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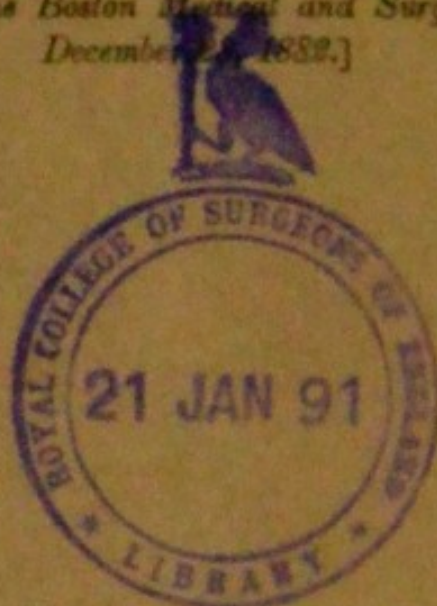
NEW LENOX MALARIA CASE.

BY

J. F. A. ADAMS, M. D.

PITTSFIELD, MASS.

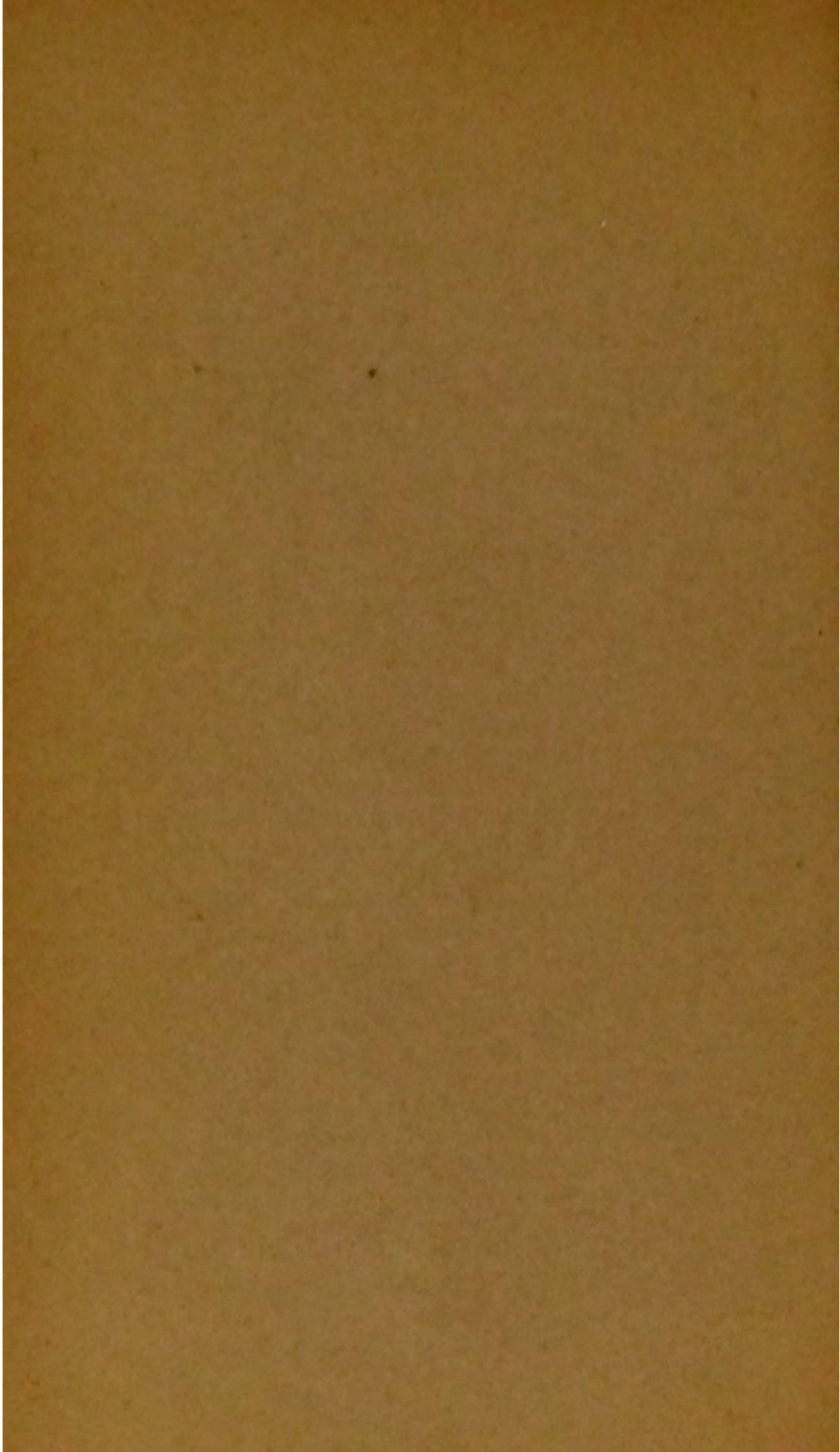
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THE NEW LENOX MALARIA CASE.

