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of the conditions seems to lead to another conclusion. The recent epidemic of tetanus in Camden, N. J., prompted the local Board of Health to send out a circular giving the facts collected by the Board. From this circular it appears that a bacteriological examination of the vaccine matter used in Camden showed it to be free from tetanus germs. The reason for the epidemic is found in the prevailing weather conditions, combined with carelessness on the part of persons recently vaccinated. There had been a long spell of dry weather, accompanied by high winds, which raised the dust, so that there were tetanus germs constantly present in the atmosphere. Infection resulted when the scabs had been removed, and the germs gained access to the wound.

R. DEC. WARD.

WIRELESS TELEGRAPHY.

THE readers of SCIENCE may be interested in the following editorial taken from the London *Electrician* of December 20. It seems to us also that the Marconi system cannot be expected to replace submarine cables, which form at present a network which appears almost as complicated on a small map of the world as the network of railways on an ordinary map of the State of Illinois. An attempt to substitute the Marconi system for existing cables would lead to a state of affairs closely analogous to the confused din in a stock exchange where each person makes more noise than all the rest. This analogy enables one to appreciate the limitations of wireless telegraphy. In the one case we have electrical waves and in the other case sound waves spreading in all directions from each sending station; and we must remember that Marconi's receiver is far inferior to the human ear in its ability to analyze a complicated system of waves falling upon it, or, in other words, to respond selectively to certain types of waves.

W. S. FRANKLIN.

"The current week opened with the startling announcement throughout the world that Mr. Marconi had succeeded in transmitting wireless signals across the Atlantic. By means of a

kite he had contrived, at St. John's, Newfoundland, to intercept waves transmitted from Cornwall, the actual receiver being a telephone and the actual 'message' the Morse letter 'S' at intervals of five minutes, as prearranged. The sounds were very faint, though they are declared by Mr. Marconi himself to have been unmistakable. Thursday, December 12, 1901, may prove, therefore, to be a date to be remembered in the history of wireless telegraphy. Within this apparently feeble result—three very faint clicks repeated at intervals of five minutes—there is to be seen the germ of ocean wireless telegraphy, and, perhaps, telephony. It is a germ that promises to develop into abundantly fruitful maturity. It is not in the interlinking of continents divided by an ocean, but rather in the overspreading of the ocean itself with telegraphic facilities that the power and fruitfulness of this latest achievement of Mr. Marconi is to be perceived. Submarine cables already link ocean-divided continents far better than wireless telegraphy can ever do. Long ago we pointed out that the true field of wireless telegraphy is across comparatively short distances of water—that, in fact, it is really a disadvantage to wireless telegraphy to be able to take in such a wide compass as an entire ocean. Indeed, when such immense areas are covered the probabilities of confusion and clashing of signals is a thousandfold increased.

Lest any section of the public should be disposed to regard Mr. Marconi's latest experiment as foreshadowing the replacement of submarine telegraph cables by wireless apparatus, we hasten to bid them dismiss the idea. No serious competition with submarine telegraphy can ever take place on a commercial basis, at any rate until the Marconi system is evolved into something very different from what it now is. This raises the interesting but thorny question of patent rights. Others besides Mr. Marconi will have something to say on this head. We do not say that Mr. Marconi will not succeed in sending messages between this country and America; but, having regard to the uncommercial conditions under which they must be sent, it is clear that the wireless channel of transmission will be rigorously avoided by business men, to whom a guarantee of secrecy and the certainty of a recorded message are absolutely indispensable. Wireless signals in the ether can never be secret; it must always be possible to intercept them. And messages received in no more permanent form than by sounds in a telephone are too evanescent and uncertain to commend themselves

to the purposes of commerce. Nor must it be overlooked that the speed of transmission by Marconi telegraphy must be extremely limited compared with the possibilities of the cable. It is, therefore, not the territory of the telegraph and cable companies that Mr. Marconi can successfully invade with his wireless telegraphy."

CLARENCE KING.

A MEETING of all the scientific men engaged in the work of the U. S. Geological Survey was held in Washington on Saturday, December 28, to express their profound sorrow at the death of Mr. Clarence King, first Director of the Survey. Short but appreciative addresses, eulogistic of the life and work of Mr. King were made by Major J. W. Powell, the successor of Mr. King as director of the survey; Hon. Charles D. Walcott, the present director, and Mr. S. F. Emmons. At the request of the director Mr. Arnold Hague read the following tribute to the character and achievements of Mr. King, which was unanimously adopted by those present as an expression of their admiration of his life and their bereavement in his death:

"It is with profound sorrow that we learn of the death of Clarence King, the first director and, in a sense, the founder of the Geological Survey. In him we have lost not only a great scientific leader, but a genial and accomplished gentleman, whose personal qualities endear him to all who knew him, and whose many acts of loving kindness have left a wide circle of friends in all walks of life to mourn his untimely death.

"As organizer and, during ten years, Chief of the United States Geological Exploration of the Fortieth Parallel, he set higher standards for geological work in the United States and laid the foundations of a systematic survey of the country. He gave practical recognition to the fact that a good topographical map is the essential basis for accurate geological work.

"As first director of the present Geological Survey, he laid down the broad general lines upon which its work should be conducted and which, as followed by his able successors, have led to its present development. He established the principle that a geological survey of

the United States should be distinguished among similar organizations by the prominence given to the direct application of scientific results to the development of its mineral wealth.

"In that essential quality of an investigator—scientific imagination—no one surpassed King, and his colleagues have all profited by his suggestiveness. He was never content with the study of science as he found it but always sought to raise the standard of geology as well as to apply known principles to the survey of the country.

"King first introduced microscopical petrography into American geology and, as early as his Fortieth Parallel work, he foreshadowed the application of exact physics to questions of geological dynamics. Early in the history of the present survey he established a physical laboratory. One result of this step was a paper on the 'Age of the Earth' which takes very high rank among modern scientific memoirs. Although in his last years circumstances rendered it necessary for him to devote most of his time to other occupations, he had by no means abandoned plans for geological investigation on a scale worthy of his reputation.

"In Clarence King geological science in America will miss a pioneer and a leader; the Geological Survey loses its broad-minded founder and adviser, and its older members a beloved friend."

MAP OF THE PHILIPPINES.

THE *National Geographic Magazine* publishes as a supplement to its January number a map of the Philippines—5 feet 2 inches by 3 feet. The map is on the scale of 15 miles to an inch and was prepared by the U. S. Signal Office. Every town or hamlet known by the Jesuits or reported to the War Department by its many officers throughout the islands is indicated on the map. It is a compilation of everything now known about the Philippine Archipelago. Sheet I. gives the Northern Philippines and Sheet II. the Southern Philippines, as officially divided by the United States Government. A glance at the map shows how much exploration is needed