past fiscal year there were 764 boxes of foreign transmissions, 14,496 parcels of domestic exchanges, and 143 boxes of government exchanges handled by the institution. Over two hundred thousand persons visited the Smithsonian institution and the national museum during the year.

MUCH DIFFICULTY has been experienced in accounting for the occurrence of cases of contagious diseases, when, so far as could be ascertained, no exposure to any pre-existing case had occurred. These instances have been regarded by some as evidence of the possibility of their originating spontaneously. M. Verneuil has suggested a theory which, if true, would account for such anomalies. The microbes of disease, according to this view, remain in the skin and other portions of the body in a state of quiescence, and may continue thus inactive for years. By some means, as yet inexplicable, these microbes are aroused to a condition of activity, reproduce themselves in great numbers, and set out on their deadly mission. It is, in the absence of evidence to the contrary, much more reasonable to suppose, that, in the obscure cases in which exposure has not been recognized, such exposure has actually occurred, than to adopt a theory like this, which has not the slightest basis for its existence. If all cases which cannot be traced to their source were to be explained in this way, it would be the rule rather than the exception. A physician who had had large experience in an English small-pox hospital delared that not one case in twenty was capable of being referred to any known source of infection, the disease being ascribed by the patient to cold, fatigue, or some other innocent circumstance. The instance referred to by Sir Thomas Watson, in his essay on 'The abolition of zymotic disease,' should be a constant reminder to those who would refer the appearance of these diseases to a spontaneous origin. In 1829 a prisoner in Millbank penitentiary was attacked with small-pox, under such circumstances that it was thought no possible exposure could have taken place, and for thirty years the case was quoted as proof of the possible spontaneous origin of small-pox. In 1860 the fact for the first time became known that the physician of the penitentiary had come directly from a case of confluent small-pox in a neighboring town to the prisoner's cell, and had undoubtedly been the carrier of the disease.

THE SUBMERGED TREES OF THE COLUMBIA RIVER.

THE attention of many tourists who have traversed the magnificent valley of the Columbia River through the Cascades, has been called to two phenomena which have excited their interest. One is the occurrence of submerged trees in the bed of the river: the other is the slow lateral creeping of the road-bed and track of the Oregon railway and navigation company. During the last summer I had an opportunity to make a brief study of these two subjects, and, as they are likely to prove of increasing interest, it may be worth while to recite the results of the examination.

The Columbia enters the Cascade barrier three or four miles below the Dalles. The platform of that range here has a width of eighty miles. From the Dalles to the Cascade Locks, a distance of over fifty miles, the Columbia flows as a broad, deep, quiet stream, with a sluggish current at low water. Its course resembles that of the Hudson through the highlands; and this fact is at once suggestive, because the passage of rivers through mountain-ranges is generally swift, and broken by many rapids. If it is otherwise, there is almost certainly an interesting reason for it. The Cascade Locks are situated almost exactly on the axis of the Cascade range. Here is a cataract which has always been an insurmountable obstacle to navigation; for, within a distance of a few hundred yards, the river makes a descent of about thirty feet. The government is now building a short canal with large locks, to enable steamboats from below to reach the still waters above. Beginning at a point about a mile and a half above the cataract, the traveller, as he sails up the river, observes many old stubs protruding from the water and from the sand-banks, laid bare during the low stages of the river. They are seen for a distance of thirty miles, recurring at frequent intervals, here clustered thickly together like the piles of an old wharf whose superstructure has decayed and vanished, there with wide intervals between them. During high water these tree-trunks are entirely submerged. An examination of the wood serves to identify them with the living species of fir which form the forests upon the mountains and cliffs round about.

