will be of great service in allowing barges to proceed from the Don to Odessa, which at the present moment is impossible, and it is believed that there will be no difficulty in doing this even at periods when the storms that rage in the Black Sea stop coast navigation. The commencement of the canal took place without any fuss, all festivities being reserved for its completion. No engineering difficulties whatever exist.

— The average tonnage of ships passing through the Suez Canal has increased from 1,000 tons in 1871, to over 1,750 in 1887. Out of 3,137 vessels passing through last year, 2,230 were English, and only 3 American. *The Engineer* well says, "This table also indicates the depth to which the once great merchant navy of the United States has sunk, to find that only three voyages were made in the year by its ships through this great water-way."

— The annual reception of the microscopical section of the Brooklyn Microscopical Society was held June 5.

— At the last meeting of the New York Academy of Sciences, Mr. George F. Kunz exhibited some of the finest red corundum (ruby) from within twenty miles of Atlanta, Ga. This was in pieces weighing one pound, and was part of a mass weighing 350 pounds which was found on the surface. He also exhibited gold quartz from Dutch Guiana (gold formerly found there only in placer deposits had been traced to the vein by a brother of the United States consul, Mr. Thomas Brown), and exhibited specimens said to have assayed $450 to the ton. The mines are situated four miles from Paramaribo; and the ore is sent to the coast by natives, who carry it on their heads in fifty-pound bags, making two trips a day. He also read a paper entitled 'List of Diamonds found in the United States,' which will be published later on by the society, and stated, that, in addition to the diamond weighing four and a third carats, exhibited by him two months ago, and reported as having been found near Morrow Station, thirteen miles south of Atlanta, Ga., he had recently heard of a two-carat stone which was brought to Mr. L. O. Stevens of Atlanta, Ga., by a colored man, who found it in his garden a few miles from the city, but who would not sell it, or allow it to be sent North. It was imperfect and off-colored. Mr. Kunz also said that five years ago he had identified topaz, for the first time in Maine, at Stoneham; and ever since then he had been on the lookout for the rare gem phenacite, crystals of which he had the pleasure of showing on that evening. This was the first time it had ever been found in the United States outside of Colorado, where it was first discovered in 1882. In Maine a number of superb light-green and sherry-colored topaz crystals were found. They were several inches in length, but of little gem-value.

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.*

Twenty copies of the number containing his communication will be furnished free to any correspondent on request.

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

An Unusual Auroral Bow.

THE description of the aurora of the night of May 20, by Mr. Kellicott of Buffalo, in *Science* of June 1, is so remarkably similar to the phenomenon as it appeared here, that it seems worthy of mention. Besides "the long streamers emanating from a bright, irregular arch resting on dark clouds," there appeared that extra arch, about the apparent width of a rainbow, with its extremities resting on the eastern and western horizons, and its top passing near the zenith. This arch was first noticed here at 9.30 P.M. standard time, and was very bright at that time, but without color. After 9.35 P.M. it began to grow fainter, but was still faintly visible at 10 P.M. A phenomenon visible here which was not mentioned by Mr. Kellicott was the appearance of a segment of a secondary arch or band attached to the top of the main arch in the north, and at 9.30 P.M. extending down to the horizon a little west of north. Between 9.35 P.M. and 9.40 P.M. the lower end of this segment seemed to detach itself from the earth, and, pulsating like a piece of ribbon held by one hand and waving in the wind, it rose upward, at the same time exhibiting beautiful colors, and at 9.40 to 9.42 P.M. joined the main arch, which assumed the appearance of a bent bow. The main arch retained this appearance for nearly a half-hour, but slowly assumed the appearance of the normal auroral bow without streamers. The times and appearances given above were taken from notes made at the time of the aurora.

H. HELM CLAYTON.

Blue Hill Observatory, June 5.

The People and the Common Schools.

HOW natural it is for us to try to shift responsibility from our own shoulders upon some other fellow's back! and yet, as Lester Wallack used to say in 'Ours,' "there is nothing so consoling to a man, when he is found out, as the sweet consciousness of — guilt."

The people are at last becoming conscious that there is something wrong in the great public-school system of New York City, — a fact that has been evident to every true educator in the land for the past ten years; and now the people dearly desire to make somebody a scapegoat for their sins. After stoning the scapegoat out of camp and into the wilderness, they would like to again relapse into a complacent contemplation of their own righteousness, soothed by a serene sense of duty well done.

They can safely enjoy "the sweet consciousness of guilt," however. The schools are to-day just what the people, through apathy, indifference, carelessness, and ignorance, have permitted them to become, — one vast machine; a treadmill, teachers treading the wheel, happy innocent children the grist, superintendents for task-masters, and the product a mass of automatons.

