the most reliable sources of information at our command, they are only challenged by such bitter personalities and trifling evasions as those indulged in by your correspondent. Writing with evident animus, he can find nothing better to object to Stepniak's crushing indictment against the whole system of government in his country than a quibble as to whether a man who escapes from the prison hospital can be said to escape from prison (your readers will find a detailed account of Prince Peter Kropotkin's escape in Stepniak's 'Underground Russia'); and the obvious truism that polite circles at St. Petersburg profess ignorance of cruelties, their master desires to conceal.

Until some better evidence to the contrary than this is laid before us, we English lovers of liberty must consider the case against Russian despotism as proved; and we shall endeavor — not in hatred, but in love, toward the Russian people — to aid them by every means in our power in their heroic efforts to free themselves and their country. C. M. WILSON.

London, Dec. 27.

Ruminants of the Copper-River region, Alaska.

While on the Copper or Atnah River of Alaska, and its principal tributary the Chitina (*Chitty*, copper; *na*, river), I had occasion to learn something of the species of ruminants inhabiting the region. Of the Cervidae, only two species, as far as I had occasion to learn, exist; viz., the moose, Alces machlis, called by the natives tenáyga; and a form of the caribou, Rangifer tarandus, called by the natives honnâi.

Of the Bovidae, there were two species, one of which, called by the natives tebáy, I had occasion to carefully examine. It nearly resembled Dall's mountain sheep (Ovis canadensis Dalli, Nelson), "found in the mountains of Alaska and southward into British America." My party killed several of these animals, one of which, a ram, had horns twenty inches long and nearly straight. It was killed on a very high point, much above the timber-line, and in its fall was considerably crushed. The horns were similar in structure to those of the big-horn, but had very little curvature. I saw a spoon made from a tebáy's horn, which had a length of twenty-six inches, and measured five inches across the bowl. The natives informed me that some had much larger horns than the one that furnished material for this spoon. This may or may not be true.

The head of the tebáy was much like that of a Southdown ram, the muzzle much less sharp than that of Shaw's Ovis canadensis or Nelson's Ovis canadensis Dalli. The hair, as to kind, was in no respect different from that of the latter animal, but was of a uniform white color, and by no means dirty; in fact, was nearly as white as his surroundings of snow. From the best information obtainable, I would class it as an equal in size to the big-horn, and a relative of Dall's mountain sheep. The ram and one other tebáy were killed on the most northerly tributary of the Chitina, called by us Chitistone (Copper-stone) River, on account of the existence there of copper ore.

The natives informed us that a few miles below the junction of this tributary with the Chitina we could kill small tebáy, and four were obtained. Their heads were left on the mountains, but the body seemed identical with that of the Chitistone River specimens, though very much smaller. Why only small ones should be found at this place, in the latter part of April, I cannot say. The mountains here were not so high as farther to the east and north, where the large ones had been killed. The last tebáy seen or heard of by us were near the source of Copper River, on the divide between it and the Tananá River.

The other species of the family was a white animal whose pelt I frequently saw used in articles of wearing-apparel, and which, from its description, was probably the mountain goat, Mazama montana, found also on the head waters of the Yukon River and its upper tributaries. I saw some of these animals at the junction of the Copper and Chitina rivers, on the west banks of the former, but was unable to obtain them. H. T. ALLEN,

Lieut. 2d cavalry, U.S.A.

Washington, Jan. 2.

The festoon cloud.

In the *Philosophical magazine* for July, 1857, Mr. W. S. Jevons, then assayer at the Sydney branch of the royal mint, had an article on the cirrous form of cloud (vol. xiv. 22–35), and gave therein the best early account that I have met with of a peculiar form of cloud, since commonly called the 'festoon' or 'pocky' cloud. He says these forms are often to be seen on the under surface of dense cirro-stratus clouds, 'especially at the front or tail of a thunder-cloud.' Sometimes these dropping portions of cloud, or 'droplets,' as he calls them, seem to come into contact with dry air, when their well-defined form is destroyed, and a fibrous or fur-like appearance only remains. 'They appear to be truly portions of subsiding cloud.' An accompanying 'imaginary section of a thunder-cloud near Sydney' nicely illustrates their attitude, but not their form.

The earliest valuable figure of the festoon cloud is presented in an article by A. Mitchell, on weather prognostics in Scotland, in the Edinburgh *New philosophical journal* (xviii. 1863, 221), where it is copied from a drawing by the Rev. C. Clouston: it is probably the same figure that is given in a work by the latter author, 'An explanation of the popular weather prognostics of Scotland,' etc. (Edinburgh, 1867); but this I have not seen. The drawing shows the cloud to be distinctly convex downwards, the separate festoons being grouped together somewhat like the adjacent grapes on a bunch; and it is spoken of as a sure sign of stormy weather. Its relative rarity may be estimated from a note by Symons, the veteran English observer, in his *Meteorological magazine* for July, 1868. He first saw it early in the morning of a June day in 1858, just before a violent thunder-storm; then during the succeeding ten years he never saw it, or heard of its being seen, till he came upon the book above mentioned. He said it looked like 'bags of sand,' but does not refer to it as a falling cloud.

Poey, a lifelong student of cloud-forms, sent a brief note to *Nature* (Oct. 19, 1871, p. 489), in which he speaks of this cloud as a new form, and gives a rough figure of it: he considers it very rare, having seen it but twice in his life, both times suspended from the pallio-cirrus of thunder storms, — once in Washington, D.C.; again in Beloit, Wis. This note brought out several others; among them one signed 'J.,' evidently by Jevons, calling attention to his

early account; another by Scott, in the *Quarterly journal of the royal meteorological society* (i. 1873, 55–59), in which most of these references are mentioned.

