— Captain Gates of the ship L. Schapp has reported to the U. S. hydrographic office that on April 19, when off Cape Horn, on a voyage from San Francisco to Liverpool, the temperature of the water suddenly rose from 42° to 44°. Judging from this that the vessel was too close inshore, he hauled off three points, and, after standing on this course for four hours, the temperature fell to 42°. The captain stated that on a previous voyage he had noticed this warm belt, and judges that it does not extend more than ten miles offshore. He believes he would have gone ashore if he had continued on his first course half an hour longer. He had not seen the sun for twelve days.

— The longest completed tunnel in the world is at Schemnitz in Hungary. It is 10.27 miles in length, with a cross-section of 9 feet 10 inches by 5 feet 3 inches, and is used for drainage purposes. The new Croton aqueduct tunnel, now in course of excavation near this city, will be much the longest tunnel in the world. When completed, it will be nearly 30 miles long, with a section much larger than that of the Schemnitz tunnel, being about 16 feet in diameter. Twenty-two miles have already been excavated.

— The International statistical institute will hold a meeting in Rome early in April.

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.*

The natural method of teaching languages.

WILL you permit me to call attention to two misstatements in Mr. Stern's article on 'The natural method of teaching languages,' which appears in *Science* of Jan. 21? On p. 69 he says, "Why is it that the old method . . . could be shaken in its very foundation to such a degree that one of its warmest defenders writes but lately, 'It is evident to me that the old grammatical method cannot survive the assault of the natural method'?" The writer referred to as 'one of the warmest defenders' of the old method has been conspicuous and outspoken in discarding 'the old method,' both in theory and practice, for many years, and, had his name been quoted, the absurdity of the above would have been at once apparent.

Farther on, Mr. Stern says, "It would seem strange . . . that an educational journal which is not friendly [*sic*] inclined towards the method should have recently been forced to admit that 'the subject is now attracting great attention in the secondary and higher schools.'" The expression 'forced to admit' is misleading. Possibly it was intended to be so. It would be interesting to learn the exact nature of the *forcing*. By the same token it might be claimed that any statement of fact is a forced admission. It was simply given as an excuse for introducing the matter as the subject of *Interchange*. Perhaps Mr. Stern would claim that our statement that "there are twenty thousand secondary teachers in the United States" was a forced admission, but we have never so regarded it.

THE EDITOR OF THE ACADEMY.

Syracuse, N.Y., Jan. 22.

The submerged trees of the Columbia River.

The phenomena which Capt. C. E. Dutton has so well described under the above heading in No. 208 of *Science* were observed by me in the autumn of 1870, when, in the course of preparations for a topographical and geological survey of Mount Rainier, I made a trip from Portland to the Dalles and back, and later, on my return from Mount Rainier *via* the Dalles to Portland, during the month of November of the same year. The submerged trees excited my vivid interest during these trips up and down the river; and during an enforced stay at the Cascades on one of these occasions, I made some investigations in the vicinity, which, with information I obtained from old Hudson Bay trappers and Indians, suggested to me an explanation of the backing-up of the river different from that offered by Captain Dutton. This explanation, which was embodied in a somewhat popular address delivered by me before the American geographical society in New York on March 13, 1887 (Bulletin No. 4, session 1876–77, p. 11), I venture to repeat here, for the reason that Captain Dutton assures me that he had not known of my publication on the subject, and that the explanation had not been suggested to him at the time of his investigations. It is briefly this: —

1. The valley of the Columbia River at the Cascades is a cut, considerably broader than the actual stream-bed, through over 3,000 feet of beds of basalt and basaltic breccia, which here form the axis of the Cascade range, and which rest on a loosely aggregated bed of conglomerate carrying leaf-remains and trunks of trees, sometimes petrified, sometimes merely carbonized, apparently of miocene age. This bed of conglomerate is seen to outcrop about at the river-level at the foot of the Cascades: therefore in its cutting-down or corrasion the Columbia River had already reached this conglomerate bed below the falls, and above was within thirty feet of it.

2. The river at the Cascades is a narrow boiling stream, rushing down over immense broken masses of basalt, and between steeply cut banks of basalt; which banks are, if I recollect rightly, somewhat higher than the broad forest-covered stretches of the valley which extend on either side of the stream to the base of the steep bounding cliffs. In this stretch on the north bank I observed an old stream-bed filled with rounded pebbles, through which at least a part of the stream once ran.

3. The Indian tradition above referred to says that there once existed a natural bridge at the Cascades, and that the ancestors of the present tribes (probably at no very distant period) used to cross the river here dry-shod. The form of the banks at the head of the stream lends probability to the truth of this tradition, for they appear like the rude abutments of such a bridge, which had been left after its destruction.

4. The submerged stumps of trees which line irregularly the banks of the river above the Cascades are of the same species, and generally about the same size, as the older of those which clothe the steep

slopes of the valley on either side from the water-line upwards. Their submergence is evidently, therefore, a matter of quite recent date, even historically speaking.