THE trial of the Smith Paper Company of Lee, Mass., for maintaining a nuisance at New Lenox, commonly known as the "Malaria Case," took place before the Superior Court at Pittsfield, beginning October 10, 1882, and ending November 1st, with a verdict for the defendants.

The indictment, which was presented by the grand jury July 10, 1882, recited that the Smith Paper Company possessed and have maintained a certain dam on the Housatonic River, by means of which the water has been dammed back and flowed up over the surface of a large tract of land adjoining the river in the towns of Lenox and Lee, for a distance of four miles in length, and one mile in width. By such maintenance of the dam and the use of the water the channel of the river and the adjacent lands have been alternately flowed and drained, causing a deposit of mud and various organic substances in the channel, and rendering the adjacent lands marshy and covered with decaying vegetation and other filth, the source of noisome stenches and unwholesome exhalations, which have poisoned the air and injuriously affected the health of persons living or passing in that vicinity.

The case was tried before Judge Brigham; the Commonwealth was represented by District-Attorney A. J. Waterman, assisted by Hon. Justin Dewey, of Great Barrington, Thomas Post, of Lenox, and E. M. Wood, of Pittsfield. The defense was conducted by Messrs. Pingree and Barker, of Pittsfield, assisted by ex-Judge Soule, of Boston, and E. D. Slocum, of Pittsfield. The opening argument for the Commonwealth was made by the District Attorney, and that for the defense by J. M. Barker, Esq.

Seventy-two witnesses were called by the Commonwealth, and sixty by the defense.

The testimony for the Commonwealth may be summarized as follows: —

In 1870 the dam of the Smith Paper Company, near Lenox depot, was raised three feet, a dam four feet high having previously existed at the same place. The effect of this was to greatly enlarge the reservoir by overflowing the meadows on either side of the river, the water being set back for a distance of four miles in a direct line. In the upper half of this distance the water was not ordinarily raised above the banks of the river, but in the lower half the banks were submerged, and the water spread out irregularly to a width of about a quarter of a mile on the average. This surface was diversified with islands and tongues of land, varying in shape and extent with the height of the water. When this was flowing over the dam a considerable pond appeared, with marshy borders, but when the water level was one or two feet below the crest of the dam large tracts of muddy bottom were exposed, all vegetation being killed, and nothing remaining but the decaying skeletons of trees and bushes. With the daily variations in the height of water portions of this muddy bottom were alternately covered with water and exposed to the sun and air. The extent of these fluctuations depended upon the volume of water in the river, being very large in times of drought and low water, as during the summer and fall of 1880, and less in more rainy seasons, as those of 1881 and 1882. Outside of the water line the land was saturated with water, and would produce only coarse marsh grass in place of the valuable hay and other crops which had formerly grown there. There were also numerous depressions in the surface of the meadow, the vestiges of former floods or changes in the channel of the river. Some of these were connected with the river and called "coves," others were detached and called "pockets." The pockets, which formerly drained off readily after freshets, and produced a good quality of grass, were converted, by the raising of the water level, into stagnant

pools, where water stood most of the summer, killing the grass, and causing putrefaction and a nauseous and offensive smell.

This valley is shut in on the east by the Hoosac range of mountains, which rise abruptly from the meadow to the height of five hundred feet or more. On the west the ground rises more gradually toward the village of Lenox, which is two miles away, and two hundred feet higher than the valley.

