.6	101.0	8,300	99.4	99.8	6,600	Definite pneumonia
17	100.6	102.2	17,300	98.8	100.6	18,400	Critically ill
18	102.0	102.2	13,900	101.0		9,400	Critically ill
20	101.2		14,500	100.8		44,000	Marked improvement by crisis

and intramuscularly into a volunteer. No local nor general symptoms developed.

The record of the temperatures and white counts for the two monkeys are given in Table 1.

The rash and leucopenia developing in this second monkey, unaccompanied by rhinitis, fever or Koplik spots are difficult of interpre-

tation. The absence of any symptoms following the corresponding injection of measles blood in man constitutes strong evidence against ascribing the reaction in the monkey to the virus of measles. This is especially true in view of the direct concrete evidence of susceptibility in one of these volunteers. On the other hand, the reader may on purely general grounds feel skeptical about the susceptibility to measles of any adult. It must also be remembered that each of the monkeys received some measles blood intraperitoneally. In view of the ultimate results, the experiment is faulty in this respect; for it is theoretically possible that a refractory animal might be overwhelmed by an intraperitoneal injection although a susceptible host escaped infection after subcutaneous and intramuscular injection.

It is noteworthy that the first of these 2 monkeys remained free from any characterisitc reaction notwithstanding the intensive injection of extremely favorable material. This result might be taken as an illustration of Anderson and Goldberger's view that many individual animals are altogether refractory.

My own experience with the inoculation of monkeys with mucous secretions has given only negative results. I have endeavored to infect 2 monkeys (*M. syrictus*) by inoculation with secretions taken four days and one day before the patient's rash developed. Swabs moistened with the conjunctival secretions of the patient were rubbed over the conjunctivae and nasal and pharyngeal mucous membrane of the monkeys. Similarly swabs from the nasal and pharyngeal mucous membrane of the patient were thoroughly rubbed over the corresponding mucous membranes of the animals. Neither monkey developed any fever or leucopenia. There was no rash nor Koplik spots, no inflammation of the mucous membranes, and no malaise. Two additional monkeys (*M. rhesus*) were inoculated with secretions from a measles case taken two hours after the first appearance of the rash. The inoculations were made in the same manner as for the syrictus monkeys. In addition, scarified areas of the mucous membrane of the monkey's mouths were rubbed with swabs from the conjunctival and nasal mucous membrane of the patient.

For the sake of convenience, table 2 has been prepared showing the general results obtained by various investigators upon injecting monkeys with the blood of measles patients. This outline covers

only those experiments which were designed to determine whether the monkey is susceptible to measles. It does not include the records of those injections in which the patient's blood was subjected to various procedures such as filtration or aging, for the purpose of studying the properties of the virus. Reports based upon the injection of a single animal are also omitted.

The results concerning the inoculation of the mucous secretions as obtained by various investigators are given in the table 3. The negative experiments conducted with late cases are not included.

TABLE 2

Inoculation of monkeys with blood of early cases of measles

EXPERIMENTAL RESULTS	ANDERSON AND GOLDBERGER	HEKTOEN AND EGGERS	LUCAS AND FRIER	NICOLLE AND CONSEIL	JURGELUNAS	KAWAMURA	KEVIN AND BITTMAN	SELLARDS AND WERTWORTH
Incubation period, days	5–11	12	10	11	—	8–9	4	—
Fever	+	+	0	+	0	+	0	0
Leucopenia	—	+	+	—	—	?	+	+
Exanthem	+	+	?	0	0	+	+	?
Enanthem	—	0	+	—	—	—	+	0
Conjuctival or respiratory signs	+	0	?	—	—	+	+	0
Malaise	+	+	—	?	—	+	+	?
Subinoculation in monkeys	+	?	?	+	—	+	—	—
Re-inoculation in man	—	—	—	+	—	—	—	0
Number of animals inoculated	7+	2	2	6	2	3	3	5
Number showing symptoms	4+	2	2	5	1?	3	3	1

0, none; —, no observations; +, present; ?, irregular or doubtful.

Localized lesions. In the attempts to reproduce measles in animals, practically all of the attention has been directed toward obtaining a systemic infection. In this connection, a consideration of smallpox is instructive. The virus of smallpox certainly gains access to the circulating blood at some periods of the infection. Yet the experimental transfer of the disease by the injection of blood has not been conclusively demonstrated. However, subinoculation from skin lesions in man to the skin of lower animals, readily produces a local lesion but a generalized infection typical of the spontaneous disease has not been obtained. In the course of some unpublished work, Bigelow and the writer carried out an analogous procedure in measles.

Regarding his own experimental results, as well as taking into account those from researchers before him, Sellards concluded that there was no exact proof of the susceptibility of monkeys to measles. He considered that using the reactions in monkeys as a way of studying measles was unsatisfactory. He also considered the filterability of the "virus" an entirely open question.

Early skin lesions and Koplik spots were excised from patients and implanted in the skin and mucous membrane of monkeys. Several of the results were entirely negative but some were very suggestive. In one instance in particular, an implant of skin lesion into the skin was followed after two weeks by the development of bright pink papules in an area approximately 5 cm. in diameter surrounding the implanted tissue. These papules faded gradually in the course of three days and were followed by pigmentation and desquamation.

