American Association for the Advancement of Science.

MET IN WASHINGTON IN THE LAST WEEK OF APRIL, 1854.

TRANSPARENCY OF THE OCEAN.—Capt. Glynn, of the U. S. N., read a paper on this subject.

Philosophers ashore, and philosophers of the forecastle, have wondered in all times as to the causes and extent of the color of the sea, and queried how far into it our vision could penetrate. Capt. Wilkes advanced the opinion that the transparency of the sea varied quite directly with its temperature. To this his observations did not allow him to assent entirely.

The surface of the sea must be perfectly tranquil and smooth. There must not be a ripple on it. So essential is this point, that during a cruise of four years, he only succeeded in sixteen observations that proved worth saving. Of these sixteen, in only one the water was ruffled by a slight breeze.

The next trouble was to discover what object would be most likely to reflect all the rays of light—what would be longest visible. First we tried an iron pot painted white. When we looked for it for the second experiment, the white pot was a black one again. Next we tried a sphere of hoops, covered with white cotton cloth. Before it was called for the second time, it was smashed into a cocked hat. Next we tried a mere hoop, covered with canvas. It was laid away on some old spikes, and when needed next, it came up sound enough, but of a bright yellow. At last we took a common white dinner plate. It was good enough. It was the brightest object we could find, was always handy, and was always clean, of course, seeing I took it from my table. It was slung so as to lie in the water horizontally, and sunk by an iron pot, with a line. The first experiment was tried April 4, 1848; the last one, December 22, 1850; everything wears out at last on board of a man-of-war, and my last observation took my last white plate.

The observations were taken wherever we could get them—ranging over 200 degrees of latitude, in different oceans, in very high latitudes, and near the Equator. I have to assume, what doubtless I may, that they do not differ from what they would if taken all in the same place. At every station we noted in the connection the sun's altitude, the velocity of the current, the temperature of both the air and the water, and the number of fathoms at which the plate was visible below the surface. We took these observations from a boat, bringing the line on to its shady side—then leaning over, with faces almost touching the water, and eyes shaded from the reflected rays from the surface by the brims of our tarpaulins, we watched for the disappearance of the plate as it was slowly let down. The men were about as much interested in the thing as I was—and, as sailors may have as good eyes as officers, each one took the observation,—so this table of results is really the mean of the observations of a number of men, not of one only. The varying points between which it disappeared from the vision of all, and where all could see, never were further separated than the length that the line could be lifted or let down by a reach of the arm—not over four feet. The water varied thermometrically from 40° to 85°.

It did prove that the lowest degree of temperature gave shortest line of visibility, and it did happen that at the point where the water was the warmest, there we saw the plate at the greatest depth. On two occasions we saw the plate when it was 25 fathoms below the water's surface, and on one of these the water was at 85 degrees. On these occasions all noticed the extraordinary clearness of the water. To lay in the boat and look down, was like looking down from the mast-head. Objects were clearly defined to a great depth. Fish were playing about below us, whose movements were so distinct that it made the flesh creep to see them. On this occasion I tried if a contrast of colors would increase the visibility. I so placed the plate upon the pot that a periphery of the black surface surrounded the white plate, but it made no difference at all. The Commander remarked that he never saw the water above 80 degrees of heat. He thought no sandy bottom could have been seen further than the plate was. So he believed that the maximum of visibility under water, under the most favorable circumstances, is twenty-five fathoms. But between the highest and lowest points of visibility, which corresponded with the highest and lowest points of the water's temperature, there were great variations, which showed no direct correspondence between the temperature and the line of visibility.

At the mouth of the Mississippi we find the water no more transparent than so much muddy water. The further we get from the points where earthy matters in large quantities are washed in, the clearer the water is. Now the Pacific, like the Atlantic, is a great whirlpool—a tide flowing entirely around its circumference. In latitude 20° on the west side of the Pacific, furthest removed from all stormy quarters, and where the ocean is stillest, we found the greatest transparency of water. Off Cape Horn, where eternal storms drive up the dirt torn by glaciers and icebergs from the regions around the Pole, the water was exceedingly turbid. With the thermometer at 68°, we got only ten fathoms of visibility.