Have you not committed the monumental stupidity of placing, through laws enacted by your servants, all responsibility for the management of your schools — not only in monetary matters, but in all educational affairs as well — into the hands of bankers, brokers, lawyers, and physicians, who know no more about the science of education than school-teachers do about finance, law, and medicine, and perhaps not half as much?

To show the utter absurdity of this condition of affairs, it is only necessary to suggest that the Chamber of Commerce, the Stock Exchange, the Bar Association, and the County Medical Society select their governing committees from among the principals of the New York schools. Preposterous, is it? Would it not be safer to intrust affairs of finance to a man who knows, in theory at least, all the laws that govern trade — as a principal must — than to intrust the education of one hundred and fifty thousand children to men who know nothing of the science of pedagogy even in theory?

It is of no use to try to dodge the issue by stating that the Board of Education is guided in educational matters by the city superintendent, an expert teacher. Neither he nor the Board of Education will permit any such construction of the law defining their relative positions. The city superintendent pleads that he is only responsible for the execution of the law as it stands. The Board of Education assumes all responsibility for the inception, enactment, and continuance of all the laws, other than 'State Statutes,' which he executes.

The city superintendent is thus the self-confessed creature of the system he administers, instead of being, as you perhaps supposed, in any degree its creator. If he is not even the author of any portion of the present system, of which he has been the executive head for the past nine years, how can he be expected to become the creator of a nobler plan for the education of your children? You certainly cannot indulge in any such unreasonable expectation.

You, the people of New York City, are directly responsible for the larger part of all the evils that exist in the common-school system. Your children attend them; you hear from them daily reports of the manner in which they are educationally crammed; you see them at home, wearing out their young lives in preparing lessons for the next day's recitations; and, if some wise teacher reduces the tasks assigned for home-study, you immediately begin to inquire why your children have no more books, and why they have so few lessons to learn at home.

I know you do this, for I have heard you talk just that way. In vain have I pleaded with you for the little ones. In vain have I told you that five hours' daily attention to books, to recitations, to instruction, is all that any growing child can safely endure. "No, no!" you cry, "give them more lessons — give them tasks to do at home;" and your children go through their school-lives with the

shadow of the coming task always falling upon the task just finished. The gentle, obedient, loving, and affectionate little ones suffer; while the dear bad boys won't even make an effort, and thrive accordingly. The teacher can sometimes go home with his work finished for the day; the pupil never.

Now, if I will not permit this wrong to be perpetrated in the school under my charge, you take your boy away and send him to Mr. Examination Hunter's school; and you take your girl out of Miss Honest's department and send her down to Miss Show-off's school; and then you point with parental pride to the great load of books your little ones stagger under, as a proof of the superior efficiency of those two principals "whom we all respect." Then, when your little girl graduates, and Miss Show-off orders all the graduates to wear white dresses and tea-roses, and to come in carriages, and to drape their desks in white, you all say, "She has no right to give any such orders, and it ought to be stopped, and" — You get the dresses and the tea-roses and the carriage, and you attend the reception; and it is all so beautiful, and the members of the mutual admiration society do speak so mellifluently, — buttered honey, as it were, — that you are as proud of your daughter as a drum-major on parade. And then you go home, and your daughter has typhoid-fever, or spinal meningitis, or some other Latin disease, and you lay the blame on Providence. Who is to blame if the supply of sham education be exactly proportioned to your demand for it?

If you could only once be roused from your apathy on this subject, do you not know that your servants — the mayor, the Board of Education, and the Legislature of this great State of New York — would skip around like waiters in a dime restaurant to get you what you want?

The press has at last taken hold of this matter for you. How many of you will read what is written in your interest, and how many more will skip it all in order to read about the latest base-ball match or the last prize-fight? If you, happily, by any chance, have read thus far without throwing down the paper, will you kindly read the summing-up of the whole matter? The public schools of New York City will never be any better than the people of that city demand that they shall be.

EDWARD H. BOYER,
Principal Grammar School 9.

Reflex Speech.

NOTING the paragraph in *Science* of May 25, quoting from the *Journal of Mental Science* a statement of experiments in reflex speech, it seemed to me that certain experiences of my own in reflex writing might be of interest. I compose and write with considerable rapidity, and, on re-reading my manuscript, often find that my hand has written words in opposition to the orders from my mind. Of the several words beginning with *th*, for instance, 'the' is often written where 'they,' 'this,' or some other word, was intended. In like manner 'their' becomes 'there;' 'whether' takes the form of 'where;' 'while' replaces 'which,' 'what,' etc.; and other vagaries of the same general character now and then appear. Probably experiences of this kind are common, and are passed over without reflection as to their cause. They have long seemed to me evidences of reflex action. In rapid composition, the writing hand lags behind the conscious thought, which springs on to the words in advance, and leaves its successive orders to be executed in an automatic and unconscious fashion.

