of the peculiar germ living and producing harmful effects is very small. This broad statement is applicable to all kinds of infectious intestinal disease.

Very interesting is the study of tuberculosis. According to the latest authorities, consumption is dependent upon three factors: First, decreased vitality, antagonizing powers, or what you will. This we have spoken of, and in what manner it is induced or transmitted. Second, an active inflamatory condition. This may be pneumonia, bronchitis, laryngitis, or the like. Third, the presence of the bacillus tuberculosis. Without these three there can be no consumption. It is the usual thing, in the examination in the dead-house, to find evidences in the lungs that the subject had at some time a commencing consumption, but the vitality had been so great that nature had encapsulated the infected part with tissue of high vitality and the condition became inocuous. The fatality from tuberculosis, then, is dependent on a decreased vitality, and we must look to a proper kind of diet and a consequent increase in the general antagonizing power of the body for the remedy.

Those diseases dependent on or induced by suboxidation are very many. A few only will be mentioned by way of illustration. If we take a proteid molecule ($C_{72}H_{112}N_{18}O_{22}S$) and attack it by 139 molecules of oxygen we will have the normal oxidation and the usual excretory products given off, namely, urea, uric acid, kreatinine, carbon dioxide, water, and a molecule of sulphuric acid appearing as a sulphate. If attacked by 136 oxygens only we have the same but with an increase in the amount of uric acid. At this stage we have a condition present which is at the bottom, probably, of more diseases than any other. So that we consider the presence of an abnormal quantity of this acid in the renal excretion to show a condition of suboxidation of the nitrogenous elements of the food-stuffs. Had the nutritive compounds been completely transformed within the system they would have been eliminated as urea — a compound very soluble and easily handled by the organism in proper amounts. But such not being the case we find that the failure in its elimination gives us many diseases. People who have this condition are greatly disposed, by the antecedents or isomers of this acid in the tissues, to congestive conditions of all the structures where such compounds exist, but more especially the naso-pharyngeal mucous membrane and the intramuscular planes. They suffer from dyspepsia, functional disturbance of the liver, palpitation of and peculiar feelings about the heart, bronchial affections, often iritis, eczema, and a number of peculiar symptoms generally known by the obscure term, neurasthenia. They are most sensitive to changes in temperature and atmospheric density, declaring they cannot live in certain localities, and, in fact, suffer from general bodily derangement. We look at uricæmia in this wider and more general way and recognize its influence in connection with many of the vague abnormalities of childhood. Some observers have found as high as 30 per cent of the children — especially those confined at school — troubled with neurasthenic and other incomplete expressions of defective metabolic action. A very large percentage of the nervousness and ill-health of young women has this condition as one of their chief ætiological factors.

In an article on the "Pathology and Rational Treatment of the Uric Acid Condition," in Merck's Bulletin of last year, it was shown that the prevalence of uricæmia was very great and because of the almost universal habit of partaking of food whose nature as a nutrient compound is bad and whose quantity far exceeds the physiological demands, especially during early youth, some degree of uricæmia under twenty years is almost the general rule. Let us look at the frequency of uric-acid calculi and the age when they most frequently occur. From a large number of cases of calculi found in the bladder by English observers, 83 per cent were of uric acid. In America the percentage is about 78. If we take the cases of Civiale, Coulson, and Thompson, numbering in all 10,467, we find that 6,524 or 62⅓ per cent were under twenty years of age. In the statistics of 8,574 cases in this country, 4,986 or 58 per cent were under twenty.

Returning to the same method of investigation, we find that if only 129 oxygen elements are used we have the condition known as oxaluria. If we fall still further below the normal and have but 94 elements of oxygen to attack the proteid we have lactic acid formed, and rheumatism, neuralgia and the like as the result. If we have but 76 elements to attack the proteid molecules, we have as one of the products of incomplete metamorphosis glucose, and thus either temporary or permanent diabetes.

Has not enough been said to show that suboxidation is a dangerous if not fatal condition? Why should we multiply difficult chemical explanations for known clinical and every-day facts?

Bright's diseases are probably more often caused by the same condition than any other. You really call upon the kidneys to do more work than normally in taking care of increased quantities of refuse matter because of the large quantity of food ingested and at the same time place it upon decreased nutrition. The result is, you have first a functional derangement which it is possible to disperse, and then an organic condition which it is impossible to remedy. Those who understand the science of proper feeding and apply that which they know to their cases of Bright's get results satisfactory both to their patients and themselves, otherwise their patients inevitably get worse and die early.

