

In a tabular form by Colonel Sykes, the secretary to the association. From elaborate tables prepared by the aeronaut, Mr. Welsh, and completed by Colonel Sykes, it appears that there is a steady decrease of temperature in passing through the lower stratum of air up to about 4,000 feet; above the decrease is arrested, and a uniform temperature appears to prevail in the zone of atmosphere above for a distance of 2,000 feet, above which the temperature again falls in a regular ratio to altitude. This increase of cold is coincident with an abrupt diminution of vapor. A decided rise of temperature was always noticed on entering a cloud, and for a space of 600 feet above it, after which the decrease and elevation proceeded as before. The regular progression of decrease of temperature with elevation can, therefore, be no longer maintained. The interruption in the decrease of temperature was invariably accompanied by a large and abrupt fall in the temperature of the dew point, or by actual condensation of the vapor. From the analysis of the samples of air, it appears that the composition of the atmosphere, as regards the proportion of oxygen and nitrogen, scarcely varies more as we ascend through the first half of that atmosphere (for at an altitude of about $3\frac{1}{2}$ miles one half of the atmosphere lies beneath the aeronaut) than it is found to vary at different spots upon the surface. There is indeed no sensible difference in the composition of the air at the surface and at the greatest height accessible to man.

SAILING OF THE ARCTIC EXPEDITION.

On Saturday, the 7th inst., the Arctic expedition of Dr. Hayes sailed from the port of Boston. The event excited a great deal of interest, and drew together quite a large crowd on the wharf, while the decks of the vessel were crowded with a large number of distinguished individuals, among whom was Governor N. P. Banks, who has evinced a readiness at all times to advance the progress of the expedition. The vessel and all its outfit were formally presented to Dr. Hayes, and he was assured by the Boston committee of their entire confidence in his integrity, ability and honesty. Dr. Hayes, in accepting the gift of the vessel, and the honor and trust conferred upon him, made an eloquent speech, during which he was frequently interrupted by expressions of kindly sentiments on the part of gentlemen present; and the doctor took this occasion to introduce the officers and crew to those present, and complimented them on their courage in joining him in his journey.

The following is a list of the officers and crew:—Commander, Dr. Isaac J. Hayes; astronomer and second in command, August Sontag; sailing master, S. P. McCormick; mate, H. W. Dodge; captain's clerk, G. F. Knorr; assistant astronomer, Henry G. Radcliff; carpenter, Gibson Caruthers; cabin boy, Colen C. Starr; steward, Frank L. Harris; cook, John Williams; crew, Charles McCormick, William Miller, Harvey S. Heywood, Thos. F. Browne, John McDonald and Thomas Bowman. The expedition carries no surgeon other than the commander. There will be neither an artist nor a photographer on board, although the vessel has a splendid set of photographic instruments, which will undoubtedly be used by Mr. Sontag, who is a very good artist.

VOLCANOES OF THE NORTHWEST.

The following interesting article is from the Des Moines (Iowa) *Commonwealth*:—"Mount Baker and Mount St. Helens, in Washington territory, are active volcanoes; the former smokes considerably, and occasionally shows a red light at night. St. Helens smokes a very little, the smoke in the day-time resembling a thin column of white steam. There has been no eruption of St. Helens since 1842, at which time it covered the country with ashes to the Dalles, distant one hundred miles. Great streams of hardened various places in Mount St. Helens and Mount Adams, and probably near the other sister volcanic peaks. Mount St. Helens and Mount Baker are the only active volcanoes on the American soil, unless Mount Shasta (which sometimes smokes a little, but not enough for the smoke to be seen from the foot of the mountain) be added to them. Mounts Hood, Rainer, Jefferson and Adams were undoubtedly volcanoes once, but they are now extinct. In a paper contributed by George Gibbs to the documents relating to the survey for a northern Pacific railroad, he says the Indians have a characteristic tale relating to Mounts Hood and St. Helens, that they

were formerly man and wife, but they quarreled, and threw fire at each other, and that St. Helens was the victor, since when Mount Hood has been afraid, while Mount Helens, having a stout heart, still burns. There was still a further tradition among the Indians, when the writer was in Oregon, that Mount Hood and Mount St. Helens, were connected by a continuous ridge or chain, and that the Columbia river, which runs between them, had a subterranean passage at the point known as the 'Cascades.' The Columbia then had a smooth, even course, under an immense arch of the mountain, but that unfortunate matrimonial difficulty above referred to did not end in throwing fire; they also broke down the conjugal arch, which fell with a thundering crash into the river, and formed the 'Cascades.' The 'Cascades' are from one to two miles in length, and have a fall of about twenty feet per mile. Their appearance would indicate that there might be some truth in the tradition, and that it occurred at no very distant period—perhaps within the last century. The opinion is sustained by the geological formation above the 'Cascades,' where the river spreads out and becomes a lake, some twenty miles in length and several in breadth. The bottom of the lake in many places is covered with a heavy growth of timber standing upright, in the exact condition it grew, no doubt, and reaching to the top of the water, say from 20 to 30 feet. The tops of the trees have long since disappeared, making the surface of the lake, at low water, look like a clearing full of stumps. On examination, the wood was found to be quite sound below the water. An answer to the question, how long has the forest been submerged? might also fix the period when these volcanoes became extinct."

THE WORKING OF STEAM ENGINES.