In the summer of 1878 intermittent fever began to prevail in the vicinity of this reservoir, the first cases appearing close to the river, on the east side, at the foot of the mountains, and has continued to prevail until the present time, being limited to the valley in which the reservoir is situated and to the hill-sides around it to a distance of a mile. This region has a population of about eight hundred souls, of which number three hundred and fifty-three were attacked with intermittent fever up to October 1, 1882. The first cases were close to the river, and chiefly on the east side, and thence new cases appeared further and further away. Up to 1880 cases had appeared in every one of the twenty houses on the east side of the river between the dam and the Pittsfield line. In some houses as many as six cases have occurred. No cases have occurred in the higher parts of Lenox. Of the contiguous towns on the south, no cases have occurred in Stockbridge, with a single exception, in 1880, and but very few in Lee. In Pittsfield, which adjoins Lenox on the north, a few cases have appeared each year since 1880, chiefly in the vicinity of a millpond east of the village.

Of the witnesses living in the malarial district forty-six had themselves had chills and fever. Of the physicians called by the Commonwealth, Drs. Holcombe, of Lee, Roberts and Wentworth, of Pittsfield, had treated cases of intermittent fever in the same locality.

The testimony of experts called by the Commonwealth, though given in some cases at great length, may be briefly summed up as follows:—

Dr. C. C. Holcombe, of Lee, after describing the cases he had treated, and the condition of the locality, was asked what cause he could discover for the disease. He replied, "The conditions that exist about the defendants' dam, as I have described it, are sufficient cause for the cases."

On being asked what those conditions are, he answered, "I mean the conditions which could be removed by thorough drainage."

Dr. J. F. A. Adams, of Pittsfield, said, "My belief is that the prevalence of the fever is due to the swampy nature of the locality. This affords a soil favorable for the development of malaria, but this development would not take place except for the epidemic influence which comes from without." He described the progress of the epidemic northward through the western portions of Connecticut and Massachusetts, appearing first and prevailing most violently in the vicinity of swampy places. He did not accept the germ theory because the existence of a specific germ is not yet proved, but thought it more in accordance with the known facts than any other theory. He believed the malarial poison was exhaled from the swampy land on the margin of the reservoir, and from the muddy bottom when exposed to the sun and air. He considered the condition of things in this locality peculiarly favorable to the development of malaria, and similar to those which have always and everywhere been found to conduce to the prevalence of malarial fevers. He believed that if the dam had not been there the cases of this disease in that neighborhood would have been very few, and that the removal of the dam would greatly diminish the number and severity of such cases.

Dr. W. H. Wentworth, of Pittsfield, said, "I do see a sufficient cause for the disease. It was the low, swampy condition of that valley."

Dr. O. S. Roberts, of Pittsfield, said, "I think I discover the cause in the shallow water, which ex-

poses a large extent of vegetable matter to the atmosphere the greater portion of every day."

Dr. George M. Beard, of Millport, Clay County, N. Y. "I do discover an adequate cause for the malaria at New Lenox. From my experience I have not the least doubt that this is a hot-bed for promoting, if not generating, malaria." In support of his opinion he said that he had been appointed by the New York State Board of Health to examine an abandoned portion of the Chemung Canal, which had become partly filled up and converted into a marsh. Malaria appeared in the vicinity in 1877, and during the two following years nearly every person in that neighborhood had chills and fever. Drainage was begun in 1881 and completed in 1882, a ditch being dug in the centre of the canal, with the result that, in 1882, only forty-one cases have occurred in that vicinity, only four of these being under the care of physicians.

Dr. John T. Wheeler, of Chatham, N. Y., said: "I think the cause lies in the marsh, and the conditions affecting it." He believed the condition would be improved by drainage, and cited a case within his own knowledge at Chatham, where the drainage of a shallow pond and marsh in 1876 and 1877 was followed by a great diminution in the cases of chills and fever. The first year after drainage the number of cases diminished one half, and now there is not one tenth the former number.

Dr. William Deming, of Hartford, Conn., testified that he lived in Lenox from 1858 to 1867, and never saw or heard of any cases of chills and fever there, except imported ones. He said that he could see conditions favorable to the development of malaria in that valley.

Dr. Charles A. Lindsley, Professor in Medical Department of Yale College, and member of State Board of Health of Connecticut, said, in answer to various questions: "I discover there the conditions usually prevailing where malarial fever prevails. I don't think

I ever saw a pond so favorable for the development of malaria in so marked a degree. For a remedy, I would not obstruct the water by a dam. Intermittent fever has always prevailed most extensively by marshes, but all marshes do not produce it. The primary cause is an unknown poison, which comes in an unknown way, and is only known by its effects. The reason why one swamp is healthy and another not is that the poison exists in one and not the other. Such a dam should never have been erected in such a place as the New Lenox valley."