TABLE 3

Inoculation of monkeys with mucous secretions of patients

EXPERIMENTAL RESULTS	ANDERSON AND GOLDBERGER		JURGELUNAS		SELLARDS	BLAKE AND TRASK
	Swabbing mucous membrane	Subcutaneous injection	Swabbing or scarifying mucous membrane	Subcutaneous injection	Swabbing or scarifying mucous membrane	Swabbing mucous membrane or intratracheal injection
Incubation period, days	----	8 and 9	----	----	----	6–10
Fever	0	+	0	0	0	+
Leucopenia	----	----	----	----	0	+
Exanthem	0	+	0	?	0	+
Enanthem	----	----	----	----	0	+
Conjunctival or respiratory signs	0	+	0	0	0	+
Malaise	0	+	0	----	0	+
Subinoculation in monkeys	----	+	----	----	----	+
Number of animals inoculated	2	6	3	1	4	10
Number of negative or doubtful reactions	2	2	3	1	4	2

0, none; ----, no observations; +, present; ?, irregular or doubtful.

Normal human skin implanted in control monkeys was gradually absorbed without producing any eruption.

In seeking for a method of active immunization against measles, Blake and Trask (21) report the development of a localized lesion in monkeys by the intramuscular injection of an attenuated virus. It is well to recall that Hektoen, injecting the virus of measles subcutaneously in man, observed no trace of any local reaction.

Discussion of the reaction in monkeys. There is certainly, at present, no exact proof of the susceptibility of monkeys to measles. The work of Nicolle and Conseil suggests that the virus of measles is

The acceptability of these delicate reactions occurring in monkeys as a reliable method for the study of measles resolves itself ultimately into a question of the standards which the individual investigator considers essential. To me, they are not satisfactory. Personally, I am not willing to accept as established the various characteristics of the virus of measles as worked out in this way. Thus the important conclusion that the virus is filterable rests primarily upon more or less vague results obtained in three monkeys. I prefer to consider the filterability of the virus as an entirely open question.

Inoculations of rabbits and guinea-pigs. In the past two years, a few attempts have been made to simplify the study of measles by the substitution of rabbits or guinea-pigs for monkeys in experimental work. Nevin and Bittman took blood from 6 cases of measles, two to four days "after the onset of the disease." Six rabbits were inoculated intravenously and all gave evidence of a reaction. There was no characteristic fever nor leucopenia. The animals were shaved before inoculation. The redness caused by shaving became more intense in those receiving blood and subsequently desquamation occurred. In the control series, the redness after shaving faded without desquamation. Subinoculations of blood were made from rabbit to rabbit and 9 of 11 animals reacted. One strain, after five passages in rabbits, was inoculated into a monkey, *M. rhesus*. A somewhat suggestive leucopenia developed on the third day; the following day two spots somewhat resembling Koplik spots appeared on the labial mucous membrane; then a maculo-papular rash appeared on the face and later a red granular rash on the mucosa of the lips. The exanthem was followed by a marked desquamation. Subsequently, this animal showed no reaction to an intratracheal injection of 10 cc. of mucous washings from a patient with measles. The authors consider that this monkey developed typical measles as a result of the injection of blood from the inoculated rabbits and was, therefore, immune to the injection of secretions from a patient with measles. To me it seems equally possible that the rash developing in the monkey after an inoculation of rabbit's blood was not necessarily produced by the virus of measles; also the failure to react to a test injection of mucous secretions may have been nothing more than the corresponding failures which have been noted from time to time in normal monkeys.

Grund injected rabbits intratrachaelly with mucous secretions from measles patients. Of the 23 animals experimented on, a large number remained without illness. No febrile reaction or leucopenia emerged, and immunity tests were contradictory. Grund concluded that no one individual animal gave a typical picture of measles.

While Duval and D'Aunoy believed that they had reproduced measles by injecting the blood of measles patients into rabbits, Sellards concluded that their findings would

require extensive confirmation and elaborate controls in order to confirm. The researchers also studied guinea pigs and believed them susceptible to measles. However, some of the essential data was not present in their report, with incomplete information on temperature and leucocyte counts that would not lead one to logically come to the same conclusion.

In some later work, Nevin and Bittman passed a strain of measles virus through three rabbits and then through a series of three monkeys in order to eliminate as far as possible any question of rashes due to a foreign protein. Leucopenia, Koplik spots, an enanthem and an exanthem were noted in all of the monkeys after injection with blood from inoculated rabbits. Some of the rabbits, in addition to an erythema, developed a generalized maculo-papular rash followed by pigmentation and extensive desquamation. Koplik spots and enanthems were also noted. The authors conclude that the virus of measles "survives passage in rabbits."

Simultaneous with the studies of Nevin and Bittman on the blood of measles cases, Grund (22) working in the same laboratory collected mucous secretions from these same patients and injected rabbits intratracheally. Of 23 animals a rather large number proved refractory. No definite febrile reaction or leucopenia occurred. In 1 or 2, a maculopapular eruption developed and in 10 or 11 an erythema occurred. Sub-passages in rabbits gave somewhat more encouraging results. Immunity tests on convalescent animals proved rather "contradictory." Grund concludes that no one individual animal gives a typical picture of measles but that the series, taken as a whole, encourages the belief that rabbits are susceptible to the virus of measles.

