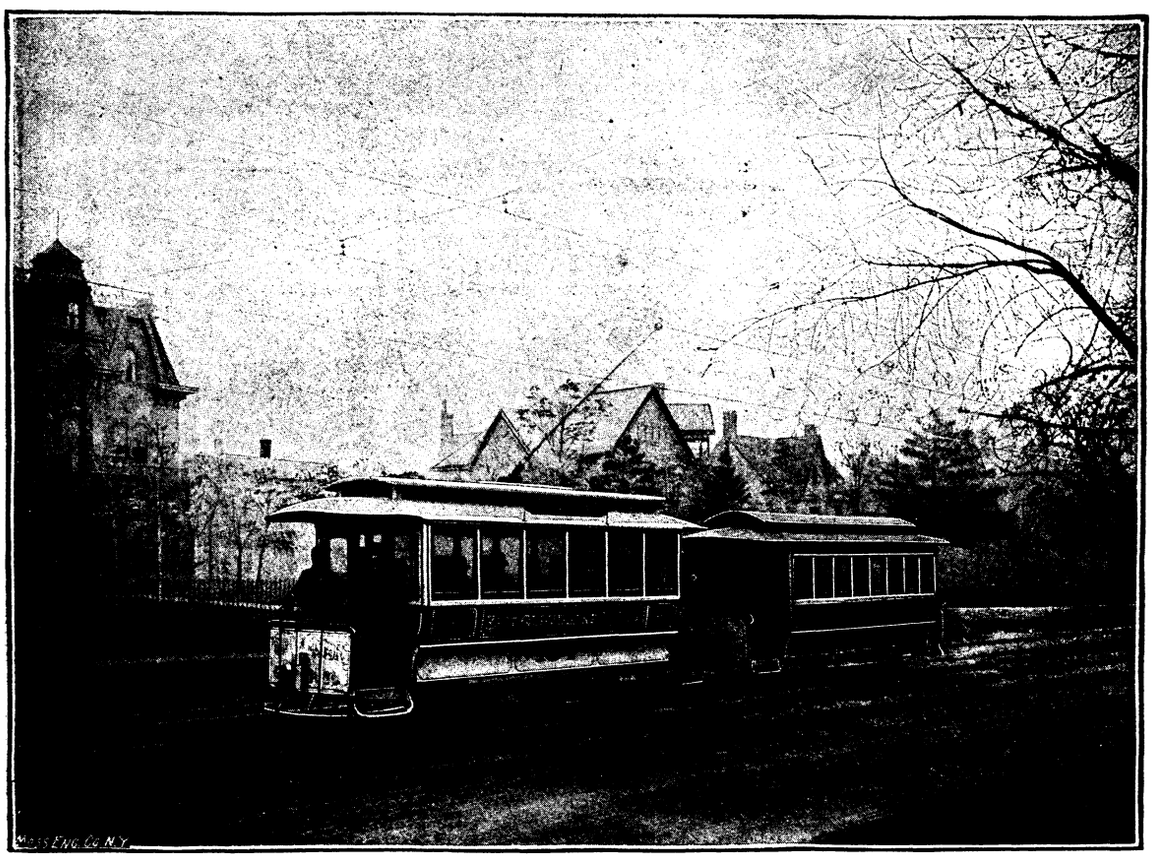
capacity can be easily quadrupled without changing the line of machinery.

Since the road has been in operation, it has been visited by delegations from all sections of the country, of railroad men, who have inspected the operation of the road with the view of introducing the Sprague system upon their own lines. The East Cleveland Railway Company have afforded them every opportunity for inspection, and the result has been that a large number of contracts since the opening of the road have been awarded to the Sprague Company.

In a recent snow-storm which occurred in the city of Cleveland, the tracks were all covered to a depth of from six to eight inches; and the horse-railways in that city were delayed in their trips, and only ran intermittently. The electric road, on the other hand, made regular trips, ploughing its own way through the drifts, and successfully demonstrating the advantages of electrical over animal power. The Sprague Company are now equipping snow-ploughs, to be operated by powerful electric motors, for this road; so that no snow, however deep, will be able to stop the running of the cars. It is estimated that these electric ploughs will clear the tracks quicker than an ordinary plough drawn by a dozen horses.