Dr. Horace S. Fuller, of Hartford, Conn., chairman of Hartford Board of Health, said: "I should say, assuming the facts stated in the question, that the condition here is a sufficient cause for the disease. I have no doubt that this pond would contribute to the prevalence and intensity of the disease."

Dr. Charles F. Folsom, of Boston, member of the National Board of Health, and former Secretary of Massachusetts State Board of Health, said: "I find an adequate cause for the existence of fever and ague. All the known causes for its existence are there." In regard to the "unknown factor," he said that he does not at present accept the germ theory. He has made investigations, but the result has been negative. He believed drainage would relieve this locality, but that effectual drainage would be impossible with the dam as it is. As long as the dam is maintained at its present height, he believed the condition will remain the same as now.

Dr. A. W. Barrows, of Hartford, Conn., said: "The condition and exposure of the ground I consider a cause for the prevalence of the disease. Malaria as a poison has found lodgment there. The conditions here are by the medical profession recognized as developing malaria. In this instance I have no doubt the conditions increase the intensity, prevalence, and persistency of the disease."

Dr. Chauncey M. Field, of Plainfield, N. J.: "I found causes which in my opinion are sufficient for

the disease. These were the changes in the atmosphere produced by the conditions found there." He cited a case at Bound Brook, N. J., where he has lived till within a few months. A railroad built in 1874 dammed up a pond of seventy-five acres, converting the adjacent lands into a morass. The people around it were attacked with chills and fever. The dam was removed in 1880, and the pond drained by ditching. The following year the number of cases greatly diminished. In 1881 another pond, a mile away, was also drained with a similar result, as regards chills and fever in its vicinity.

Col. George E. Waring, of Newport, R. I., Sanitary Engineer and Engineer of Land Drainage: "I discover an adequate cause for the excessive prevalence of malarial fever. I am in accord with the physicians as to the influence of the exposed bottom in producing malaria. I believe, in addition, that the raising of the water level in the neighborhood, saturating the soil near the surface, impeding the outflow of drains and of tributary streams, is an important factor in producing the disease." For remedies, he mentioned two:—

(1.) To excavate the entire soil, so as to make a reservoir with steep banks, and prevent the exposure of the bottom.

(2.) The *simple* remedy — the removal of the dam followed by proper drainage. If the dam were removed, he believed the effect of freshets would be cleansing.

Gen. E. L. Viele, of New York, Consulting Engineer: "There is no doubt in my mind that the sole cause of the disease is the condition of things existing by reason of this dam. The former swamp might have induced cases of fever and ague, but would not have created an epidemic." From his own investigations he was satisfied that the germ theory is correct. The dam saturated large areas of soil, causing decay of vegetation, and exposing decaying matter to the solar rays. In the beds so created the seeds of malarial diseases flourished.

The Defense. — The defendants brought witnesses to show that the reservoir and its vicinity were swampy before the dam was raised in 1870; that a dam of some sort had existed since the first settlement of the country; that the dam rests upon a ledge of rocks which would prevent the complete drainage of the valley if the dam were removed; that the river is subject to semi-annual freshets which would promote a swampy condition, however well drained it might be; that the fluctuations of level are due more to the dams above, holding back the water, than to the Smith Paper Company's dam; that there are other swamps in Lenox which are not malarious, and that malaria prevails irrespective of local conditions. A number of witnesses testified that they had not observed any bad smells. The existence of intermittent fever was admitted by the defense, but not attributed to the dam. On the contrary it was asserted that the dam maintained the water at a more even level than would exist without it, and was therefore a positive benefit, by keeping the bottom more constantly covered with water. The defendants employed an engineer to make a survey and map of the reservoir, from which it appeared that its present area is two hundred and eighty acres, and that, before the dam was raised, it was one hundred acres; that the depth of water above and near the dam is two and one half to five feet when the dam is full; that the depth of mud in the same locality is twelve to fourteen feet; that the distance from this dam to Van Sickler's dam, the next above, is six and one half miles by the map, and thirteen and one half by the river, with a fall between them of twelve feet, and that the area of the "pockets" between the dam and the Pittsfield line is twenty-five acres.