These submerged trees, together with the long still reach of water above, at once suggest that an obstacle has been placed athwart the stream, forming a dam which converted the river-valley above it into a long narrow lake, and that the rising water submerged an old forest of which these trees are the vestiges. Indeed, this is the only explanation which suggests itself. It is strongly

corroborated by many other circumstances which need not be enlarged upon here. No geologist who has visited the locality has ever doubted, so far as I know, that this is, in general form, the true explanation. The only question which arises is about the nature of the obstacle which has dammed the river. Dr. Newberry, who visited the place in 1855 in connection with the Pacific railroad surveys, suggested that it might be due to the slipping of the bank of the river into mid-stream at the Cascades, thus throwing the current upon the southern bank. This idea has diffused itself among the people of the neighborhood, and is frequently spoken of as the *vera causa*. In support of this view, reference is frequently made to the second fact; viz., the slow lateral creeping of the railroad-track on the southern bank of the river.

Desiring to see these phenomena, which seemed to promise much instruction, I made a visit to the place, and devoted a couple of days to their examination. As regards the creeping of the railroad-track, the explanation is patent as soon as the spot is visited. The place is situated on the south bank, about a mile below the cataract. The materials which are creeping are felspathic sands, deposited by the river itself in irregular strata, and now undergoing rapid decomposition and kaolinization. The products of decomposition become a smooth slimy clay; and having a rather steep front toward the river, which is here a swift and powerful torrent, the slope of the bank is a little too steep for stability. The materials, being of a somewhat unctuous character, flow easily with a slow glacier-like motion. The phenomenon, however, is a local one, limited to a stretch of only a few hundred yards, and does not occur anywhere else in the neighborhood, so far as I am aware. The bed-rock beneath it is disclosed, and there is no indication that it participates at all in the motion: on the contrary, the indications are very plain that it does not. It also became evident, that, whatever might be the origin of the obstruction which has backed up the Columbia River for nearly fifty miles, this particular phenomenon has had nothing whatever to do with it; though possibly it may be, and probably is, a remote consequence of the obstruction. It certainly is not the cause.

In looking upon the north bank for indications of a slide which could have precipitated any obstruction across the channel, I was unable to find any. On the contrary, the more carefully the ground was studied, the more difficult it seemed to reconcile this supposition with the facts; for there is no steep elevated ground, from which an obstructing mass could have slidden, nearer than three miles. The river-valley is here very wide, and north of the river lies its ancient flood-plain, which consists of ancient lavas and conglomerates in heavy masses, planed to an approximate rough level, with patches of river-gravel and sands scattered over it. The study of this old flood-plain disclosed facts which seemed to furnish a much more satisfactory solution of the problem.

Beginning at a point about a mile above the cataract, this flood-plain is seen to ascend as we go down stream. If the proper stand-points are selected, this slope in the wrong direction is conspicuous to the unaided eye. But we need not rely upon such a means of verifying the fact, for the relation of the river, as it now runs, to the older flood-plain, tells the story with emphasis. A mile above the rapid the old flood-plain is no more than thirty feet above the water; a mile below the rapid it is about two hundred feet above it; while the fall of the river itself in that interval is not more than forty feet. The inference seems decisive. There has been an uplift of the entire platform athwart the river-valley in the shape of a very flat anticlinal arch. The width or span of this arch is about five and a half miles, and the eastern branch of the flexure is steeper than the western. The displacement is not recent in a historical sense, but it is probably post-glacial.

The effects of such an obstacle would be manifold. Not only would it dam the river, but it would set up below the cataract an action which it is important to consider. A great river, thus obstructed, at once attacks the obstacle with immense power. And the more pronounced the obstacle, the more vigorous the attack. The Columbia has already cut through it a low, inner gorge somewhat similar to that of the Niagara River below the falls. The rapid at the locks is steadily receding, and, if no further displacement occurs, it will probably require not more than a century or two for the river to have cleared a passage deep enough to drain the slack-water reach above. The work of cutting a passage through the obstruction five and a half miles in length is nearly complete. That the dam was once higher than now, is also to be inferred. Year by year it is getting lower. The effect of the obstacle upon the slack water above it is also plain. The flow of the water being retarded, it drops its sediment, and the river-bed is gradually built up. Thus the trees which grew along the flood-plain before the upheaval were not only submerged, but were buried in sand and gravel. When the dam was higher, they were more deeply buried than now. As the dam is gradually cut down, the trees are slowly exhumed again. But it is well known that trees submerged in fresh water and buried

in silt may last for thousands of years. Only when brought into the open air again does the process of decay go on with ordinary rapidity.