Duval and D'Aunoy (23) conclude that rabbits are susceptible to measles developing a specific reaction which they regard as analogous in all essential features to the human disease. They consider "only temperatures of 102°F. or over as pyrexia" and regard white counts under 9000 cells as evidence of leucopenia. After the intravenous injection of patient's blood in rabbits, they noted the development of coryza, conjunctival injection, and enanthem similar to Koplik spots and in 40 per cent of the animals an exanthem appeared. A number of rabbits developed an acute hemorrhagic nephritis.

After several subpassages in rabbits, a very remarkable phenomenon was noted by Duval and D'Aunoy. They report a striking increase in virulence and conclude that a number of animals died undoubtedly from the direct effect of the virus of measles and not on account of intercurrent infection. This finding would require extensive confirmation and elaborate control in order to eliminate the possibility of epizootic disease.

The susceptibility of guinea-pigs to measles was studied also by Duval and D'Aunoy. They conclude that the guinea-pig reacts specifically to the virus of measles showing a definite and constant rise of temperature with a coincident fall in the total number of leucocytes after an incubation period of nine to twelve days.

Several large series of experiments were conducted but unfortunately some of the essentials of these data do not appear in the report. Those portions of the data concerning the temperature and leucocyte count which the authors present are not sufficiently complete to permit a logical conclusion. The situation in brief is as follows: The temperatures and leucocyte counts of 30 normal guinea-pigs were taken for thirty-one days and the daily average result of this series is recorded. In a similar manner, 15 guinea-pigs were injected with normal human blood and the daily average temperature and leucocyte count is recorded. Finally, the blood from 7 cases of measles was injected into guinea-pigs. In each experiment of this series, 6 animals were used, 4 for blood from measles patients and 2 for controls. Thus 28 pigs received measles blood and 20 of these showed evidence of reaction. However, only two charts are given of temperature and leucocyte counts and it is entirely impossible to determine whether these charts represent the data of a single animal or the composite data of more than one. Since some of these animals were sacrificed, the curve is not a composite of the entire group. Obviously the chart of a single experiment or of an entirely unknown number of animals cannot be compared with the composite chart of 30 control animals, studied one or two months previously. The 14 control animals inoculated simultaneously with those receiving measles blood showed no reaction but no data are given. It would appear that any temperature above 102° was regarded as abnormal. In passage experiments from guinea-pig to guinea-pig, the virus increased in virulence even to the extent of killing "a number" of the animals. Acute hemorrhagic nephritis is reported as a constant finding but unfortunately the number of animals examined is not indicated.

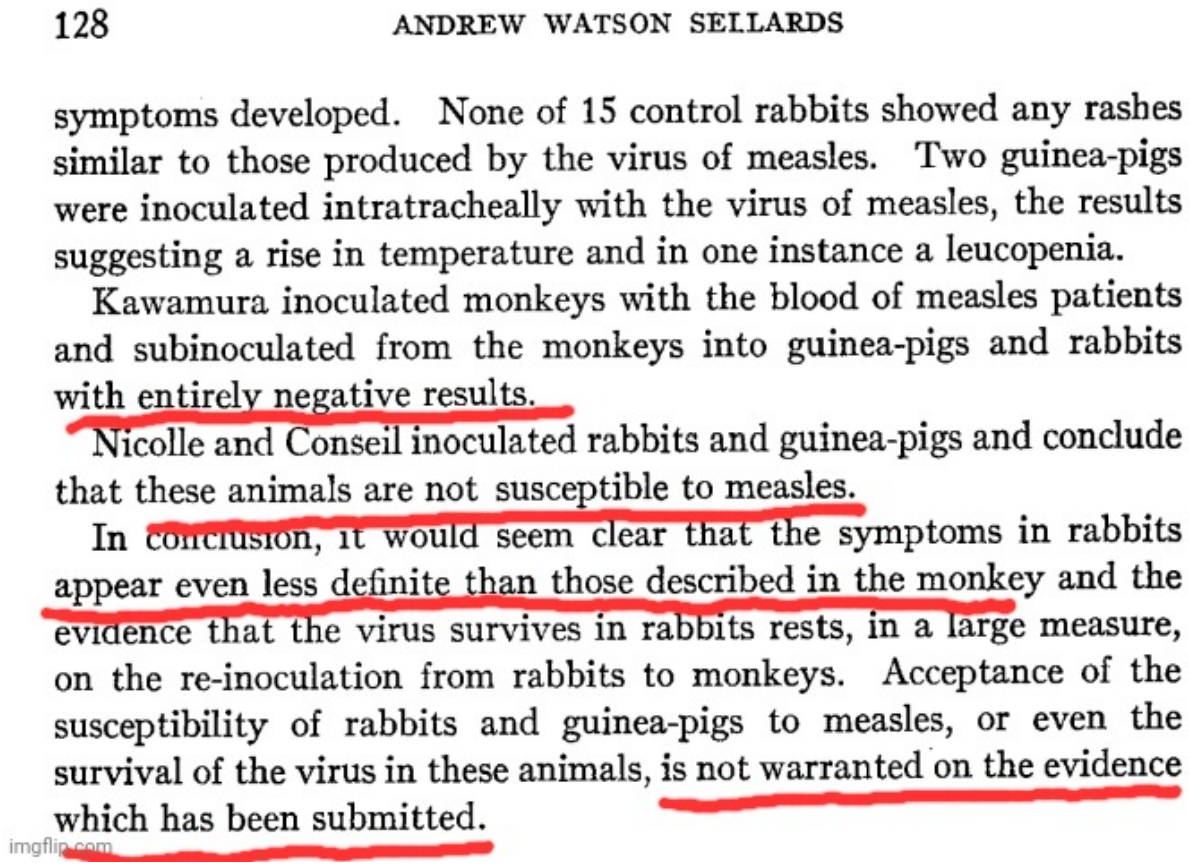
Tunnicliff and Moody (24) injected 9 rabbits intratracheally with the virus of measles using presumably mucous secretions. Good rashes were observed in 8 of these animals but no other definite

