her own sake and good name, let me lay before you one or two examples demonstrating how the disadvantages I refer to, are due entirely to existing laws, and what we would gain by the change in them. A very excellent procedure on the part of the government is now in force, which consists in sending, at stated times, a certain number of midshipmen of the navy to the Smithsonian institution. Here steps are taken to instruct them in marine zoölogy or other matters from which science may be furthered some day, as the opportunities of these young men may afford. Those only are chosen who appear to promise the most, so far as the object in view is concerned. In the long-run, and after all degrees of success of this scheme have revealed themselves, we may obtain, sooner or later, in this way, a man who is really a naturalist in every sense of the word. If I am not mistaken this has already been done, for I have sufficient acquaintance with the young man to say so. He has produced excellent work, published some creditable things, and described several new species. Now no law strictly defines the disposition that shall be made of this one success, in a hundred perhaps, but worse than this, it is more than likely that the operation of the ordinary military impedimenta will defeat, in a very short space of time, what is really a splendid investment on the part of the government. If it falls to his lot to be placed aboard of a man-of-war, under some one who has no appreciation of the importance of such things, and he makes the attempt to utilize his knowledge, it is again more than likely that he will be told that if he wishes to follow such pursuits he had better resign. This proposition is discreditable, I think, any way we look at it, for surely the navy will gain a greater degree of respect for having among their number one who shows ability in any particular line of research, and it certainly seems that the government fails in its duty in not turning such a person to the best account, to say nothing of the interest it would pay her on the original investment.

Precisely the same impedimenta constantly confront the scientific investigator in the army, and my observations upon all that such workers have to contend against in civil life, lead me to believe upon comparison, that they can never entertain any conception of the thousand and one contrivances that surround him, to defeat, and in no way further, his efforts. Not that such persons would object to any thing that the struggle for existence might impose in the natural order of things, when one grows the wiser and the better for the test, but the distractions I refer to, are exceedingly pernicious, and of a far more serious character. Say, however, an ordnance officer wins his reputation as a pathologist, and just such parallel cases have occurred, and always will occur, what happens? — why in some roundabout way we soon find him in the laboratory, but unfortunately with an order over his head directing his return to the arsenal. Now this is bad, for if he goes back to the arsenal the habit of his mind, in spite of his personal integrity, will prevent him from being a good ordnance officer, while on the other hand, the government has abundant need of efficient pathologists, and here is one perhaps whose fame is world-wide. If he be retained in the laboratory the present law demands that he *do good work by stealth*, which is very bad for the investigator. and not a creditable thing for the country, for we should be enabled to do such things entirely above board. and be able to express our pride in them as a people, without apology, besides.

It would be superfluous in me to attempt to point out the least part of the incalculable benefit that the work of these scientists has been to their country, in the vast majority of instances, nay, to the world at large, and I must believe that the establishment of the scientific corps, that I suggest, would be a step in the right direction.

To say one of the smallest things in its favor, it would obviate the necessity of the recurrence of the ridiculous farce we were, as a nation, unavoidably guilty of, in offering Lieutenant Greely after his arduous expedition, a position in the quartermaster's department,— or such things happening, as occurred only a short time ago, an officer being reported to his department commander, because he was found guilty of pursuing lines of research foreign to his duties, and publishing the results of his investigations, notwithstanding the fact that it was proven that said duties had not been neglected in consequence.

The number of officers composing this corps should be limited to thirty, and transfers to it from other departments or the line, should be made only upon the consent of the officer. Officers should be allowed, however, to apply for such a transfer, and such application should be given due consideration by the National academy of sciences, which constitutes the highest advisory body to the government we have to decide such matters.

If the individual is found worthy of such distinction, and his work passes the required test as now applied by the academy, and he be willing, then the transfer should be effected at the earliest practicable date.

R. W. SHUFELDT.

Fort Wingate, N. Mex., Jan. 25.

## Science and Lord Bacon.

A year ago the honorable Ignatius Donelly appeared in Washington with a documentary proof that the plays of Shakspeare were written by Lord Bacon. I did not hear Mr. Donelly's lecture, but several ladies informed me that they believed there was 'something in it.' As 'Bacon's essays' was one of the first books I bought and read, it occurred to me to examine his scientific work; but there is very little, and his single experiment appears to have been the stuffing a fowl with snow, which brought on the chill that caused his death. It seems to me that Bacon's services to science have been greatly overestimated, and that Macaulay's declamation on this point is as absurd as Mr. Basil Montague's arguments to prove that his hero never took bribes. A writer of so much intelligence as Bacon, and yet one who ridiculed the Copernican theory after the discoveries of Galileo, could have had but little scientific spirit; although it is to be remembered that the England of his day was far behind Italy and France in scientific knowledge. Can it be that in this matter we have been imposed on by the fustian of English writers, of cyclopedias and schoolbooks?

ASAPH HALL.

## The competition of convict labor.

In his reply to my criticism of his views on the convict-labor problem, Mr. Butler denies that he consciously stands on the grounds of the ruling order of political economy. He holds that his stand-point is that of 'practical ethics' (*Science*, vii. No. 157).

