

ground) to Augusta, was 301 miles, and from Augusta to Savannah 146 miles, making the total connexion through the iron wire, 447 miles, and the distance through the ground from Columbia to Savannah, 135 miles. The clock was at Savannah. The arbitrary signals were given at Charleston. The observed clock excess was by 59 measures—+0s.056. The computed wave-time, for the above assumed velocity, was 0s.058, leaving a difference of +0s.002.

The third experiment was made at Cincinnati, on the 9th of May last, on the occasion of the meeting of the American Association for the advancement of science. The telegraph line was composed of 840 miles of iron wire, without ground connexion. The distances were as follows: from Cincinnati to Steubenville, 295 miles; thence to Cincinnati the same; thence to Louisville 125 miles, thence to Cincinnati the same. The personal clock signals were given by Mr. Stager, chief operator, at Cincinnati. In the first experiment the arbitrary signals were given by the operator at Steubenville, and recorded at Steubenville, and also on the two registers at Cincinnati, on opposite branches of the line. These registers, I will call, respectively, Stager and Jones; Stager being the register for the clock station. The observed excesses were, for Steubenville arbitrary signals, as follows:

Stager—Steubenville.....+0s.040 by 31 measures.  
Stager—Jones.....÷0s.039 by 31 “

Again, for the Jones arbitrary signals, on the Stager clock scale, we found:

Stager.—Steubenville.....—0s.004 by 39 measures.  
Stager—Jones.....+0s.050 by 226 “

The direction of the current from the platinum to the zinc, through the junction wires, was from Stager to Steubenville, thence to Jones, thence round by Louisville to Stager.

This is the first experiment made by the Coast Survey on a telegraph line of iron wire exclusively without ground connection.

The first conclusion to be drawn from this experiment is, that the excesses of the clock station readings in the experiments heretofore made, have not been owing to the fact that a part of the galvanic current has been made through the ground, since they are here found to be as great for the dimension of the line as in former experiments with the partial ground connexions.

This experiment was made with a long circuit of iron wire without ground connexion. It confirms the general conclusion respecting the value of wave time. It gives a new field for the discussion of the physical question, whether the wave is propagated round in one direction and only affects the magnets as it reaches them in succession in this direction, or whether the wave travels by the shortest direction from one magnet to another, without reference to the character of the pole. Our experiments with lines composed partly of ground and partly of iron wire stretched on poles, led to the preference of the latter view of the subject. The experiments at Cincinnati in 1851 raises some doubt on this conclusion; it was made with a single battery at Cincinnati and with 840 miles of wire all in the air. The work of this night was not as complete as I could have desired, I must therefore wait till similar experiments are made under more favourable circumstances before attempting a further examination of the question.

#### The Arctic Expeditions.\*

The return of the Phoenix steamer,—which, our readers will remember, was despatched with a transport to convey stores to Sir E. Belcher's searching squadron—puts us in possession of

intelligence from the Arctic regions of a most interesting and at the same time a very painful nature.

The leading feature of interest lies in the fact, that the problem of a passage for ships between the Atlantic and the Pacific Oceans, north of the American continent—a problem which has engaged the enterprise of maritime nations, and particularly of our own, for upwards of three centuries—has been finally solved. Capt. McClure has succeeded in navigating his ship from Behring's Strait, in the west, to within about sixty miles of Melville Straits,—and was, according to the last accounts, waiting only for the disruption of the ice to pass through those straits and return by the eastern outlet to England.—The problem had long since been stripped of all that portion of its interest which was reflected on it from the field of commercial speculation; but its solution, after ages of such perilous adventure as that by which it has been sought, is a great scientific triumph,—and adds fresh glory to the old and famous flag of England.

In lieu of the commercial interest which once attached to this long *vexata questio*, none better than the readers of the *Athenaeum* know how melancholy an interest of another kind has attached to the late years of adventure in these ice-bound seas:—and the painful part of the intelligence now brought home has reference to that latter subject of anxiety and suspense. The secret of ages has been yielded up at last, we have too much reason to fear, on heavy terms. The proud satisfaction which Englishmen must feel at the discovery of a North-west—rather, North-east—passage, is clouded by the sad fact, that the intrepid conquerors of this mysterious route have come on no traces of Franklin and his unfortunate companions.

When on the eve of sailing, Capt. McClure emphatically declared that he would find Sir John Franklin and Capt. Crozier,—or make the North-west passage. He has, geographically speaking, redeemed the latter part of this pledge:—but the fate of those gallant Commanders and their crews is hidden yet amid the dark and labyrinthine ice-paths of the Arctic seas. The scientific secret of centuries has been wrenched at last from the Spirit of the North;—but the human secret which in these latter days the heart of more nations than our own has so yearned to solve, he guards yet, in spite of all questioning, in some one of his drear and inaccessible caves.

It will be remembered by those who have followed the history of the Arctic Expeditions in our columns, that Capt. McClure was first lieutenant of Sir James Ross's ship *Enterprise*,—and having been promoted, volunteered for the second Expedition by way of Behring's Strait. He was appointed to the command of the *Investigator*, under Capt. Collinson, of the *Enterprise*; and proceeded with that officer to Behring's Strait in the early part of 1850. Capt. Collinson having failed to penetrate the pack ice, parted from Capt. McClure, and sailed to Hong Kong, where he wintered; but the latter, notwithstanding a signal of recall from Capt. Kellett of the *Herald*, who was the chief officer on that station, dashed onwards with a bold determination to force a passage to the north-east,—taking on himself all the responsibility of disobeying orders. Fortunately, his daring has been crowned with success; and it is not a little singular that Captain Kellett, who was the last person seen by Capt. McClure when he entered the ice on the west,—should have been the person to rescue him at the expiration of three years on the side of Melville Island on the east.

We learn from Capt. McClure's despatches—which are very voluminous—that on the 5th of August (1850) he rounded Point Barrow, the north-eastern extremity of Behring's Strait,—and then bore to the east, keeping near the shore. On the 9th, he passed the mouth of the Colville; and on the 11th, a notice was deposited upon Jones's Island, which was found thickly

\* *Athenaeum*.