The accumulation of fat in the tissues, or obesity, is a pathological or diseased condition. All the fat that is added to the body above five per cent of the total bodily weight is usually the result of an abnormal physiological condition of the nutritive system. Obesity is the result of an incomplete oxidation of the proteids with the formation of fat as one of the by-products resulting from an imperfect metabolism of such bodies. This is substantiated by fully recognized chemical laws. It is Professor W. H. Porter who says that "while this abnormal amount of adipose tissue may perhaps to the ordinary eye beautify the macroscopic appearance of the individual, it is no guarantee of a sounder constitution or a higher vitality in the microscopic and chemical construction of the bodily tissues, generally it indicates the reverse or that a pathological condition is hidden beneath this superficial beauty."

We have not spoken of a large number of diseases in which an incorrect diet is an important factor in their continuance, space will not allow; enough has been said, however, to call attention to certain facts of great importance. First, we should understand which kind of diet is the best suited to furnish to the body the elements which it requires daily; second, the constituents of the diet should be such as will give nourishment to the body and use but a minimum of vital force in its preparation; third, the quantity ingested daily should be such as will maintain an equilibrium between production and destruction, this is determined by a study of the renal excretion; fourth, auto-intoxication by products of decomposition and fermentation in the intestines is prevented by the application of the above facts; fifth, entrance of deleterious agents into the entero-hepatic circulation is prevented by preventing hepatic derangement; sixth, suboxidation is a dangerous condition, and has as its sequelæ a definite line of disease processes.

In conclusion, we desire to impress upon the mind that there exists a very intimate relation between imperfect alimentation and organic or functional derangement, and that as we are understanding more about diet and the proper food principles forming it each year, we appreciate its enormous importance.

We are rewarded when supplying a scientific course of diet and regulating the same by a conscientious study of the renal excretion, by seeing abnormal processes of the body give place to normal, acute diseases decrease in mortality, convalescence speedy and complete, and chronic conditions ameliorated, and comfort replacing pain and annoyance.

SNOW-ROLLERS.

BY DR. E. W. CLAYPOLE, AKRON, OHIO.

IN the early part of last year I received from a former student a letter telling me that in the place where he is now residing (Milledgeville, Fayette County, O.) a very curious phenomenon had been observed. After a light fall of snow the ground was strewn with small balls, light and fragile, the like of which no one could recollect having previously seen.

Recognizing from his letter that he was writing of a case of the formation of the rather rare "snow-rollers," I wrote immediately requesting details, and received in reply the following letter: —

MILLEDGEVILLE, O., Feb. 7, 1892.

PROFESSOR E. W. CLAYPOLE.

Dear Sir: On the morning of Jan. 30, 1892, a curious phenomenon was witnessed here — snow-rollers — of which I send account. I found it difficult to obtain trustworthy information as regards extent of area. None of the city papers spoke of that, and only quoted from local county papers, the correspondents of which furnished all that I saw regarding the occurrence. The rollers may have extended over a very large area in southern Ohio. They were formed in the streets of Wilmington, in Clinton County, though they are not mentioned in the adjoining country. Wilmington is twenty miles from here. No one residing a mile from here, in any direction, with whom I have spoken, witnessed the phenomenon.

People here are divided in opinion whether they fell or were formed by rolling. Our local editors alluded to their correspondents who spoke of the balls as bearers of "fish-stories," refusing to believe them.

The morning of Jan. 30, 1892, presented in this vicinity a phenomenon of nature as striking as it is rare. The surrounding clean, level fields were covered with balls of snow, varying in size from three to five inches long and from one to two inches wide. Wheat-fields and meadows abounded with these balls, and suggested, at first sight, that a troop of school-boys had been having a battle with the snow.

Two fields, of thirty acres each, that came under my observation (one a new-sown wheat-field and the other a meadow) were literally covered with these "snow-rollers," there being at least 500 on the acre. Roadsides and lots contained a few, and, what is remarkable in this connection, I noticed them on housetops and straw-ricks.

On close investigation, I found the balls to be uniformly light and fragile, so that to lift one and preserve its form was impossible. Some were oblong, some almost spherical, while others resembled a tea-cup or small bowl.

There were no tracks behind them, or, if these had been made, the falling snow had obliterated them.

The accompanying weather conditions were as follows: The ground had been covered with snow for three weeks. A crust had formed on the top, thick and firm enough in places to bear up a person. This thawed a little during the afternoon of the 29th. The ensuing night was warm, the mercury registering 40° F. By ten o'clock a brisk wind was blowing, which increased in velocity, and soon the snow began to fall in large, moist flakes. The morning showed that about a half-inch had fallen on the crust, and on this lay the balls.

