and reported for duty without serious accident or illness of any of its members.

Reports on the minerals, birds, general character of the country and its inhabitants, the fur trade, etc., from Engineer McLenegan, accompany the report to Capt. Healy, commander of the Corwin, from which the above notes are derived. The Kowak abounds in salmon, pike, and white-fish, which are dried by the natives. The white spruce is the largest and most abundant tree. The natives are all Innuit or Eskimo; and their numbers in this region are estimated at three hundred and fifty on the Nunatok, two hundred and twenty-five on the Kowak, and two hundred and fifty on the Selawik lakes and rivers. The coal-belt is about thirty miles wide, and is probably lignitic, resembling the small seam near Nulato, on the Yukon. The 'color' of gold was obtained almost everywhere, but it is doubtful if it would pay to work it. Beds of a beautifully mottled serpentine, used by the natives for ornaments, were found in the mountains near the Kowak, as well as the so-called 'jade,' used far and wide for the most costly and elegant stone implements, which is perhaps the variety of pectolite recently described by Clarke from specimens got at Point Barrow. Seventy-seven species of birds were collected, mostly of species common to the Yukon region, among which the rock ptarmigan and white-tailed godwit (L. uropygialis?) are noteworthy, as well as the great white-billed loon (C. Adamsi).

Commercially the most important result of the expedition is the indication of a route by which whalers or others, held by the ice eastward from Point Barrow, might find a comparatively available way to the settlements on the Yukon, *viâ* the Colville and Kowak rivers, and through the Koyukuk valley. Geographically the journey of Lieut. Cantwell is the most important of the past year in America; and its results, taken in connection with those of Lieut. Stoney, who subsequently passed over nearly the same route, will give us an approximate knowledge of a considerable area which has hitherto been almost a blank upon the best maps.

THE CHOLERA BACILLUS. — KOCH'S REPLY TO HIS CRITICS.

THE doubts that have arisen in many minds in regard to the specific nature of the cholera bacillus of Koch may be in some measure dispelled by the latter's answers to his critics in a recent number of the *Deutsche medicinische wochenschrift* (No. 45, 1884). In it he shows the differences between the cholera bacillus and that found in the mouth (*Lancet*, Sept. 20, 1884), and then takes up the work of Finkler and Pryor. He shows that they have not obtained pure cultures (this from specimens of their own); that their bacillus is larger and thicker, more rapid in growth, and very different in 'culture-form.' In examinations of three cases of 'cholera nostras,' he failed to find the 'comma bacillus.' Koch has also succeeded in producing cholera by the inoculation of one one-hundredth of a drop of a solution of a pure culture. This produced death in rabbits and guinea-pigs in from one and a half to three days, when placed in the duodenum. The appearances *post mortem* were those of the human subject in death from Asiatic cholera.

In addition to this, we have the confirmatory evidence of E. van Ermengen in a communication to the Belgian microscopical society, Oct. 26, 1884 (*Lancet*, Nov. 29, 1884). This observer found the comma bacillus in the intestinal fluids of eight autopsies and thirty-four examinations of stools. He considers that its peculiar-shaped, chain-like groups and occasional wavy filaments distinguish it completely from other bacteria. He finds that it is more or less abundant, according to the stage of the disease; and in two cases (*foudroyant*) they were present almost as in a pure culture. They disappear during reaction.

Premonitory diarrhoea was not investigated for the presence of the organism, for lack of time. In cases of algide cholera, where no bacilli were found in the stools, culture of the most minute portion produced enormous numbers of the organism within twenty-four hours. He considers that the presence of the organism is diagnostic of cholera, and that the method of microscopic examination in conjunction with cultures should be adopted in all doubtful cases. By thus settling the diagnosis early, efficient prophylaxis against the spread of the disease may be established. He found no spores, and considers their absence probably established by the want of resistance to drying of this organism. He finds precisely the same differences between the cholera bacillus and those of Lewis and of Finkler and Pryor, and exactly the same objections to the latter's work, as does Koch (*loc. cit.*). He, as well as Koch, succeeded in producing cholera by inoculation of one drop of a culture, extending over four days (this in dogs, guinea-pigs, and rabbits). The cadaveric appearances were those of cholera; and the intestinal fluids contained many comma bacilli, from which further cultures were made. He thinks that the pathogenic action of these bacteria is very likely due to some product of their growth in the material in which they are sown, and closes his communication by advising that physicians generally should be instructed in the methods of microscopic search for these organisms in order to the early determination of the existence of the disease, and all that that implies. This is a recommendation which might be made in this country, and adopted with much benefit to the community at large.