Further attention to the festoons is given in Poey's little book, 'Comment on observe les nuages pour prévoir le temps' (Paris, 1879, 86), and in Ley's review of it in *Nature* (Jan. 1, 1880, 210). The former calls it '*globo-cirrus*,' and traces its first mention back to Lamarck in 1804; but Poey finds only twenty records of the cloud that he can recognize, seventeen of them being connected with storms. Ley calls the festoons *mammato-cumulus* and *mammato-cirrus*, figuring both kinds, and noting that they are certainly not common, although not nearly so rare as is usually supposed. Abercrombie notes that the festoons result from the failure of the ascensional current that is commonly associated with showers and squalls (*Nature*, May 24, 1884).

My object in writing is to ask if the cloud is commonly seen in this country, and if it is then generally associated with the cirro-stratus of thunder-storms, or with the larger storms that are so unfortunate as to have no special name, unless we call them 'areas of low barometer.' My note-books record the festoon clouds twice in Montana in 1883, twice during the past summer of 1885 in Connecticut and New York (all these being in the cirro-stratus cover of the after-part of thunder-storms), again here in Cambridge, on Dec. 13, 1885, about noon, in the pallio-cirrus sheet attending one of the above-named 'areas,' and at a distinctly greater altitude than the low scud and intermediate cirro-stratus clouds that soon closed in, and gave us rain in the afternoon. They seemed in all cases to be gently falling cloud-masses of films, resembling the forms that ink may take when dropped into water; and, when watched attentively, they could be seen to descend and dissolve away. Are they as rare as the notes by Symons and Poey would lead us to think? W. M. DAVIS.

Cambridge, Mass., Jan. 5.

Topographical models or relief-maps.

I must personally thank you for your good words in behalf of non-exaggerated reliefs in your last issue, p. 24. I have had a long experience in this kind of work, and never found a case which required the vertical scale to be exaggerated. No relief of the surface is too delicate to escape the human eye when represented with sufficient skill and care in modelling. The demand for exaggeration in a relief comes from those who will not spend a sufficient amount of time and pains upon the intermediate contour curves, or from those who have not trained themselves in drawing from objects. The habit of exaggerating the relief excuses itself at first on the plea that common people cannot appreciate heights when true to nature, but the fact is that the difficulty is felt by the modeller himself; and when the habit is once formed, it becomes incurable. If a relief-map be not true to nature, what is the good of it? Geologists have been forced to abandon exaggerated cross-sections; why should they permit relief-map makers to revive the discarded error, and put the representation of the whole in antagonism to the representation of the parts?

About the year 1865 or 1866 I made a wooden model of one of our lower Silurian limestone valleys, with its bounding ridges, about 20 miles long. The model was about 18″ by 36″, in 12 bars of wood, each 18″ long by 3″ wide. On each side of each bar I painted the corresponding section of the valley, with its limonite horizons, and faults. The model still exists. My purpose was first to get correct ideas of the country structure for my own work, and then to exhibit my conclusions to the Pennsylvania railroad company, who employed me. The reliefs in the valley were very low; but they were perfectly legible to the eye of a layman. What would have been the fate of my side-sections had I used an exaggerated vertical scale?

In 1865 I made a model of the underground of the Plymouth anthracite mine, with its remarkable vertical fault, from levels which I took in the mine. What good would this have been had I used a different vertical scale?

I have myself made models on several plans; the most satisfactory, but the most laborious, being to draw a good many cross-sections on the same vertical and horizontal scale, along parallel lines, as nearly as possible at right angles to the general strike; then cut strips of wood, lead, zinc, or stiff paper (I have used all four) to represent the cross-sections; set these up in their places; fill in with wax or plaster; and finally tool the surface thus obtained. I prefer this method to the common one of jigging out the contour curves, and filling the terraces between them with slopes of wax. The latter method is easier and less costly; but it is sure to make the modeller slovenly in his geological representation, and it is a powerful seduction towards exaggeration of the vertical scale. Beginners and earnest scholars ought not to be allowed to use this method until they have been drilled to accuracy, and to love the true natural aspect, by the compulsion of the method of cross-sections. I never see a false relief-map without indignation, and a touch of the contempt we feel for all anachronisms. J. P. LESLEY.

Philadelphia, Jan. 10.

The cherry tortrix.

This insect, Cacoecia cerasivorana Fitch, was very common in Michigan the past summer. The most interesting thing about it is the large web or tent which it spins, and in which it usually stays. As it needs more food, it 'ropes in' new twigs, and thus has fresh foliage right at hand. I found that these little caterpillars would deflect a shrub, an inch or more in diameter, several inches, that its leafy branches might be brought into its tent. How do these little larvae exert so much force? I know that entomologists usually say it is by the pulling of the hundreds of larvae as they move their heads back and forth in the operation of spinning; but I do not see how they can pull. As they touch their mouth to the web or twig, the liquid secretion adheres, and quickly hardens into a tough thread; but the larvae do not seem to draw, nor is it certain that the thread would be strong enough so early in its formation to draw with any force. From very careful observation in the laboratory, I was led to believe that it was due to the contracting force of the many hardening silk threads that brought the large twigs together. These larvae are smooth, and must find the web a great protection. The teeth on the chrysalides are of great service in enabling them to push out of the tents, just as the moths are to issue. A. J. COOK.

Lansing, Mich.