and the adverse opinion still expressed upon it by many, which may be safely called the opinion of ignorance, will soon be heard no more.

Another class needs some knowledge of bacterial life. This includes all, — the father, the mother, the teacher, the citizen. Whoever has charge of human life should know something of the nature of infection with its manifold ways, of the necessity of disinfection and the means within reach. Education in such subjects is the only means of strengthening our present lax and indifferent spirit with reference to the public health. For this third and largest class a brief course of lectures, with demonstrations that will impress firmly the reality of the vital force inherent in bacteria, would be amply sufficient. What is needed is a certain attitude, an intelligent receptivity of the younger generations which will be favorable to all proper measures for the protection of public and private health, and which will promote in every way the study of the laws that underlie it.

The teaching of hygiene is taking root rapidly and firmly in the continental universities, and bacteriology is intrusted to such chairs. Our own higher institutions are beginning to realize the need of such instruction. As yet we have not gotten far beyond muscle, but that is a very good beginning. Bacteriology, though linked to hygiene as a branch of study, should, for the time being, find its place without difficulty in the biological laboratory.

THEOBALD SMITH.

Washington, D.C., Jan. 23.

## Queries.

25. TREE TEMPERATURES. — In speaking with two farmers, each of more than ordinary intelligence, one last winter and another this, on the subject of temperature, they asserted that a thermometer hung against the trunk of a living tree of any size would not register as low as if suspended (as one made the observation) from a wire clothes-line, and the other from a pine post. Is this a fact?

D. LICHTY.

Rockford, Ill., Jan. 23.

26. THE EARTH'S ROTATION AS AFFECTING RAILWAY-TRAINS. — In Maury's 'Physical Geography of the Sea,' edition 1855, p. 39, paragraph 43 reads as follows: "Take for illustration a railroad that runs north and south. It is well known to engineers that when the cars are running north on such a road, their tendency is to run off the east side; but when the train is running south, their tendency is to run off on the west side of the track, i.e., always on the right-hand side. Whether the road be one mile or one hundred miles in length, the effect of diurnal rotation is the same; and the tendency to run off as you cross a given parallel at a stated rate of speed is the same, whether the road be long or short, the tendency to fly the track being in proportion to the speed of the trains, and not at all in proportion to the length of the road." Now, this article is quoted by many scientific authorities. It goes the yearly round of papers and periodicals. Is it true? To prove or disprove it, I have sent out a circular letter, to get from those familiar with railroads the facts on the subject. If it is true on a single-track road running north and south, with the same number of trains passing each way, the rails, and flanges of cars, not turned, would be equally worn. On double-track, the east rail north-bound, and west rail south-bound, would be most worn. Cars that were not turned would have their wheels and flanges equally worn; but locomotives, if "the tendency is always to the right," would have their right-hand flanges most worn. To facilitate the inquiry, I ask a list of questions. The questions are not asked for any personal advantage, but as of general scientific interest. 1. Do cars, when running north, have a tendency toward the east? 2. Do cars, when running south, have a tendency toward the west? 3. Have any instances come under your observation that indicate, by any wear of rails, of journals, of boxes, of flanges, or any part of a railway equipment, that "a train going north has a tendency to run off on the east side, but when the train is going south the tendency is to run off on the west side of the track"? 4. General remarks, with detailed description, — evidence *pro* or *con* from engines or rails.

JOHN C. GOODRIDGE, JR.

New York, Jan. 28.

## Answers.

21. GLOBULAR LIGHTNING. — Governor Talmadge of Wisconsin lived in a two-story log-house on a level prairie near Fond du Lac, a short distance from a ridge of limestone that rose abruptly from the prairie. The upper story of the house had two rooms, with windows and doors forming a straight line through the house, and also an entry or hall between the rooms. One afternoon, when the windows and doors were open to allow a draught of air through the rooms, a ball, apparently a foot in diameter, floated slowly in one window, past Miss Talmadge, through the hall, and probably out of the other window, as the servant-girl ran screaming from that room. About the same time a barn near the house was struck and consumed. I could learn nothing further that was definite from those who saw the ball, when I reached the house.

T. MCDONOUGH.

Montclair, N.J., Jan. 24.

22. WASP-STINGS. — I have read with interest the items recently published in *Science* on this topic. Forty years ago, when a lad at school in Killingly, Conn. (in that part of the town at present known as Putnam Heights), I learned from schoolmates that any wasps could be handled without danger if one held his breath. I saw the experiment successfully made by many of my fellows, and ventured to make it myself with like results. Since that time scarcely a year has passed without my repeating the trial on wasps that have come in my way. I have never been stung except when I have forgotten myself, and allowed myself to inspire or expire the breath. Sometimes, after throwing the wasp violently away, I have been stung, because it had clung to my finger, and, not observing it, I had breathed. Ordinarily I notice after an experiment a slight feeling of numbness on the part of my hand where the wasp has attempted to sting me. I am accustomed to judge by this feeling whether the wasp was one of the stinging kind. As to the cause, I do not know of any. But many scientific persons have unscientifically refused to believe my statements, or to test them by experiment, because I could not answer their question, 'How do you account for it?' Whether the forced suspension of breathing paralyzes the nerves near the surface of the skin, — whether it stops the capillary circulation near the surface, — or whether its effect is something altogether different, I do not know. Nor do I see exactly how a paralysis of the superficial nerves, or an influence on the surface circulation, would prevent the poison from giving pain after commencing respiration again, provided that the wasp has succeeded in piercing the outer layer of the skin: for if the poison is exuded from the stinger, as I have sometimes seen it, it would act effectively upon removal of the paralysis when breathing is resumed. But my experience seems to lead to the conclusion that the poison does not penetrate at all during the suspension of the breath, but is left on the surface of the skin, and produces only the effect of a faint numbness after its effects begin to be felt through the outer coating. I do not take up this subject as one who has conducted any careful scientific experiments on it. My account of the matter may, however, help, like former articles in *Science*, in interesting experts in physiology to make genuine scientific experiments. One may hope that something important will be discovered in regard to the effect of forced suspension of the breath upon the nerves of feeling, the capillary circulation, or the resistance of the skin to penetration.

W. T. HARRIS.

Concord, Mass., Jan. 29.

23. DROPS OF WATER. — In answer to E. J. Pond's query in *Science* for Jan. 20, it seems to me that the phenomenon is explainable in the same way as the related phenomenon of drops of water on a hot stove; viz., rapid evaporation causes a layer of vapor to surround the drop, and this, by its repulsive expansion, keeps the globule of liquid from touching the hot metal in the one case, and the surface of the water in the other. The small drops that fall from the oar-blade will float a short time before calescing, even when no wind is blowing; the fall through the air apparently setting up evaporation enough to bear up the tiny globule. I have seen them at night, when the air was perfectly still, gleaming like seed-pearls in the moonlight. When the wind is strong, much larger drops will be supported because of the rapid evaporation.

C. M. WIRICK.

Metropolis, Ill., Jan. 24.