LONG ISLAND SOUND.—Charles A. Schott presented the abstract of a paper on the tidal currents of Long Island and its approaches, from observations in connection with the United States Coast Survey, between the years 1844 and 1848, inclusive. The great tidal wave from the Atlantic, which enters the sound between Point Judith and Montauk Point, is divided into two branches by the intermediate position of Block Island. And another portion of this wave enters New York Bay, and passing through Hell Gate, meets the wave from the east. The tides meet near Hewlett's Point. The variable limits of this meeting are Sands' Point and Throg's Neck. It was found that the velocity of the flood stream was a little less than that of the ebb, owing to the discharge of the river water into the Sound. The average velocity of the tide in New York Bay was found to be 3 knots; in New York Harbor, 3 7-10 knots; in the Sound, 2 1-5 knots. The velocity in the Race (off Fisher's Island) was 4 7-10 knots; in Hell Gate, 5 9-10 knots. These velocities vary, of course, with the size of the channel, (width and depth) and the quantity of water to be discharged. The total number of stations taken to observe the currents was seventy-five, and they generally occupied thirteen hours each.

GULF STREAM—Prof. Bache, of the coast survey, read a paper on the distribution of temperature in and near the Gulf Stream of the coast of the United States.

On the seaward line off Charleston, from the shore to sixty miles out, the depth increases gradually, till it acquires a depth of one hundred fathoms. But it soon deepens with great rapidity, as if on the side of a mountain, until at about eighty miles out the ocean-bottom is more than six hundred and fifty fathoms from the surface. This continues forward less than ten miles, when the depth as suddenly decreases to not more than three hundred and fifty fathoms, which so goes on only a few miles, when it again deepens to about five hundred fathoms, with subsequent fluctuations. There is, therefore, a submerged mountain-peak or ridge between these points of a truly remarkable character. The differences in the temperature vary almost precisely according to the change of contour of the bottom, showing that the temperature at great depths is much modified by the propinquity of the ocean's bed. It appears that the Gulf Stream, while certainly not superficial, does not run to the bottom, for off Cape Florida, at twelve hundred fathoms, the water in summer is of a temperature of 38° Fahrenheit—a degree below the average winter temperature much further north

COURSE OF THE GULF STREAM—Lieut. Maury followed Prof. Bache. He showed that the stream varies its course according to the season, having a more southerly sweep in winter. The stream is more rapid off Cape Hatteras than Cape Canaveral, and never deposits the seaweed, with which it is so plentifully beset, on the western side. This was accounted for by supposing that the stream stands above the general level of the ocean, with its highest point in the centre or axis of the stream, and sloping off like the roof of a house each way. This stream is what modifies so agreeably the climate of Western Europe, and at the same time causes its fogs. Storms that arise on the coast of Africa, trailing westward, fall into its influence, and sweep around its circuit. In this stream the "San Francisco" was on the 26th December, and it was along its eastwardly current that the ship drifted. The Gulf Stream is sensibly affected by the discharge of the waters in Winter from the Chesapeake, Delaware and Hudson.

METEORIC STONES AND SHOOTING STARS—Dr. Lawrence Smith, of Louisville, Ky., read portions of a paper on the Meteoric Stones, with an account of some recently discovered.

He exhibited several small meteorites, and some large ones. A fragment of one in his possession he showed, of which the whole body weighed over 60 pounds. It was found in Tazewell County, Tennessee. A large one from Saltillo, Mexico, lay on the table, weighing 260 pounds.

Mr. Bartlett (Boundary Commissioner) had described to him one specimen which weighed 600 pounds and its greatest length was five feet. These bodies are composed principally of nickeliferous iron with portions of cobalt, copperas, copper, and phosphorus. The iron generally amounts to 95 parts out of a hundred. But in all meteorites we find one combination of these constituents, namely: *Shreibosite*, of which there is no natural specimen on earth.

It was long supposed that these bodies were identified with the shooting stars, but that error is of easy demonstration. For in all the periodically returning occasions of shooting stars, there is not a case on record where the fall of meteoric stones has accompanied them. Then we can obtain the elevation of the shooting stars, and without difficulty learn their velocity. They are often far beyond the circle of our atmosphere, and travel at the rate of sixteen miles a second, while we know that nothing can revolve around the earth at a swifter rate than five miles a second. Shooting stars then are cosmic bodies, revolving around the sun as a center. They are self-luminous too. But meteoric stones could not strike the earth in their fall, coming at the rate of sixteen miles a second, without producing very different impressions from what are recorded of their fall. Nor can these stones be self-luminous in our atmosphere. They are of heavy iron. They cannot be mere concretions of nebulous matter as some have maintained.—They have not the form that nebulous matter would assume on condensing. Evidently then they are not identical with shooting stars.