What is that? There are differing schools or codes of ethics both in theory and practice, and the only sense that the term 'practical' can be used in relation to ethics is that it may designate the kind of ethics in practice in the time and place in question. This in our country and time, and special field involved, is the ruling order of political economy. This is the practised one as opposed to the professed one, which is Christian, and most decidedly different from the former.

He defends this questionable position with equally questionable figures. There are no 'official' figures compiled by any such men as our practical politicians (especially in matters where they may be assumed to be interested) which any scientific man would accept as evidence to controvert the constancy of the order of nature. The assumption that contractors would hire convicts in trades which are plentifully manned by free laborers, except for the one reason, greater cheapness, involves just such an infraction in the order of nature as is expressed in the commonplace reference to water running up hill.

But even so, says Mr. Butler, the total proportion of convict labor to free is only 1.1 per cent. "And it is this minute percentage of competition that has caused all the hue and cry against convict labor."

This is a peculiarly misleading way of 'treating' the figures. The pressure of convict competition has been felt in certain trades of certain localities, such as shoe and hat making of the state of New York. There the percentage has been large enough to injure both employers and employed, and, if Mr. Butler wishes to show the causelessness of the 'hue and cry,' he ought to show the percentage in special trades and localities. A shoemaker does not compete with a tinsmith, nor does the purely local trade of one locality interfere with that of another.

It is true, however, that even the unaffected trades have taken up the 'hue and cry;' and that is because their ethics differ from the 'ruling school,' where the principle, 'every one for himself,' is held, and instead of that their ethical doctrine is, 'an injury to one is the concern of all.'

E. LANGERFELD.

Amongst a number of inferences, the above communication contains one statement, and that not bearing on the question of the general merits of the contract system, but on its application to the hat and shoe trades in the state of New York. Whether any modification of the system in this point of its application is advisable, experience must determine; perhaps a restriction as to the number of convicts to be employed in any one industry would be desirable.

The official figures as far as these two industries are concerned are as follows. In 1879, 320 convicts were employed in making hats in the state of New York, while 5,267 free workmen were engaged in the same industry; thus the competitive force of the convict labor was about 4 per cent. In 1879, 1,927 convicts — 1,885 males and 42 females — were employed in New York prisons (at Sing Sing, Auburn, and Clinton prisons, at the penitentiaries at Albany, Brooklyn, Rochester, and Blackwell's Island, and at the western house of refuge at Rochester) in the manufacture of boots and shoes. According to the census of 1880, 26,261 is the number of free laborers at boot and shoe making in New York state. This shows the competitive force of the convicts' labor in this instance to be something over 4 per cent. This amount is still small, though considerably greater than the figure (1.1) which we found to represent the competitive force of all the convict labor in the United States, without regard to particular industries.

Your correspondent has selected that example in which competition is greatest, but even then 4 per cent is the highest figure reached, and surely it is not so very formidable. I have had some hesitation in adducing fresh figures, for fear that they may be summarily rejected as useless, because they do not fit in with some person's ideas as to how the 'course of nature' ought to go.

NICHOLAS MURRAY BUTLER.

## The festoon cloud.

I have been much interested in the recent articles in *Science* on festoon clouds. In August, 1884, I witnessed a remarkable exhibition of this description over Vineyard Sound, between the shoulder of Cape Cod and Martha's Vineyard. It was in the morning, about nine or ten o'clock. The sky was overcast with clouds betokening a shower. A thunder-cloud was in the north-west, from which occasional mutterings were heard. High over the water was a dark cloud, from which depended portions of the cloud like great curtains. These depending portions grew lighter in color, and thinner in texture, until, when within about one hundred feet from the water, they frayed out into a fringe-like appearance. Between these curtains the atmosphere was comparatively clear, up to the dark cloud above; but, as the depending portions approached the dark cloud, they grew in dimension and density, forming arches from one to the other. The dark cloud extended south-west and north-east in the direction of the axis of Vineyard Sound, but the depending clouds were at right angles to this direction. I secured a sailboat, and sailed underneath these clouds, and the display was truly wonderful. The fringing of the lower portion of the depending clouds was very beautiful, and the high arches between were impressive. This exhibition was followed by a severe thunder-storm, as I remember. There seemed to be currents of air of different temperatures, but, in the absence of instruments, I was unable to make any record of this. I recall that the wind was unsteady and shifting at the surface, which required careful management of the boat.

J. M. ALLEN.

Hartford, Conn., Feb. 6.

## Correction of thermometers for pressure.

Imperfect instruments, faulty methods, and personal errors have caused the introduction of a great many inaccuracies in scientific literature, and entailed great labor in their correction and the repetition of experiments. This is especially true in the case of physical constants. It is manifest that in this work of redetermination the most painstaking accuracy should be aimed at, and every possible source of error avoided. Otherwise the work must be repeated at some future day, and our theories based upon uncertain constants will have but little force.

It occurred to one of us (Dr. Venable) that a source of error in thermometric readings, not generally corrected for, might lie in the effect of pressure upon the glass bulb containing the mercury. No reference to any such corrections could be found in the books at our command, and we resorted to experiment to test the amount of the possible error.

A few experiments, carried out with some fine