SPRAGUE ELECTRIC RAILWAY AT CLEVELAND, O.

Among the cities which are coming into prominence in the Southern States, there is none probably in which the application of electricity for industrial purposes has received greater attention, and been more extensively applied, than in Asheville, N.C. We gave a description, in a recent issue, of the successful opening of the electric railway which connects the city of Asheville with the railroad-depot, distant about a couple of miles, which has been running successfully.

Although possessing a successful railway, the attention of the Asheville citizens in regard to electric power has not been devoted exclusively to railway-work; but there are a number of stationary motors in the city which are giving satisfaction. Both the Asheville *Citizen* and *Country Homes* are printed by electric power. On account of the perfect regularity of speed which is the characteristic of these motors, on account of their differential winding, they are peculiarly adapted to the operation of printing-presses. There are also several machine-shops, carpenter-shops, and elevators which are using the Sprague motors.

HEALTH MATTERS.

Climate of Colorado.

DR. WALTER A. JAYNE presented an exceedingly interesting paper, on "The Climate of Colorado and its Effects," to the American Climatological Association at its recent meeting. In his paper he discusses the air of Colorado both as to atmospheric pressure and dryness. The annual rainfall is between fifteen and sixteen inches, — a small amount as compared with the United States in general. The winds are at times disagreeable and annoying by reason of the dust, but no injurious effects result from them except physical discomfort. In concluding his paper, he says that there are one or two very simple rules which all consumptives coming to high altitudes should understand and observe, since, because of the unusual characteristics of the climate, they are so important that neglect of them will retard recovery, and in advanced cases may destroy the slight chance still remaining to the invalid of receiving benefit from the change, and lead to a fatal result.

1. The approach to elevated regions should be gradual and by easy stages, not, in these days of Pullman coaches, to spare fatigue, but in advanced cases with limited lung space, and in those with fever and considerable activity of the disease, to avoid over-taxing the capacity of the lung to adapt itself to the rarefied atmosphere. For the same reason the invalid should, for a time after arrival, either take very moderate exercise or none at all.

2. The residence should be continuous and prolonged.

He is confident, that, were the first of these rules more generally followed, we should hear far less of the ill effects of high altitudes,

and be able to note a larger percentage of advanced cases as improved; and if the second was faithfully observed, there would be more cures and fewer relapses.

Overcoats.

The custom in this country is so prevalent of wearing heavy overcoats, whether one is outdoors or seated in overheated cars, that the remarks of the *London Lancet* on this useful garment will probably find interested readers. The teaching of modern science and of ancient custom goes to show that heat-production within the body has much to do with the tissue changes concerned in muscular activity and with healthy digestion. It is conserved by warm and moderate, wasted in evaporation by excessive, clothing. Finally, by a simple nervous re-action, it is increased after the contact of external cold.

It follows from these observations, that, if we be so clad with comfortable underclothing that surface perspiration is not formed in excess, and is rapidly removed, one great cause of chill — sudden evaporation — is done away with. Outer cold, then, provided it is not too severe, only touches, as it were, the spring of the heat-making metabolism, and, exciting an elastic rebound in the chain of vaso-motor fibres, awakens that oxidative action by which every tissue is made to yield its share of heat to the body. This bracing influence is lost wholly or partly to those who are too heavily clothed, and in its place we may have a dangerous excess of surface heat. It is for this reason that the *Lancet* has before protested, as it now does, against the indiscriminate use of the thick and heavy overcoat; and it thinks that men in fairly robust condition, especially if young, should be clad warmly next the skin, and wear either a light top coat or none at all.