MESSRS. EDITORS:—Having recently noticed an article on the working of steam engines (in the *SCIENTIFIC AMERICAN*), I thought a word or two of my own experience might not be amiss; and as in the last 10 years' experience I have often gained many useful lessons from the columns of your valuable paper, my own may benefit some of the novices now in the field. In the first place, I advocate a cut-off valve (of which there are a great many now in use) and a high pressure of steam, so as to get the benefit of expansion. But the common trouble is that what is gained by the expansion is lost by the increased friction on the valve; so that what we now want is an *anti-friction valve*. You mention the fact that the piston rings are too cumbrous. I agree with you precisely; having run engines with rings large enough for machines of twice the capacity. Then the process for setting the packing is behind the age, as, with the old plan, it is impossible to have the bearing of the ring evenly divided. But I think this is on the point of being overcome by the use of a new spring, manufactured in this city, and called the "letter Z packing spring," which consists of a number of small springs bent the shape of a flat letter Z, and placed between the piston head and the ring; the head being made round, instead of the skeleton shape. The springs being placed close together make the bearing exactly even on the whole surface; and as fast as the cylinder wears, the springs take up the spaces, thereby doing away with the labor of setting-out packing until the rings become worn out or too small. In these days, when *engineers* are manufactured at an hour's notice, this is quite an object, as it removes the most intricate duty of the engineer—the setting of his packing. Another great fault of engines is the smallness of the exhaust pipe, which I agree with you should be a great deal larger than the induction valve. C. R.

Albany, N. Y., July 14, 1860.

A WONDERFUL CAVE.

MESSRS. EDITORS:—According to promise, I herein give you another report concerning the cave at this place. Since my first *winter* visit, detailed in a previous letter (published on page 211, Vol. II., of the *SCIENTIFIC AMERICAN*), I have made frequent visits to the cave; but as there has been but little alteration, I have delayed a regular report until now. On June 23d, at about 10 A. M., a friend and I started on a *midsummer* trip. crossed the river in a boat and commenced the ascent of the bluff as usual; it being very steep and, upon the whole, like the river Jordan—"a hard road to travel." All difficulties, however, being surmounted, we arrived

at the mouth of the cave, and sat down to rest awhile and cool ourselves; looking at the thermometer, we found it stood at 80°. Here we found several pieces of candle and one old candlestick left by other visitors. We then commenced the descent; and as we walked, crawled and slid along, it began to grow cold quite fast—it seemed like going out of a warm room into the cold atmosphere of a *winter* morning. We soon began to see the frost on the walls, sparkling in the light of our lamps like millions of diamonds. This one sight is worth as much as all the natural exhibitions of every-day life to every lover of the beautiful. As we came to our first stopping-place we began to find ice, from a mere film up to six or eight inches thick. This part of the cave is in the shape of a wedge with the small end up; it being about six feet wide at the base, the sides drawing together overhead about 20 feet high—the one side covered with ice (clear as crystal) and the other with sparkling frost. Now we hung the thermometer on the wall and waited the result; the mercury going down gradually to 30°, where it remained. We also had a little water in a cup, and after leaving it on the rock for about 10 minutes, it became skimmed over with ice. There is not near the usual amount of ice in the cave that there usually is at this season of the year; and no doubt it is owing to the dryness of the season. The present spring and summer, so far, has been very dry in Decorah; and I have noticed that the more rain we have, the more ice forms in and around the mouth of the cave. Two years ago, there was so much ice in the first 50 or 60 feet of the cave that we had to cut steps in it with a hatchet to get down with safety. A great quantity of rain fell during that season. J. W. H. Decorah, Iowa, July 3, 1860.

"YELLOW JACK" BANISHED FROM THE CRESCENT CITY.

MESSRS. EDITORS:—It is with much regret that I observe a paragraph at the close of the letter of your correspondent, "B," dated Columbus, Ky., May 27, 1860, and published on page 386, Vol. II., *SCIENTIFIC AMERICAN*, in which it is stated that "the yellow fever had already made its appearance in New Orleans." This, no doubt, was written inadvertently and without inquiry, and probably the writer of it has been better informed before this; but coming, as it will, before the eyes of over a hundred thousand readers, it is calculated to do our city much injury. I have a large interest in this city, and am sorry that your journal should be the means of giving currency to so great an error, for to this day—one month from the time that your correspondent received his information—we have not had a single case of yellow fever. S. E. M. New Orleans, La., June 25, 1860.

MYSTERIOUS MUSIC ON THE GULF SHORE.—The mystic music sometimes heard at the mouth of the Passagoula river, on a still night, is one of the wonders of our coast. It is not confined, however, to the Passagoula river, but has often been heard at other places. At the mouth of the Bayou Coq del Inde and other inlets opening into the Gulf along the coast of our own country, the curious listener, lying idle in his boat, with lifted oars, when every other sound is hushed, may sometimes hear its strains coming apparently from beneath the waters, like the soft notes of distant Eolian harps. We have always supposed that this phenomenon, whatever its origin might be, natural or supernatural, was peculiar to our own coast. It appears, however, from Sir Emerson Tenant's recent work on Ceylon, something very like it is known at Battialloa, in that island, and it is attributed to rather less poetical and mysterious origin—that it is a peculiar species of shell-fish. They are said to be heard at night, and most distinctly when the moon is nearest the full.—*Mobile Herald*.

MANGANIC ACID.—A paper has been communicated to the Paris Academy of Sciences by Dr. Phipson, in which the author shows that the metal manganese, by uniting with oxygen, forms only one acid—manganic acid—analogueous to chromic acid; and that the so-called "permanganic acid" does not exist. The salt so extensively used now in chemical laboratories, and known as "permanganate of potash," is shown to be *bimanganate* of potash, corresponding to bi-chromate, or anhydrous bi-sulphate of potash. This is an important discovery in mineral chemistry.