Tunnicliff and Moody injected 9 rabbits intratrachaelly with mucous secretions, and while rashes were observed in 8 of them, no other definite symptoms developed.

Kawamura used blood from monkeys that were inoculated with the blood from measles patients and then attempted to transmit disease from the monkey to both guinea pigs and rabbits without success.

Nicolle and Consil concluded that rabbits and guinea pigs were not susceptible to measles after attempting to inoculate these animals unsuccessfully.

Based upon the experimental results of others, Sellards concluded that symptoms in rabbits were even less definite than those seen in monkeys. Thus, he believed that accepting rabbits and guinea pigs as susceptible to measles, or even that the "virus" could survive within these animals, was not warranted based upon the evidence submitted.



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symptoms developed. None of 15 control rabbits showed any rashes similar to those produced by the virus of measles. Two guinea-pigs were inoculated intratracheally with the virus of measles, the results suggesting a rise in temperature and in one instance a leucopenia.

Kawamura inoculated monkeys with the blood of measles patients and subinoculated from the monkeys into guinea-pigs and rabbits with entirely negative results.

Nicolle and Conseil inoculated rabbits and guinea-pigs and conclude that these animals are not susceptible to measles.

In conclusion, it would seem clear that the symptoms in rabbits appear even less definite than those described in the monkey and the evidence that the virus survives in rabbits rests, in a large measure, on the re-inoculation from rabbits to monkeys. Acceptance of the susceptibility of rabbits and guinea-pigs to measles, or even the survival of the virus in these animals, is not warranted on the evidence which has been submitted.

When discussing the transmission of measles to man, Sellards stated that injecting the blood of a measles patient, where the "virus" was assumed to reside, into a healthy subject, does not mean that one will acquire measles. He reiterated that his own work involving the injection of the blood of measles patients into healthy subjects only produced negative results.

On the transmission of measles into animals, Sellards stated that there was no convincing proof of the susceptibility of monkeys to a measles "virus." He felt that all

observers agreed that the symptoms produced in monkey experiments were rather vague and that experienced investigators reported conflicting results and marked variations. No matter what the mode of inoculation, the interpretation of the results remained the chief difficulty. The experimental reactions were too mild to determine that they were the result of a measles “virus” from the human patient. Sellards believed that it was important to come to an exact method of study for all future research rather than pile up a massive amount of data that was reliant upon one or two doubtful methods. He concluded by stating that the cardinal problems remaining to be solved for measles were:

- The demonstration of the causative microorganism
- The cultivation of the microorganism
- The experimental recreation of the disease in animals

lesions, perhaps in very scanty numbers. Neither has any cellular reaction been described which is diagnostic of the disease, the principal characteristic being some proliferation in the tissues around the vessels, of the endothelial leucocytes, the latter often showing mitoses. There is no evidence of primary necrosis or acute exudation of polymorphonuclear leucocytes such as the ordinary micrococci produce.

Bacteriology. Cultures of the inflamed mucous membranes have shown for the most part only the flora commonly occurring in the upper respiratory tract such as the cocci, the diphtheroids and frequently the influenza bacillus. A number of microörganisms have been found from time to time in cultures of the blood; two are worthy of mention; namely, the micrococcus obtained by Tunnicliff and a Gram-positive pleomorphic bacillus reported by Bigelow and the writer. Each of these organisms when inoculated in monkeys produced maculopapular lesions, the histology of which was consistent with that of human measles. In my opinion, this finding is not sufficiently distinctive to justify one in placing confidence in either of these organisms as the etiologic agent.

Transmission to man. It has already been emphasized that the existence of the virus of measles in the circulating blood of a patient does not necessarily presuppose that the injection of such blood in a susceptible person would produce an infection. The most valuable and the one most definite experimental contribution to the study of measles was made by Hektoen when he produced measles artificially in 2 volunteers by the inoculation of blood from a patient. He demonstrated at the same time that the virus will survive in ascitic broth at 37°C. for at least twenty-four hours. The clinical symptoms in these volunteers differed in minor respects from the usually constant picture of the natural infection. Information is lacking concerning certain features such as Koplik spots and the leucocyte counts. Indeed it is not yet established in how far "measles inoculata" might vary from the spontaneous disease.