There can be no doubt that the habitual use of great-coats is indirectly accountable for the chills which they are intended to prevent. Were the overcoat worn continuously, it might attain its object. Its intermittent use, even when ample underclothing is worn, affords no solid guaranty of safety, but rather the reverse. The man of sedentary habits has especial need to remember this. He emerges daily from a warm breakfast-room clothed in his ordinary winter garments, with probably woollen underwear, and over all the heavy ulster or top coat. After a short walk he finds that the sense of warmth he began with is more than maintained. He arrives at his office or place of business, and off goes the overcoat, though the air of the newly opened room is as cold as that without, and draughty in addition. During the day perhaps he travels to and from adjacent business-houses, wearing only his house clothing. The overcoat is laid aside till closing time reminds him of the journey home. The frequent result is, that somehow, between the hours of his departure and return, he is chilled. No doubt he would run as great a risk if, lightly clad, he were to face the rigor of a winter day. In this case, however, exercise and habit might do much to develop the power of endurance, and there would, at all events, be less danger of sudden cold acting upon a freely perspiring surface. Woollen underclothing represents a state of healthy comfort intermediate between these extremes, and more resistant to chill than either.

In commending its use, however, the *Lancet* does not assert that the influence of age and constitution is to be overlooked. Youth can oppose a power of resistance to depressing agencies which does not reside in the worn-out nerve-centres of a riper age. Similarly, that elastic re-action which characterizes the nervous and sanguine types is not to be looked for in the lax tissues of the lymphatic. The weaker physique naturally calls for fuller protection than the stronger; and any rule requiring the disuse of the overcoat should allow of reasonable exceptions in favor of the old and constitutionally feeble. Unusual severity of weather, especially if associated with night air and the loss of sleep which this implies, is another condition which might well constitute an exception. In such a case we are compelled to add some form of overcoat to the ordinary amount of clothing. Some parts of the body — for example, the chest, throat, and feet — are certainly more susceptible to cold than others. As a useful safeguard, cold or tepid bathing of such parts is in merited favor. The custom so common with many persons, especially women, of walking out in thin-soled boots, often plays an important part in catching cold. The progress of time and of rational thought may be expected to bring in a more comfortable arrangement by clothing the foot in woollen hosiery and a stouter boot.

SWINE OR MAN. — It is said that more money has been spent by the United States Government in the investigation of the diseases which affect swine than of those which affect the human species.

AIR AND WATER ANALYSES. — Modern investigators are not satisfied with chemical analyses of drinking-water and air as tests of their purity, but demand a biological test as well. Bujwid has recently been examining the air and water of the city of Warsaw by the most modern methods. He states that pathogenic micro-organisms are ordinarily found in the air: it therefore follows that disinfection of hospitals and operating-rooms is of no practical value or significance. Certain micro-organisms which may be found in the air Bujwid failed to find during investigations over a period of three years. Of those found in the air non-pathogenic, but one not yet known gives rise to suppuration in mice and rabbits: the rest are innocuous. The number of bacteria in the air is subject to great variations, and depends largely upon the winds and conditions of habitation. After a rain or snow the number is smaller. Basement rooms and abodes contain the largest numbers. On an average, one hundred thousand times more bacteria are found in water than in air. Good water should not contain more than three hundred rod bacteria to the cubic centimetre (0.06 of a cubic inch). Different results were obtained from the examinations of water from various springs and running streams. Above the city the water contained about three hundred bacteria, in the midst of the town over fifty thousand, to the cubic centimetre. Bujwid found no pathogenic micro-organisms whatever. After filtering this same water (sand-filters have recently been introduced into Warsaw), the proportion of bacteria diminished from twenty to sixty. Spring water contains a still larger number of micro-organisms. In the discussion which followed a presentation of these views by Bujwid, Barzyci stated that in a village near the city of Rzeszow, having no spring, a peasant living by the creek was affected with typhoid. His linen was washed in the stream. Shortly many of the inhabitants who obtained their drinking-water from the creek, and who lived below the house in question, likewise sickened with typhoid: all living above escaped.

BALDNESS. — As our readers are already aware from the discussions which have already appeared in *Science*, various theories have been proposed to account for the baldness which prevails to such an extent in civilized countries. A Swiss writer attributes it to a microscopic fungus, which, however, he has not as yet been able to describe or indeed to discover. He thinks that barbers should be compelled to disinfect their combs and brushes.