To all of the experts called by the defense the three following questions were put: —

Question I. "Assuming that the dam of the defendants is situated across the Housatonic River in Lee and Lenox; that it is built upon a ledge of rock which crosses

the river about six and one half feet below the top level of the dam; that this dam flows about two hundred and eighty acres of land, a large portion of which was originally swampy, with a muck bottom in many places of from ten to thirty feet in depth; that this dam has been used for the last twelve years for supplying water power, the water not having been drawn down more than twenty-six and one half inches below the crest of the dam, and usually remaining in it at a height of from six to fourteen inches below the crest; that for five years before, there had been in the same location a dam similarly operated, but two feet less in height; that for many years before that time a dam similarly operated had been in the same location, but was about four feet less in height; that prior to 1877 no cases of malarial disease had appeared among the inhabitants residing on the roads nearest to the pond; that, commencing in 1877 or 1878 and continuing to the present time, malarial disease has prevailed to a considerable extent among the inhabitants dwelling around the pond, affecting those residing near and at a distance of a mile or more: Is the appearance or prevalence of the disease, in your opinion, caused by the existence and use of the dam as described?

Each of the seventeen experts called by the defense answered this question in the negative.

Question II. "Would the removal of the dam, leaving a large extent of low and alluvial land covered by freshets, and one hundred acres of marsh uncovered every day, which is kept in a constantly wet condition, remove the disease?"

Each answered this in the negative.

Question III. "If the natural state is as last described, would malarial fevers have prevailed as extensively if the dam had never been erected?"

Each answered this in the affirmative. The additional testimony of the experts may be briefly stated as follows:—

Dr. Francis Bacon, of New Haven, Conn., does not adopt any theory of malaria. "On the germ theory,

the removal of the dam would be a disastrous experiment. There are no conditions for the development of malaria stated definitely by authors, the conditions usually described being everywhere present in a greater or less degree. This epidemic is an invasion from without. The first cases usually appear along water-courses, but the disease soon spreads to higher lands. Malarial fevers are more common on low lands, as are also consumption and other diseases. There are some striking instances of the prevalence of malarial fevers near bodies of water, but this rule has been stated too strongly. I have seen many instances of the wide spread of malarial fevers in conditions noticeably the contrary of wet and marshy. For a remedy, in this case, he would first get rid of the outlying swamps, by drainage, and next prevent the contamination by sewage of the stream above. When asked to name a first-class modern authority who does not in substance say that malarial fevers chiefly prevail in marshy localities, he mentioned Ferguson (who said they are most common in a marsh which has dried up), and Oldham (who attributes them to the effect upon the system of heat and chill).

Dr. F. K. Paddock, of Pittsfield, Mass., testified to the marshy condition of "Wood's Pond," a portion of the reservoir near the dam, before the dam was raised. He said the valley is the natural basin for a very large water-shed, so that freshets produce an extensive overflow. He did not believe the malarial condition could be relieved by drainage, but thought the disease would subside of itself.

Dr. William D. Breck, of Springfield, Mass., testified that in Springfield, the water shops pond has stood for fifty years. About twenty years ago the dam was raised and the pond enlarged, so as to be from one sixteenth to three quarters of a mile in width, and three or four miles in length. This is drawn off in summer, exposing a large amount of vegetable material to decomposition. Up to the present year not a case of intermittent fever has occurred, he said, within

three quarters of a mile of this pond. In the vicinity of Springfield, he said, the disease prevails on high as well as low land. It has prevailed most severely at West Springfield. Everybody in a certain section there had chills and fever three years ago. There has been no alteration of any kind, and there is scarcely a case there now.

Dr. Lyman M. Tuttle, of Holyoke, Mass., said that in Holyoke the water supply is taken from a pond which has been at various times raised six feet. Two years ago it was raised so as to flow one hundred acres. Last year sixty acres of this was bare; this year twenty-five acres. The worst cases of chills and fever were in 1877 and 1878. Since then they have been gradually decreasing, and last year there were very few cases. He has had as many cases on high as on low ground.

Dr. Henry M. Van Devier, of Somerville, N. J., lives four and one quarter miles east of Bound Brook, and knows of the prevalence of intermittent fever there both this year and last. Besides the drainage of the ponds described by Dr. Field, much has been done in the way of local sanitation. A fire in Bound Brook a year ago destroyed the worst part of the town.