It is no light thing for any observer to feel obliged to differ from Dr. Newberry concerning the interpretation of facts in the field. It has been my fortune during the last three years to traverse regions previously trodden by him in New Mexico, Arizona, California, and Oregon, and I have left them with a profound admiration for the sagacity and the wonderful accuracy, rapidity, and penetration with which he mastered the facts. This, I believe, is the only instance in which I have been led to a conclusion differing in any important respect from his.

C. E. DUTTON.

THE HEALTH OF NEW YORK DURING DECEMBER.

THE department of health of the city of New York estimated that the population of the city on Dec. 1 was 1,457,356, or nearly one and one-half millions of inhabitants. Of this number, 3,502 died during the month. This latter statement is not strictly accurate, as in it no account is taken of the natural increase in the population, which, over and above those who die during the month, is not far from 3,300, or more than 100 each day. As compared with November, there were 426 more deaths in December. The greatest mortality on any one day was on the 6th, when 144 persons died. The deaths due to diarrhoeal disease were but 65, the smallest number since the month of April. Of children under five years of age, there were 1,531 deaths, 241 more than in the preceding month. Consumption caused 478 deaths, a slight increase over November; diphtheria, 218 deaths, 30 more than in the previous month; and scarlet-fever, 23 deaths, the identical number of deaths which the November records charge to that disease. As will be seen by a glance at the chart, measles figured very prominently among the mortality factors, causing 271 deaths, or more than scarlet-fever and diphtheria together. During the month of November there were 166 deaths due to measles.

The highest temperature of the month was 55° F., on the 24th at 10 P.M. This is not so high by five degrees as the corresponding month in 1878, which was the lowest maximum for the decade; the average for the ten years being 66.2° F. The minimum reached by the mercury was 13° F., on the 5th at 6 A.M., and again on the 17th at 8 A.M. During no December since 1877 has the thermometer been so low, while the average for the decade is 20.8° F. It will thus be seen that December, 1886, was an unusually cold month as compared with the corresponding month for ten years past. The amount of rainfall was 2.79 inches, including 10¼ inches of snow, 5¼ of which fell in one day, the 5th. During December of 1885, snow fell on but one day, and then in such small quantity as to make its measurement impossible. In the previous year, 10⅝ inches of snow fell in December, and in 1884 the amount was 22½ inches. The average December rainfall for the ten years commencing 1877 was 3.37 inches.

The following tables are of interest as showing the total mortality during the year ending Dec. 31, 1886, as compared with 1885: —

Deaths in New York for 1885 *and* 1886.

	1885.	1886.
Under 5	15,267	16,121
Zymotic	9,100	9,660
Scarlatina	559	371
Measles	736	663
Diphtheria	1,325	1,727
Typhoid	294	325
Diarrhoeal	3,426	3,494
Phthisis pulmonalis	5,196	5,477
Total	35,682	37,351

1886. DEATHS FROM	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Scarlatina	49	43	42	49	44	29	25	15	11	18	23	23
Measles	5	2	8	10	17	26	58	36	21	48	166	271

Scarlet-fever caused fewer deaths in the former than in the latter, while diphtheria and typhoid-fever have been more fatal. Measles has of late excited a good deal of public alarm, and justly so, as shown by the table. While in January it caused but 5 deaths, decreasing to 2 in February, and not notably increasing until the summer, when November set in, the mortality suddenly rose to 166, and continued its upward course in December, carrying off 271 persons. The total mortality of the year was less than in 1885, but more than one-third of it took place in the month of December, and more than two-thirds in the two months of November and December. Consumption (phthisis pulmonalis) is, as usual, at the head of the column of the causes of death. The researches of Koch and others, which have