My own work on the inoculation of volunteers with blood of measles patients has given only negative results, indicating that the injection of a patient's blood will not regularly and constantly reproduce the disease in individuals who are apparently susceptible.

Susceptibility of monkeys. Experimentally, one of the most important factors in the study of measles is the question of the susceptibility of monkeys. Attempts have been made in two directions to establish proof of the susceptibility of monkeys to measles. Nicolle injected blood from a measles patient into a monkey and noted a mild febrile reaction. A child inoculated with blood from this animal developed measles. Unfortunately the precautions which were taken to prevent accidental infection are not described.

Blake and Trask found that the histologic picture of the skin rashes occurring in monkeys inoculated with measles corresponded to the histology of the lesions of human cases. This histologic picture is not pathognomonic. We have, therefore, no convincing proof of the susceptibility of monkeys.

Although my own attempts to infect monkeys have been disappointing, nevertheless it seems to me that the weight of evidence in the literature favors the conclusion that occasionally individual animals develop mild reactions when inoculated with the virus of measles. However I am not willing to place dependence on this method for studying the disease. Practically all observers agree that the symptoms are rather vague, many individual monkeys being entirely refractory. Variation occurs in this respect to a much greater degree for example than in the case of the experimental production of typhus fever. Moreover, experienced investigators report altogether conflicting results in the study of measles regarding such cardinal factors as the development of a skin rash and the occurrence of a febrile reaction. There is also marked variation concerning details such as the incubation period, the presence of Koplik spots, of leucopenia, rhinitis and malaise. Anyone contemplating the study of measles in monkeys will find that very naturally no uniform technique has as yet been evolved. In the choice of material for inoculation, equally good results have been reported by the use of either blood or mucous secretions. Three modes of procedure have been employed for the inoculation of mucous secretions; namely, (1) swabbing the mucous membranes with or without preliminary scarification, (2) subcutaneous injection, and (3) intratracheal injection. No comparison of these methods has been attempted but theoretically the intratracheal injection when followed by regurgitation with coughing

and sneezing would give opportunity for a thorough inoculation of the mucous membranes.

Whatever the mode of inoculation, the chief difficulty arises in the interpretation of the reactions. Of the various findings reported in the monkey, there are three features of cardinal imporance; namely, (1) fever, (2) leucopenia, and (3) rash, either of the skin or mucous membranes. These symptoms supposedly characteristic of experimental measles, are too mild to determine convincingly the etiologic relationship of suspected microörganisms isolated from patients.

This may seem to be an unhopeful view. On the contrary, it is merely suggested that attention should be directed toward a further study of the reactions in animals. It seems to me important to establish first of all an exact method of study rather than to increase the mass of data that has been founded on more or less doubtful methods.

Of the cardinal problems yet to be solved in measles we may mention: (1) the demonstration of the causative microörganism, (2) its cultivation, and (3) the infection of lower animals in such a manner as to provide a reliable and practical method for the recognition of the virus. By contrast with measles, let us consider a disease such as spotted fever, in which the causative organism is readily demonstrated microscopically in tissues and which produces in guinea-pigs a fatal infection with characteristic lesions. In any attempts at cultivating this organism, suspected cultures can be tested readily and conclusively. However, in measles, in working on any one of the three features just mentioned, it is necessary to contend with two unknown factors.

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In Summary:

- In 1758, Francis Home attempted the first inoculations of measles fluids into patients and concluded that in most instances, he succeeded in producing the disease **in a mild and modified form**
- However, Erasmus Darwin was not impressed with the results and stated that some attempts had been made, **but a difficulty seemed to arise in giving the disease**
- C. J. Themmen's own experiments using the tears, sweat, and other fluids from measles patients on 5 children **were all negative**
- Chapman in Philadelphia in 1801 **tried in vain** to inoculate measles by means of **blood, tears, the mucus of the nostrils and bronchia, the eruptive matter in the cuticle without success**
- In 1809, Willan inoculated three children with the fluid of miliary vesicles in measles **but without success**
- In 1810, Wachsel attempted to inoculate an 18-year-old with measles, **but this was said to be doubtful** and was **considered a "natural" infection rather than an experimental one** based upon the length of time it took for the symptoms to develop
- In 1822, Dr. Frigori tried to infect 6 children with measles which produced mild non-specific symptoms, **but they did not develop measles**
- Frigori was not satisfied with the results and **attempted to infect himself without success**