From the above facts and traditions I reconstructed the history of the formation of the cascades, the damming and backing up of the stream above, and the consequent submergence and killing of the trees which grew immediately along its bank, as follows: —

At the time when the general cutting of the Columbia valley had reached about the level of the present flood-plain at the Cascades, through some crack or other natural opening its waters found a passage into the underlying conglomerate bed, which, being permeable, allowed a passage of this water down stream to a point in the bed itself where it outcropped at or above the level of the lower part of the stream. Such a passage, once established, would be rapidly enlarged by the force of such an overlying mass of water as the Columbia River; and to those familiar with the corrading force of water, as shown in the stream-action of western rivers, it must readily be apparent that it would soon become large enough to take in the whole stream; that thus for a certain distance the whole Columbia would run underground, like the so-called 'Lost Rivers,' which are still found under the basalt flows of the Snake River plains. Thus would have been formed the natural bridge spoken of by the Indians. Moreover, by this lowering of its bed at this point, the bed of the river above would have been correspondingly lowered, and tree-growth would have gradually extended down to the water's edge, as it does at present.

Meantime the corrasion of this underground stream would gradually wear away the supports of the overhanging sheet of basalt, until at length they became inadequate to hold it up; and when they fell, the underground passage would have been suddenly filled, the river dammed up to the present level, and the stream also backed up so as to cover the roots of and thereby kill the trees along the lower part of its banks. Such is essentially the present condition of the stream: for the broken masses of the basalt which form the present stream-bed at the Cascades resist the wearing-away of the water better than did the conglomerate, and the river above the Cascades still stands at a higher level than it did before the falling-in of the basalt bridge.

I must admit the possibility that an actual survey of the region about the Cascades might disclose facts that would make the above explanation inadmissible, since it is founded on a very hasty and superficial examination. In spite of the fact of Captain Dutton's later and possibly more thorough examination than my own (for I have not been there since 1870), I am not quite willing to yield my theory in favor of his, for the reason that his theory involves what seems to me a geological improbability, — one which, in my experience at least, has not been supported by any observed facts. This is, that an earth movement — for such the flat anticlinal arch he assumes to account for the raising of the old flood-plain below the Cascades involves — could have proceeded more rapidly than the corrasion of as large a stream as the Columbia, so as to actually dam it up, and then have conveniently stopped, so as to allow corrasion to gain its former ascendency over the earth-movement.

S. F. EMMONS.

Washington, Feb. 8.

A carnivorous antelope.

A few months ago, while visiting a friend on a cattle-ranch in the San Andreas Mountains of southern New Mexica, I saw what to me seemed a most abnormal habit. My friend had a young antelope six or seven months old, which he had captured when very young, and kept as a pet about the ranch. This animal is, by the way, very tame, following its master about without once offering to join its fellows, which often come in sight of the house. When offered pieces of raw beef, it will eat the meat with evident relish, and in preference to vegetable food. I have seen it eat piece after piece until it has disposed of half a pound or more, then it would walk to the corn-crib and eat corn as a sort of dessert. It also eats bread, cooked potato, and sweet-potato both raw and cooked.

RALPH S. TARR.

Cambridge, Feb. 14.

Language-teaching.

The important subject of the teaching of modern languages having been discussed in the columns of *Science*, and no definite plans having been offered by either of the writers discussing it, perhaps the original and independent views of a practical teacher will not be unwelcome.

It is obvious that a complete knowledge of a language consists, 1°, in having full command over the bodily organs through which it is either received or communicated to others, — viz, the vocal organs, ears, and eyes, — so as to be able to utter any sound like a native, to understand all that he says, and to read any book aloud in the proper manner; 2°, in mastering those fundamental rules of grammar — including those of the verbs — indispensable in order to speak and write correctly; 3°, in the possession of a fund of words and idiomatic forms for the expression of ideas; and, 4°, in the power of using these words and forms according to the special genius of the language studied.

Sounds of the human voice are the vibrations of an expired current of air, produced by the vocal organs, which (in the case of the French pronunciation) are, for the formation of every sound, in a fixed and determined position. In my book on pronunciation, 'French orthoepy,' I have indicated the relative positions of the vocal muscles for every French articulation and vowel. The learner is trained, by means of different vocal exercises, to use the instrument of speech in exactly the same manner as the natives; and, employing the same means, he must necessarily obtain the same result. These gymnastics of the voice are accomplished in a few short hours, and are an indispensable preliminary exercise before commencing the study proper of the language.

Teaching a language without the few fundamental rules that regulate it, including those of the verbs, is depriving the student of a most valuable aid and guide; while making grammar the all-important subject, especially in the beginning, is to create a confusion in his mind, and to impede his progress. I have taken a middle course; and in my grammar will be found, in a concise form, only those general rules without which nobody can either speak or write properly. My grammatical exercises have been framed with the view of initiating the learner into the idioms and construction of the language. To avoid those disconnected and commonplace phrases