BOSTON MILK-SUPPLY. — In no city of the United States is the food-supply more carefully watched than in Boston. The inspector of milk of that city has just made his thirtieth annual report, which covers the work performed by him during the year 1888. From this report it appears that 915,867 more gallons of milk were sold in 1888 than in 1887, and, notwithstanding this increase, the quality was much better. In 1883, 60 per cent of the milk examined was found to be below the standard fixed by law. In 1884, only 40 per cent was below; in 1885, 30 per cent; in 1886, 18 per cent; in 1887, 12 per cent; and in 1888, but 8 per cent. The inspector justly claims this great improvement as the result of the labors of his department.

THE MICROBE OF MALARIA. — The evidence is accumulating that the microbe of malaria which was described by Laveran is the cause of intermittent fever. At a recent meeting of the French Academy of Sciences, Professor Bouchard expressed the opinion that Laveran's claim had been substantiated.

BOOKS FROM CIRCULATING LIBRARIES. — Subscribers of public libraries have of late been warned against the danger of contracting contagious diseases from books which have been in houses where these diseases existed at the time. The health authorities of Dresden have been examining the dust which had accumulated on unused volumes, with reference to the discovery of

micro-organisms, and especially the bacillus of tuberculosis. They report that they have found nothing of a harmful character, and have arrived at the conclusion that the danger of spreading infection by means of circulating libraries is very slight. They recommend, however, that books should be well dusted before being read, and that the fingers should not be wet in the mouth in order to turn the leaves. If the experiment is correctly reported, the authorities of Dresden are not justified in deducing any such inferences. The material which may accumulate in the form of dust on "unused books," and that which may collect on books in infected rooms, are of a totally different character. To determine the danger from the use of these latter books, another series of experiments must be made, and, in the present state of our knowledge as to the germs of infectious diseases, not much could be expected even from such experiments. The germs of measles, scarlet-fever, and small-pox, which diseases are known to be propagated by articles of wearing-apparel which have been exposed in infected rooms, have never been recognized, and the search for them in the dust which has collected on books would doubtless be as futile as it has been elsewhere; but there is no *a priori* reason why such books might not be carriers of contagion equally with clothing and furniture. The advice given to dust books well before reading them, in order to avoid danger, is, if the Dresden authorities are correct in saying that such dust is harmless, entirely unnecessary, while, if the dust should be infected, it would be the best possible way to spread the infection. Books which have been in an infected room, especially if they have been opened, should be destroyed. It is practically impossible to disinfect them.

THE LOCO-WEED. — Readers of *Science* have from time to time written us regarding the "loco-weed" and its poisonous properties, and we have recorded every thing which could be learned about its effects on animals and men. In Vol. IX. p. 32, we referred to a curious affection which exists among horses in north-western Texas, known as "grass-staggers," which is caused by eating the "loco-weed," which gives rise to the saying that the horses are "locoed." The Indians believe that an insect is the cause of the disease, but competent investigators have failed to find any insect life upon the plant. In Idaho the same disease is found, and is treated by amputation of the tails of the affected animals (*Science*, ix. p. 306). Francis H. Snow of Lawrence, Kan. (*Science*, ix. p. 92), refers to observations which tend to support the idea that insects are connected with the causation of the disease. Professor Sayre of the University of Kansas was said to be making an exhaustive study of the "loco" problem. Dr. Mary Gage Day of Wichita, Kan., has recently made a number of experiments upon healthy cats to test the toxic qualities of the weed, and has communicated the results to the New York *Medical Journal*. The "loco-weed" is a popular name given to *Astragalus mollissimus* and *Oxytropis Lamberti*. In the experiments of Dr. Day, a decoction of the roots, leaves, and stems of plants gathered in September was used. The result of feeding the decoction to a kitten was to produce diarrhœa, vomiting, convulsions, paralysis, and, at the end of twenty days, death. After death, ulcers were found in the stomach and intestine. In another experiment with a more concentrated decoction, on a full-grown cat, the symptoms were much the same, the cat dying on the thirteenth day. Professor Vaughan of the University of Michigan made experiments on frogs and kittens, injecting the decoction under the skin, producing death. With reference to the character of the plants at different seasons of the year, Dr. Day is convinced, by numerous experiments on material gathered in different months, that the greatest amount of poison is present in the autumn and winter, after the seeds have ripened, and that the explanation of the ranchmen, that the "loco" disease is more prevalent in the autumn and winter because the animals eat more of the weed from the scarcity of other food, is only a partial explanation. The greater toxicity of the plants at that season she believes to be a very important element. From the facts and experiments detailed, the following conclusions are drawn: 1. There is some poison in "loco-weed" which may cause the illness, and, if sufficient quantity is taken, the death, of an animal. 2. This poison is contained in the decoction obtained from the plants, and, by systematically feeding it to healthy cats, cases of "loco" disease may be produced. 3. From the large quantity of the plant or the decoction required to produce the disease, the poison must be weak, or, if strong, it must be in very small amount.