- In 1822, Dr. Negri tried to infect two children with measles **and came up with the same negative results as Dr. Frigori**
- In 1822, Speranza attempted to infect 4 children using similar methods, **but without success**
- In 1834, Albers tried to infect four children with measles, 2 in the way of Home, and 2 by way of vaccination, **and none of the 4 fell ill**
- Albers quoted Alexander Monro, Bourgois and Spray as having **made unsuccessful inoculations with saliva, tears, and cutaneous scales**
- In 1890, Hugh Thompson attempted to inoculate 2 children with measles **and failed in both instances**
- In 1905, Ludvig Hektoen attempted to infect 2 healthy people with measles **using the blood of sick patients**
- To do so, he used two flasks **with ascites broth 50 c.c.** (peptone broth two parts, ascitic fluid heated to 55˚ C. for 54 minutes one part) that were inoculated with one and three c.c. of blood and incubated at 37˚ C. for 24 hours
- He then made subcultures **upon ascites agar, glycerin agar, and Loeffler's serum**
- This was injected into the two volunteers, who were both recently recovering from similar symptoms with scarlett fever, who experienced **non-specific symptoms that were questionable as to whether they experienced measles**
- During the winter months of 1918 to 1919, Andrew Sellards **attempted to recreate the results obtained by Hektoen**
- To do so, he inoculated the blood of measles patients in 8 healthy volunteers without prior history of measles exposure, starting with just the blood of a patient obtained 12 hours after eruption that was **mixed with 9 parts of isotonic salt solution** and then inoculated subcutaneously into a volunteer, **and yet no symptoms followed**
- In the next series by Sellards, the blood of a measles patient obtained 12 hours after a rash was **either incubated in ascitic broth or defibrinated**
- Both preparations were injected into 2 volunteers subcutaneously, and, once again, **no symptoms occurred in these series of experiments**
- More intensive injections took place as **blood was taken in citrate** from 2 pre-eruptive measles cases, **mixed together,** and then injected both subcutaneously and intramuscularly into 2 more volunteers and **repeated twenty-four hours later**
- However, **no symptoms occurred**, and after 3 weeks, these same volunteers were exposed to an early measles case and had secretions inoculated into their mucus membranes **and continued to remain symptom free**
- In 1919, Alfred F Hess M.D. sent a letter to the editor *Journal of the American Medical Association* in response to Sellards experimental results, stating that **"it is remarkable that Sellards was unable to produce this highly infectious disease by means of the blood or the nasal secretion of infected individuals."**
- Hess was unable to do the same with chickenpox and declared that "we are

confronted with two diseases—the two most infectious of the endemic diseases in this part of the world—**which we are unable to transmit artificially from man to man."**

- Turning to animal experiments, Sellards admitted that the results of experimental infection of measles with monkeys **varied rather remarkably**
- Sellards bgan by looking at the work of Anderson and Goldberger in 1911, where much of the vital information from these experiments **was missing or not available**
- The researchers used 3 different species of monkeys that experienced only very mild symptoms, **with many experiencing no symptoms at all**
- Hektoen and Eggers inoculated two monkeys with the blood taken 24 hours after the rash appeared, **and no rash or respiratory complications were observed in either monkey**
- The researchers claimed that their results, when combined with those obtained from Anderson and Goldberg, indicated that monkey's **were susceptible to a "mild kind of measles**"
- Lucas and Pfizer had two monkeys injected with the blood of a measles patient, **and no rash nor any febrile reactions occurred in either monkey**
- Sellards stated that any interpretation from their experimental results was difficult **as several control monkeys died after inoculation** as well as some of those inoculated with the "virus" two weeks after the injection of measles blood
- In 1911, Nicolle and Conseil claimed that they had **confirmed the work of Anderson and Golderger**
- However, when one monkey was injected with the blood taken from a measles patient, **no symptoms developed beyond a rise in temperature**
- Blood from this monkey was injected into another monkey **that remained entirely normal**
- In 1920, the same researchers reported on results from experiments conducted in 1913 where the transfer of measles was **attempted from a child to monkeys, re-inoculated into a child, and again into the monkeys**
- This resulted in the monkeys experiencing **no symptoms other than a febrile reaction**
- No normal baseline temperature ranges for the monkeys were reported, nor were any of the symptoms experienced by the child described, and thus, Sellard felt that it was **inadvisable to draw any conclusions from these results as such important information was missing**
- Tunnicliff inoculated the blood of a measles patient into a monkey that **resulted in no definite febrile reactions, no rash, no Koplik spots, nor any other indication of measles** in the "infected" monkey
- Jurgelunas tried to produce measles in monkeys using inoculations of the blood and mucus secretions from measles patients as well as by exposing the animals in to patients measles wards, **and had to conclude that all of his results were negative**