They are not of terrestrial origin. The number of those who think that they are, is too limited to require a set refutation of that theory.

They are not of atmospheric origin, aggregated from different directions, hardened like hail, though from different causes. Their form forbids that suspicion. Whence then are they.

Dr. Smith evidently accepted the "lunar theory." They were masses thrown off with great force from the moon, revolving around that body until in the great eccentricity of their orbits, they fall within the circle of our atmosphere; once within which, and with velocity greatly retarded, our earth becomes their center. They may have been thrown out from the craters of volcanoes a long time ago, and been thousands of years revolving before their orbit brought them in contact with our sphere. Laplace and Cerago, who once held this theory, gave it up, but they were compelled to do so or surrender another belief of theirs, that they are identical with shooting stars. One-twentieth of the surface of the moon is volcanic, and if the craters, as revealed by the telescope, are only in the usual proportion to the highth and depth of the volcanoes, there need be no doubt that they have sufficient ejecting force to hurl large masses of volcanic matter to immense distances. Remember, beside, that the attracting power of the moon is but one-sixth that of the earth, and that bodies thrown from its surface experience in consequence but one-sixth the retarding force they would have when thrown from the earth's surface.

Look again at the constitution of the meteorite,—made up principally of pure iron. It came evidently from some place where there is little or no oxygen. Now the moon has no atmosphere, and no water on its surface, or we should find it out by its refracting power.—There is no oygen there then. Hurled from the moon, these bodies—these masses of almost pure iron—would flame in the sun like polished steel, and on reaching our atmosphere would burn in its oxygen until a black oxyd coated it; and this we find to be the case with all our meteorites—the black color is only an external covering.

[According to the funny idea of D. Vaughan, of Cincinnati, these meteoric stones, if thrown from the moon, ought to keep whipping round our earth in small rings of moon dust—he has put forth the absurd doctrine that the rings of Saturn are the dust of two moons, which having lost their balance, were hurled to the planet and dissipated into dust—now whirling round in the form of rings.

MORE ABOUT THE "KILLER WHALE."—Since Lieut. Maury read his paper on the fish, before the Association for the advancement of Science, Lieut. Porter, U. S. N., has written a letter on the subject to the "National Intelligencer." The following is an extract from it:—

In Lieut. Maury's description of the whale, he made some remarks on a fish of the above species called the "killer." This fish is described in "Porter's Journal of a Cruise in the Pacific." This fish is so well known to the old salts of the whaling trade and Pacific cruisers, that I have always thought it equally well known to the scientific. Having, on more than one occasion, been an eye-witness of the attacks of this fish on the whale, I will attempt a description of it.

The killer is the wolf of the ocean, and hunts in packs, and their tall dorsal fin can be constantly seen above the water. This fish has always, as a companion, but swimming deeper, the sword-fish, and now and then can be seen the shark. On sighting their prey, which the killer sees at a great distance, the pack give chase; the unconscious whale is slowly moving near the surface, and occasionally spouting, as it were in sport, jets of water above him. But he now suddenly sees the "sea-wolf" near him. Instinct at once teaches him that on the surface he cannot be safe, and taking in a long breath, he flukes, that is, dives. But there has been another enemy watching him from the depths below, the "sword-fish," which now darts at him with the velocity of lightning and perforates the whale beneath with his long and spear-like nose.—This sends him at once to the surface; here he again meets with his enemy, the "killer."

[The rest of it is a description of the manner in which the sword-fish and "killers" dispatch the whale, and at last make a feast on his fat body.

TASTE AND SMELL IN CHEMICAL INVESTIGATIONS—Dr. Hilgrand read an interesting paper upon the intimate connection between taste and smell. The Dr. called the attention of the Section to the fact, that if the nostrils are closed, the sense of taste is lost, and a person is unable to distinguish sweet from sour. He had made many observations upon the subject, and he wished others to investigate the phenomenon also.

[We know that many chemists pay particular attention to taste and smell in qualitative analysis. These senses are given to man, and are just as useful as vision and hearing, though not so valuable. They are also capable of cultivation, and chemists would do well to improve the advice given above. At the same time great care must be exercised in using the sense of taste, for we have heard it stated, that Sir C. McIntosh, an excellent chemist, had his sense of taste entirely destroyed, by tasting chemicals. It is not safe, either, to taste some chemical compounds.

[Concluded next week.]

Fifty miles of the Egyptian Railway has been opened for traffic. Passengers to and from India now travel on it. The British have thus got a short cut of railway to their India possessions.