SCIENTIFIC NEWS IN WASHINGTON.

Effect of Permanent Moisture on Certain Forest-Trees.[1]

IN 1874, while engaged in the work of the Kentucky Geological Survey in the lowland district near the Mississippi, I had an opportunity of making some inquiries concerning the knees of the swamp cypress, which led me to the supposition that these peculiar processes from the roots served in some manner to aerate the sap. Their functional importance was indicated by the fact that whenever their summits were covered by water, as by the sinking of the ground on which they stood in the earthquake of 1811, or by the artificial elevation of the water during the summer season in mill-ponds, the trees to which they belonged inevitably died. On the other hand, the trees which grew upon high ground failed to develop any knee processes beyond slight tuberosities on the upper side of their main roots. The results of this and other inquiries were put in press about twelve years ago, but were first published in Vol. XVI. No. 1, of the "Memoirs of the Museum of Comparative Zoölogy at Harvard College," June, 1887. An incidental reference to the fact was made in the third volume of the reports of progress of the Kentucky Geological Survey (1877), p. 74.

Since that time I have incidentally observed certain other phenomena connected with the conditions of our forest-trees in swamps, which, so far as my knowledge goes, have not received adequate attention. I have hoped to find an opportunity to make a more careful inquiry into the subject, but this does not seem possible. I therefore venture to give the results of the very incomplete investigation in this letter.

As it seemed unlikely that the cypress should be the only tree to develop root processes intended to fit the plant for semi-aquatic life, I searched for similar excrescences on the roots of our other forest-trees which find their station in wet lands. Until within a few months, I have been unable to find any other species in which the processes were sufficiently developed to be classed in importance with the cypress knees. A very little inquiry showed me that all trees which find a station in very wet lands have their large roots nearer the surface of the soil than in the upland districts, and several species exhibit a tendency to have their roots at certain points actually on or above the soil. Observations in the Mississippi swamps seem to show that our ordinary tupelo or sour gum (*Nyssa uniflora*, Walt.) exhibited rather more of this tendency than any other species, and I suspected that under favorable circumstances it might show a peculiar adaptation to its swampy surroundings. Observations in the Mississippi valley were difficult, for the reason that the pools beneath which the roots of the trees extend dry out during the summer droughts. Recently, however, in the Dismal Swamp district of Virginia and North Carolina, I found many areas occupied by the tupelo which did not become desiccated in the dry seasons. In all such positions, the tree, when of mature growth, has a peculiar feature in its roots which serves in an admirable way to accomplish the results attained by the cypress knees, though the method by which it is attained is peculiar. In place of forming a spur-like process upon the root, the root itself arches upward in such a manner that the upper part of the bow rises above the level of the water in the growing season. Where the depth of water is slight, the arch may be indistinctly developed. Where the water stands a foot or more in depth, the arch becomes very much elevated. I found specimens in which the roots assumed a horseshoe-like curve, rising to the altitude of three feet above the soil, the distance apart of the roots at their base not exceeding a foot. These roots commonly have a diameter of from three to six inches. The fact that they rise above the level of the water in the growing season is often attested by a considerable growth of annual plants which have become planted in the crevices of the bark.

These roots of the *Nyssa* do not appear to develop their arches until the tree attains a considerable size. I found no trace of them

[1] Preliminary notice of some results of the United States Geological Survey examination of swamp-lands, by N. S. Shaler.