- One monkey injected with defibrinated blood ultimately formed a rash and died 11 days after injection, yet Jurgelunas considered that the rash did not conform to that seen in measles, and therefore, **measles was not the cause of death**
- Another monkey was injected with blood aquired 24 hours after the rash appeared in the measles patient, **and no symptoms developed**
- A third monkey injected with blood taken from the second day after the rash appeared also **developed no symptoms**
- Two monkeys were exposed to patients in the measles wards, spending five days with acute patients and two days with covalescent patients, **and neither developed any symptoms**
- Several other experiments were carried out in other monkeys with mucous secretions from measles patients, **which all yielded negative results**
- In 1921, Blake and Trask claimed that they had successfully infected 8 out of 10 monkeys with measles, thus "confirming" the work of Anderson and Goldberger, Hektoen and Eggers, and Lucas and Pfizer, **yet the rash that appeared did not differ from rashes that occur in monkeys without measles and febrile reactions only occurred in those animals that were inoculated with contaminated materials**
- In 1918 and 1919, Sellards and Wenworth inoculated 3 monkeys in various ways, including intensive injections of blood from measles patients, **and the animals remained well without any evidence of measles, even under favorable conditions meant to bring about the disease**
- In a separate experiment, blood from measles patients was injected simultaneously into 2 men and two monkeys, **with both men remaining symptom-free**, and **only one** of the two monkeys developing symptoms that were **not suggestive of measles**
- As the two men remained healthy, Sellards concluded that the monkey **was not suffering from a measles "virus"**
- Sellards also mentioned that his own experiments using mucous secretions **only resulted in negative findings** that the injection of the blood from measles patients **has not conclusively demonstrated measles infection**
- Regarding his own experimental results, as well as taking into account those from researchers before him, Sellards concluded that there was **no exact proof of the susceptibility of monkeys to measles**
- He considered that using the reactions in monkeys as a way of studying measles **was unsatisfactory**
- He also considered the filterability of the "virus" **an entirely open question**
- Grund injected rabbits intratrachaelly with mucous secretions from measles patients, and of the 23 animals experimented on, **a large number remained without illness**
- No febrile reaction or leucopenia emerged, **and immunity tests were contradictory**
- Grund concluded that **no one individual animal gave a typical picture of**

measles

- While Duval and D'Aunoy believed that they had reproduced measles by injecting the blood of measles patients into rabbits, Sellards concluded that their findings **would require extensive confirmation and elaborate controls in order to confirm**
- The researchers also studied guinea pigs and believed them susceptible to measles, but some of the **essential data was not present in their report,** with incomplete information on temperature and leucocyte counts that **would not lead one to logically come to the same conclusion**
- Tunnicliff and Moody injected 9 rabbits intratrachaelly with mucous secretions, and while rashes were observed in 8 of them, **no other definite symptoms developed**
- Kawamura used blood from monkeys that were inoculated with the blood from measles patients and then **attempted to transmit disease from the monkey to both guinea pigs and rabbits without success**
- Nicolle and Consil concluded that rabbits and guinea pigs **were not susceptible to measles** after attempting to inoculate these animals **unsuccessfully**
- Based upon the experimental results of others, Sellards concluded that symptoms in rabbits **were even less definite than those seen in monkeys**
- Thus, he believed that accepting rabbits and guinea pigs as susceptible to measles, or even that the "virus" could survive within these animals, **was not warranted based upon the evidence submitted**
- When discussing the transmission of measles to man, Sellards stated that injecting the blood of a measles patient, where the "virus" was assumed to reside, into a healthy subject, **does not mean that one will acquire measles**
- He reiterated that his own work involving the injection of the blood of measles into healthy subjects **only produced negative results**
- On the transmission of measles into animals, Sellards stated that there was **no convincing proof of the susceptibility of monkeys to a measles "virus"**
- He felt that all observers agreed that the symptoms produced in monkey experiments **were rather vague and that experienced investigators reported conflicting results and marked variations**
- No matter what the mode of inoculation, **the interpretation of the results remained the chief difficulty**
- The experimental reactions were **too mild to determine that they were the result of a measles "virus" from the human patient**
- Sellards believed that it was important to come to an exact method of study for all future research **rather than pile up a massive amount of data that was reliant upon one or two doubtful methods**
- He concluded by stating that the cardinal problems **remaining to be solved for measles** were:
    - The demonstration of the causative microorganism

- The cultivation of the microorganism
- The experimental recreation of the disease in animals

Somewhere along the line, the non-specific symptoms referred to as measles went from being known as a benign childhood disease to a highly contagious killer of children. However, the foundational experimental evidence does not show this to be the case. Not only were the deaths associated with measles falling throughout the 20th century prior to the introduction of any vaccine, the human and animal experiments used to show that there was a “highly contagious viral” cause

demonstrated the exact opposite. Researchers repeatedly failed to recreate the same symptoms of disease using every possible source of fluids from a measles patient. In many instances, no symptoms ever occurred, and in the few instances where symptoms did occur, they were not the same as those seen naturally. Thus, these experiments failed to show any sort of "highly contagious and infectious virus." In fact, they showed that a disease such as measles can not be transmitted from one person to another via the fluids. They showed, once again, that the infectious myth had been busted.

4 comments

Truth = Freedom

July 10, 2023 at 4:49 pm

Thank you Mike for that very detailed write up of how science has not proven their version of contagion in the case of Measles.

I would like to offer some observations if I may.
So if one was to look at the whole measles thing from a German New Medicine (GNM) perspective a different story of what we all call measles could come out. (I know this is not the focus of all your work Mike, so this is mainly for other readers. Your work is very valuable to us all!! Thank you!)

-So GNM says that measles is the resolved conflict of a fairly serious separation situation. This is also the same basic premise for Chicken Pox and other skin related issues. For example: If a child at say age 5, after being at home with mommy for 5 years, is sent to school, that child has been separated from everything that he/she has known. There could be lots of tears and stress, but lets say that in a few months, the child adjusts and now likes school, his/her friends and the teacher. That child has resolved the conflict, so now the body that was under conflict has to heal and return to normal, and wa la the symptom of measles shows up (of course all this happens

with out the child even knowing it). NOW this can't be the only kid in class this has happened too, so the the 1st kid signals with his bio-electric frequency that "hey I am ok, conflict resolved, you are ok too, you can heal" and then other kids in class also resolve their conflicts and "get" measles. This is the same concept for why yawns are contagious. But, not all kids will get measles, because they all might not have the same conflict. Or their conflict is slightly different and they may have chicken pox symptoms. GNM is fascinating.