Such observations as these furnish strong evidence that the world is again indebted to Koch for his labors in the investigation of disease, and that the links connecting his cholera bacillus with cholera as its specific cause are being forged into a complete chain of evidence.

In regard to the organism itself, we have received within a day or two a slide containing masses of bacilli from a pure culture. The preparation is a very beautiful one; and its authenticity is undoubt-

ed, inasmuch as it was put up and forwarded by Koch himself. It shows all the peculiarities of shape described by him, and most certainly bears out the assertion that it possesses distinguishing characteristics from other bacteria. In form and arrangement, it differs markedly from any other organism with which we are acquainted, either those found in the intestines or elsewhere.

SCIENCE IN MANCHESTER.

A centenary of science in Manchester. (In a series of notes.) By R. ANGUS SMITH, Ph.D., LL.D. London, *Taylor & Francis.* 475 p. 8°.

THE progress of literature and science in Manchester, Eng., is full of interest to Americans. It is not only that the city is full of life and vigor, and that its relations to the United States are very close, but there is a sort of western freshness in all its undertakings. Owens college is not yet forty years old; the Victoria university is more recent than Johns Hopkins; the Literary and philosophical society of Manchester is younger by several years than the American academy and the American philosophical society; and the Free public library is the junior of the Astor library in New York. Manchester has grown during this century more rapidly than Baltimore, and its wealth has increased at a rate which is still more remarkable. Under these circumstances, we have examined with some curiosity the volume prepared for the hundredth year of the Literary and philosophical society of Manchester, 1881.

Among the many honorable names commemorated in it, two are pre-eminent, — Dalton and Joule. The former established the science of chemistry on the basis of the atom: the latter ascertained the mechanical equivalent of heat. Referring to these great discoverers, Dr. Smith expresses his belief that there has been "a law in the recesses of humanity which has caused the influence of the community to concentrate itself, first into the Society, and then, through particular members, into the theory of chemistry, equivalents of atoms, and their connection with mechanical force, — the knowledge of which must influence mankind forever." Dalton's development of the atomic theory was preceded by other noteworthy contributions to science, — his discovery of color-blindness, his epoch-marking essays in meteorology, and his elaborate inquiry on the force of vapor; to all of which brief reference is here made.

Joule was a pupil of Dalton; "a follower," says Smith, "worthy of the prophet; . . . a pupil who has become the master of many learners." The relations of these two men are thus described. "The idea of units of *measure* in Dalton's mind developed itself gradually into the idea of units of *force* in the mind of Joule. . . . To say that the two are the most successful descendants of the great thinkers who have grappled with the subject of atoms for three thousand years, is but to express a simple fact; and to assert that Dalton and Joule have made the great leading discoveries on the subject is simply to follow history. From one we learn the order in which the ultimate particles of bodies move: from the other we learn the force and relation of their movements in those great phenomena, heat, electricity, and mechanical force."

There are other stars in the Manchester firmament. Among them are William Fairbairn, builder of the tubular bridge at Menai, a man of 'wonderful instinct' as an engineer; and his more scientific coadjutor, Eaton Hodgkinson. Sir John Hawkshaw, Sir Henry Roscoe, and Professor Balfour Stewart are famous among recent members of the society. The laboratory of Dr. Edward Schunck is said to be the finest private laboratory in the country. The founder of the society, Dr. Thomas Percival, a physician of great repute, who had the skill to elicit the best co-operation of other men, is commemorated by Dr. Smith as one who foreshadowed some of Darwin's views. His contemporary in the society, Charles White, Dr. John Ferriar and the three Henrys, also receive due notice; and so does Thomas Cooper, afterwards of Columbia, S.C., whose name has recently been brought to mind by allusions to it in the autobiography of Dr. Marion Sims.

The comments of Dr. Smith on the present state of the society are suggestive. First, he recognizes a disposition, on the part of the Manchester investigators, to send their papers to the Royal society of London. "It is useless to complain of this: it is a phase of national life, and it will probably grow stronger for a time, until this sub-centre becomes sufficiently brilliant to make men feel that it is an object of great ambition to become distinguished here." The writer thinks that Manchester has allowed its forces to be too much scattered. Next he pleads for enlarged quarters. The members of the society are unwilling to leave the rooms where Dalton studied, which were his home from morning until evening for the greater part of his life; but more space is demanded. Third, he answers the