Dr. Grove H. Wilson, of Meriden, Conn., member Connecticut State Board of Health: "Intermittent fever first appeared in Meriden in 1865. Cases occurred on high ground, and also on a dry, broad, sandy plain at South Meriden in the vicinity of a dam. There were four cases in 1865, thirty-eight in 1866, and from three hundred to four hundred in 1867. It has prevailed in all parts of the town; is now less prevalent. Typhoid fever disappeared from 1868 to 1878. Since then it is returning, the cases beginning as intermittent, and running into typhoid. I can't see that malaria has been any more prevalent on low than on high ground. The sum of my testimony is, that malaria migrates under a law unknown to me."

Dr. Rufus W. Griswold, Rocky Hill, Conn., stated

that the village of Rocky Hill is on a bluff forty feet above the Connecticut River. Out of a population of 1100, fully one half have suffered from chills and fever since 1872. He thought the disease prevailed as extensively on high as on low ground, and knew of no rules governing the progress of the epidemic.

Dr. Charles Taylor, New Milford, Conn., said that the first cases of chills and fever at New Milford appeared in 1877 on the highest land in the town. In 1878 it appeared in all portions of the village, fully fifty per cent. of the cases on high land. It began to abate in July of last year, and there have been but few new cases the present year. Its disappearance, he believed, is not attributable to drainage. New sewers were put in about the time the fever began to abate, but some of them are not yet connected, and, on one street which was sewerred in 1873, the disease has been as prevalent as in those not sewerred. Water was brought into the town in 1874.

Dr. James J. Averill, Falls Village, Canaan, Conn., said that he had not found any more cases of chills and fever on low than on high land, and that, as far as he knew, the telluric conditions have nothing to do with malaria.

Dr. Isaac R. Sanford, of Sheffield, Mass., has treated malarial fevers at Sheffield, and at Cornwall, Conn. It is his opinion that ponds do not cause malaria, and that there is no local reason why malaria should not appear at one place as well as another.

Dr. Simeon P. Dresser, Hinsdale, Mass., testified that he has treated twenty or thirty cases of chills and fever in the last two years in Hinsdale, Peru, and Washington. There are three reservoirs in Hinsdale, one of three hundred, one of one hundred, and one of fifty or sixty acres. He could not trace any connection between his cases and these reservoirs. He has had cases on hill-tops, and cited those of two wood-choppers in Peru. They had lived there two or three months, and had recently come from France. They went to Hinsdale for their supplies.

Dr. Charles W. Stratton, of Lee, Mass., had treated cases of chills and fever at New Lenox, but could find no local cause.

Dr. Abner M. Smith, of Pittsfield, Mass., believed fever and ague to be a migratory disease, not due to local causes; but said that swampy land favors malaria, the marsh being a passive condition for its development in the same way that rich ground is for the growth of corn. As a general thing, he believed drainage to be beneficial, but there are places in New Lenox where he thought it would be better if the water were raised four feet higher.

Dr. Paul A. Chadbourne, of Amherst, Mass., President of Massachusetts Agricultural College, ex-President of Williams College, etc., testified that he was a professor in the Berkshire and Maine Medical Schools from 1858 to 1862, and gave instruction as to the nature of malaria. He then believed and taught that it is of gaseous nature, due to decomposition of vegetable matter, and heat. He has now abandoned this theory, and has no opinion as to the cause of malaria based upon facts enough to make it of value. He knows of no theory as to its spread through the country which meets all the cases, and would not say that one locality is more favorable to its development than another. He believed this poison is either affected by vegetable decomposition, or it is not. If it is, the dam at New Lenox covers it up; if it is not, the dam does not affect it.

Dr. Charles W. Chamberlain, of Hartford, Conn., Secretary of the Connecticut State Board of Health, has formerly held the marsh theory and the germ theory, but has given them both up. He thinks the reason why more cases of malarial fever are found in river valleys is because the population there is generally more dense than on the hills. He believes it would be impossible so to drain the New Lenox valley as to render it any less liable to chills and fever. He thinks drainage is of value for the prevention of malarial diseases in places where malaria is *endemic*;

but when *epidemic*, drainage is of no value. When his last Report of the State Board of Health of Connecticut was completed in December, 1881, he believed and wrote that malaria was most common on low grounds, near water-courses and ponds; and also that drainage was valuable for arresting it. He has since changed his opinion. His opinion as to the value of drainage was based in part upon the results in the town of Fairfield, Conn. He has since then become convinced that drainage did not diminish the malaria in Fairfield. He does not consider malaria as endemic in Connecticut. To be so, it must exist for more than a generation. Where malaria is epidemic he would not be willing, in any locality, to advise the use of any preventive measures, with the expectation that they would be of any use.