The phenomenon was reported from several places in this vicinity, chiefly in Fayette County, and from Clinton County, which adjoins it on the west, but nowhere did the rollers extend uninterruptedly over any great area. W. S. FORD.

In reply to a later enquiry, Mr. Ford informed me that no one took a photograph of this interesting occurrence. This is much to be regretted, as I am not aware that a view of any kind is in existence showing these snow-rollers. The chance of obtaining a unique negative was lost.

I cannot say if the phenomenon here described is really so rare as the scarcity of published accounts would lead us to infer. Perhaps the publication of this note may lead to clearer knowledge on this point.

Not having access to the earlier scientific literature on the subject, I am able to quote only a few instances of snow-rollers. Several years ago there was a short correspondence in the columns of *Nature*, from which I condense the following statements.

In the issue of March 29, 1883, Mr. G. J. Symons wrote that he believed that the first recorded account of the phenomenon appeared in an early number of the Philosophical Transactions, from the pen of Dr. Clouston of Sandwich Manse, in the Orkney Islands.

Mr. Symons adds that he has heard of but one case in England. This was reported by Admiral W. F. Grey in the *Meteorological Magazine* for May, 1876. It occurred on his lawn in the south-east of England, and the balls or rollers varied from the size of an ordinary snow-ball to that of a cubic foot, and each one left a decided track to the leeward. In this case they were seen to form in the evening.

The correspondence above quoted was called out by a letter from Mr. S. Hart of Trinity College, Hartford, Conn., to the editor of *Nature*, mentioning that on Tuesday evening, Feb. 22, 1883, a light, damp snow fell on the crust that had formed over the earlier snowfall, and that a brisk wind sprang up after midnight. Next morning on the college campus and in the adjoining park and empty lots numbers of natural snow-balls, spherical and cylindrical, from twelve to eighteen inches in diameter, and hollow at both ends, were strewn over the ground. Behind them were visible to leeward tracks 25 or 30 feet long in the new-fallen snow. The rollers were so light and fragile that handling was impossible. A few of them could be traced 60 feet and some had even been rolled up hill. They were especially fine on the frozen Connecticut River.

The same writer also reports a similar occurrence in New Jersey in 1808, when the rollers were seen to form in the day-time, and extended over at least 400 square miles of country.

In a subsequent letter, printed in the number of *Nature* for March 6, 1884, Mr. Hart returns to the subject and reports a repetition of the phenomenon in Oneida and Herkimer Counties, in New York, on Tuesday, Jan. 22, 1884, adding that the rollers were of the same size as in the former case, but were in some instances firm enough to be picked up and handled without crumbling. This is, so far as I know, the only occurrence in which this has been reported possible.

The wide experience of Mr. Symons is sufficient ground for assuming that the formation of snow-rollers is not frequent in Great Britain, and the scarcity of records here leads to a similar conclusion for this country. Further reports on the subject are desirable.

LETTERS TO THE EDITOR.

*** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

Some Detailed Evidence of an Ice-Age Man in Eastern America.

MR. HOLMES'S statement in his communication to *Science* for Jan. 20, that "If there was, as is claimed, an ice-age man or at any rate a palæolithic man in eastern America, the evidence so far collected in support of these propositions is so unsatisfactory and in such a state of utter chaos that the investigation must practically begin anew," should not be allowed to go unchallenged. I will content myself, however, by giving the details in a single case, namely, those concerning the implement which was found in 1889 by Mr. W. C. Mills at Newcomerstown, Ohio, and which is now in the collection of the Western Reserve Historical Society in Cleveland.

Though the discovery was made in October, 1889, it was not brought to public notice until the next spring, when I chanced to meet Mr. Mills and learned about it. He then forwarded it to me, when its exact resemblance in form and finishing to an implement which I have in my own collection, that was obtained by Dr. Evans of London at Amiens, France, greatly impressed me. I forwarded it immediately to Professor H. W. Haynes of Boston, whose expert judgment is second to that of no other person in America, or indeed of the world. Professor Haynes exhibited it at the meeting of the Boston Society of Natural History on May 7, 1890, and his account was published in the Proceedings of that evening. In conclusion, after having enumerated its distinctive characteristics, he said, "I desire to express most emphatically my belief in the genuineness and age of this Newcomerstown implement, as well as to call attention to the close re-