Ordinarily the wheels of the brain roll on in due order; but occasionally the hand seems to take the task of suggestion on itself, taking advantage of the absence of consciousness, and moving in a more customary channel than that directed: *th*, for instance, is followed by *e* more commonly than by any other letters; and the hand, if left to the action of reflex suggestion, would write 'the' in preference to the other *th* words. It is not at all surprising, then, that the writing of *th* sends back a reflex suggestion of *e* as the concluding letter of the word, which is occasionally of sufficient strength to overcome the impulse given by consciousness to the brain to write some other word.

It may be, however, that this phenomenon is due to relations of the nervous system different from those ordinarily estimated, and that the brain has nothing to do with the dereliction of duty in the hand. I should suggest the following theory in explanation of the phenomenon. The brain does not differ in physical formation from the inferior ganglia, and may not differ in its power of memory-recording. The impulses which pass along the sensory nerves to the brain traverse several ganglia on their way thither, and may leave memory traces in each of these as well as in the brain. The impulses to motion emanating from the brain similarly pass through inferior ganglia, and may produce in them conditions similar to those affecting the brain at that instant. But when the consciousness has brought the brain into condition to produce certain successive effects, this condition does not exist in the inferior ganglia. In writing the letters *th*, for instance, two influences are at work. There are influences descending from the brain to produce certain succeeding motions in the fingers; and there are sensory influences flowing upward from the moving fingers which are full of reflex suggestiveness. It seems not improbable, then, that this reflex suggestion may now and then call forth a response from an inferior ganglion, and thus check the action of the brain, which, in its unconscious automatism, may need a reflex influence from the fingers to bring it into condition to complete the word.

If such be the case, we can readily understand why the more ordinary words beginning with certain letters are occasionally written, instead of those dictated by consciousness, which begin with the same letters. It may perhaps be that the work in both cases is done by the brain, and yet this hardly seems probable: for the brain is put in train to perform a certain duty, and its tendency to do this seems likely to be stronger than any reverse tendency to perform a more customary action. This reverse tendency may undoubtedly occasionally gain precedence; but, if the inferior ganglia have the capabilities above suggested, it is not improbable that the reversing influence comes from them, and that the precedence which the brain possesses while in conscious activity may weaken during unconsciousness, so that, if the reflex influence from the hand arouses all the ganglia through which it passes to activity, an inferior ganglion may occasionally win in the conflict with the brain, and take control of the reins of action. C. MORRIS.

Philadelphia, Penn., June 5.

Answers.

32. HUMAN BEINGS AS PACK-ANIMALS. — Prof. Joseph LeConte of the University of California sends the following information in reply to an inquiry in *Science* in reference to the strength and endurance of the human pack-animal. I shall be extremely obliged for many notes of this kind from every part of the world. "In 1844 I travelled by birch-bark canoe something like a thousand miles, from Lapoint over to the head waters of the Mississippi, and down the latter to Fort Snelling, at mouth of Minnesota River. We made several portages, the longest being nine miles. We had along two trunks, and provisions and bedding for four persons for one month. The load which our two *voyageurs* carried was certainly one hundred and fifty to two hundred pounds each. They made seven miles in one day, going over the ground five times; i.e., thirty-five miles. Three fifths of the distance they were loaded, and two fifths going back for another load. Their plan was to take the heaviest load first (about two hundred pounds), and carry it about a mile or a mile and a half, put it down, go back for another load of one hundred and fifty pounds, carry this a mile or a mile and a half beyond the first deposit, then come back, take up the first deposit and carry it the same distance beyond, etc., until all was carried to the camp for the night; then, last of all, they went back seven miles to the last camp, took up the boat (which was the lightest load of all), and carried it to camp. I will give an account of one load. They used a leather strap about two inches and a half wide in middle, and slenderer towards the end, and perhaps ten or twelve feet long. One fellow, a famous *voyageur*, would tie this about my trunk (about seventy-five pounds) in two places near each end, and throw it over the head, bringing the band across the forehead, the trunk resting on the back, then take a hundred pounds of flour and put on the trunk, and then twenty-five pounds of crackers on top of all, and walk off briskly, almost in a trot. The man was not a large or very muscular man, but rather lean and wiry."

O. T. MASON.

Washington, D.C., June 5.