-If you look at the chart of measles deaths that is near the top of the article. The rate goes up and down a lot at the beginning of the 1900's, which I would guess means that the rate of measles cases also went up and down, but what also transpired at this time in history was a LOT of changes for the American family. More and more kids were sent to school as the rate of schools were set up, and separated from their parents and shoved into a new environments. Also, there was a lot of movement of the people to different parts of the country, lots of parents died and left little children without parents, and another separation issues. During WW1, many children were separated from their fathers, and many forever. Many children had to be taken care of by others, so mothers could work, etc. Of course less children died over time due to better food and cleaner environments. This is not a one size fits all explanation.

-So as the cases and deaths went down, we can think about the changes in the American family. More and more women entered the workforce. More and more children went to school and day care, so it became more and more common and I think over all it became less and less of a separation anxiety issues for children. Especially children who started day care before the age of 1. Now adays it is more common for a child to be sent to day care than not.

Now here is an interesting thing. I have seen the opinion that measles and things like it (chicken pox, etc) are a normal maturation process that children just go through. Though in my children, who are NOT vaccinated, that process did not happen. And I have 4 of them. The first child has some shots, before I figured it out, so from a vaccination view she may not get measles because of that. If course I know that is all BS. So here is the interesting point. My children are all homeschooled. They never went to day care of any kind. The only three people who ever watched them were

grandmas, their father, and me (mom). They were never un-naturally separated from us for any extended periods of time. So that would follow the GNM theory that they would never get measles/chicken pox/etc, because they have never been in a situation to get a serious separation conflict. Three of them had what the virus people call roseola, which looking back all coincided with them starting to stay with grandma without me staying with them (like when I went shopping). Child #3 never had those symptoms, I think because when he started staying at grandma's for hours, the other siblings being present kept him from having a conflict (and he was a super laid back baby and toddler). Child number 4 was 3.5 years younger than #3 and I don't think that worked for him and somethings were a bit different at the time with the things we were doing, so he got symptoms of it, though they were different.

Of course the health of any individual could change the out come of any healing process. For me this is fascinating stuff and I like trying to figure out the puzzle. I really do think things are contagious, I just don't think they are pathogenic. This is why I believe none of the studies listed above could ever prove that measles was pathogenic, because I don't think it is.

Maybe I am wrong, or missing something, but this is what I think could be happening with the measles situation (chicken pox too).

Many Blessings to all!! Always keep searching, always keep seeking the truth.

★< https://viroliegy.com/2023/07/10/the-infectious-myth-busted-part-4-is-measles-contagious/?like_comment=9175&_wpnonce=09d1ba26cc>
Like

Jeffrey Strahl

July 10, 2023 at 5:32 pm

Thanks a whole bunch, Mike. A group of us had to deal with a contentious letter writer to Planet Waves a couple of weeks ago. He was INSISTENT that measles is real and dangerous, he had it, and the vaccine did reduce cases, in spite of his willingness to admit COVID was/is fraud. Maybe i'll chance sending him this. 🙂

★ **< https://viroliegy.com/2023/07/10/the-infectious-myth-busted-part-4-is-measles-contagious/?like_comment=9176&_wpnonce=61131ed728>**
Like

I Do Not Consent

July 11, 2023 at 10:14 pm

Thanks again for the thorough work that you do, Mike.
The “measles is contagious” myth buster that I like to use is the case of Masha and Dasha Krivoshlyapova.
Russian conjoined twins who were studied intensively during their childhood.
Reportedly, one displayed symptoms of Measles and the other didn’t.
They also showed other symptoms of illness at different times.

★ **< https://viroliegy.com/2023/07/10/the-infectious-myth-busted-part-4-is-measles-contagious/?like_comment=9182&_wpnonce=f749d262f1>**
Like

Nike < https://viroliegy.com/2023/07/10/the-infectious-myth-busted-part-4-is-measles-contagious/>

July 12, 2023 at 6:21 pm

The sadness of the temporary but periodic separation from the familiar and beloved environment leads to localized tissue loss in the skin. After the person gets used to the situation and the sadness disappears, then the point tissue losses are regenerated, leaving with point inflammatory phenomena in the skin which are necessary to eliminate the residues and to regenerate the tissue points.

Sadness slows down the intensity of energy flows through the tissues, which leads to tissue loss and a decrease in the efficiency with which those tissues function.

Fear increases the intensity of the energy flows that circulate through the tissues, which leads to tissue proliferation and an increase in the efficiency with which those tissues function.

Unfortunately there are chemicals, drugs, vaccines and biologicals and electromagnetic radiation that have the same effects on the intensity with which vital energy flows through the tissues as do sadness and fear.

★ **< https://viroliegy.com/2023/07/10/the-infectious-myth-busted-part-4-is-measles-contagious/?like_comment=9183&_wpnonce=3df844c639>**
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