Dr. Charles P. Russell, of New York, member of the New York Board of Health, stated that he excludes the marsh theory, and accepts the theory of "pandemic influence." He does not profess to know anything about the causes of malarial fever. He described a *malarial district* as one where malaria has always existed; a *non-malarial district* as one where it only appears occasionally, and for a limited period. He said that in malarial districts drainage has been found useful, as he had himself seen, in many instances; but, in a non-malarial district, drainage is not beneficial. He could not see that any system of drainage could be put on at New Lenox which would keep the ground dry.

Dr. Nathaniel G. Kierle, of Baltimore, Md., Lecturer on Pathology in the College of Physicians and Surgeons, said that he believed the cause of the intermittent fever at New Lenox is the extension to this section of the widespread influence which is prevalent over the country. He cannot tell the conditions under which malaria exists; it will prevail without conditions. Drainage, he said, is useful only so far as it may affect the general health.

Rebuttal.—Several witnesses were introduced by

the Commonwealth in rebuttal, among them the two following:—

Dr. William G. Hills, of Boston, Mass., Instructor in Chemistry in the Harvard Medical School, testified that he had examined samples of water taken from the Housatonic River, July 6, 1881. The samples were taken at intervals from the South Street iron bridge in Pittsfield to the bridge at the New Lenox depot. Traces of sewerage were found in the water from the South Street bridge as far as Lathers' bridge, but none below that point.

Dr. Samuel D. Brooks, of Springfield, Mass., stated, in reply to Dr. Breck, that chills and fever have prevailed, to his knowledge, about the water shops pond, in Springfield. Twenty cases have occurred in a sparse population, within half a mile of the pond, during the past three years, including nearly all the families in that vicinity. In each of three families living near the dam one to three cases have occurred. Cases from this locality were treated at the City Hospital in July and August last. At West Springfield, in a low, damp locality, there were twenty to thirty virulent cases in a single month in 1881. The cases at Springfield have been mostly on the side bordering the river. The Holyoke dam holds back the water, and exposes the river bottom, at Springfield.

The closing argument for the defense was made by Judge Soule. He called attention to the difference of opinion among the medical and sanitary experts as to the causes of malaria, which rendered it impossible, he contended, to fix the responsibility for the sickness at New Lenox upon the defendant's dam. He quoted from the testimony of nearly all the experts that the malarial poison is introduced from without, and is prevalent in epidemic form over a large region of country. He showed that about half the witnesses had not noticed any bad smells in the vicinity of the reservoir, whence he argued that the fact of smells had been exaggerated. Finally, he referred to the importance of the interests involved, and said that the

result of removing the defendants' dam would be to stop the busy wheels of Lowell and Lawrence.

The District Attorney, in closing for the Commonwealth, quoted from the testimony of witnesses to show that before the dam was raised the amount of boggy land was very small, and produced grass; that the "pockets" were dry, the water clean, and the locality a very healthy one. The raising of the water-level, caused by raising the dam, made the valley swampy, caused water to stagnate in the pockets, and converted a healthy valley into a foul marsh, where malaria found its natural breeding place. The sufferings, loss, and general deterioration of the community, resulting from constantly recurring attacks of fever and ague, were well depicted. The remarkable changes of opinion on the part of certain experts for the defense were not overlooked. He also showed that all examinations of the reservoir, and measurements of the depth and fluctuations of the water, testified on behalf of the defendants, were made during the present year (1882), when the supply of water has been abundant, and the bottom has been hidden from sight. He contrasted this condition with that in 1880, when, in consequence of drought, a great expanse of marshy bottom was for months exposed to the sun and air, and the deeper portions kept alternately wet and drying, which condition is liable at any time to recur.

Judge Brigham, in his charge to the jury, explained those legal and technical points which were calculated to confuse and perplex, and placed the essential points in the case in their clearest light. He did not especially favor either side of the case, but left it for the jury to decide from the evidence whether or not the defendants' dam had been proved a public nuisance and a cause of the prevalence of intermittent fever in its vicinity.

The jury, after being out for twelve hours, brought in a verdict of *not guilty*.