SCIENCE

FRIDAY, AUGUST 3, 1888.

A RECENT NUMBER of the Journal of the Society of Arts contains information of the projected railways in Asia Minor. A new railway is projected from Constantinople to Bagdad, to start from Ismid, the present terminus of a short line of railroad connecting that town with Scutari, the Asiatic suburb of Constantinople. Its length is about 1,400 miles, and the estimated cost is $75,500,000. Throughout its length it will traverse a country well populated, abounding in mineral resources, and producing great quantities of grain. British consul Jewett, of Sivas, says that the great advantages to the country, commercially and as a civilizing influence, of such a road are too obvious to need mention. It is sufficient to say that it would create a new Asia Minor, open to the trade of the world a vast territory now closed, totally change the character of the country and the people, and practically advance Turkey in Asia from the sixteenth to the nineteenth century; moreover, the commercial world at large has a special interest in this project, as it will, if carried out, shorten the distance between Europe and India by nine or ten days, and give a route to the East independent of the Suez Canal. Should the railroad be built, it is said that Bagdad, as the *entrepôt* for the trade between the East and the West, is sure to attain a commercial importance hardly second to any city in the East. With the advent of the railroad, with the new towns and cities that will spring up, the new resources and industries developed, and especially with the new ideas and wants which civilization creates, there will be a new market, and a constantly increasing demand for almost everything which Europe and America manufacture.

WITH THE REAPPEARANCE this spring of our native birds in great numbers we expected to hear from some of our ornithologists as to a reasonable explanation, The reappearance was first noted in the New York papers, and was promptly credited to the liberal destruction of the pugnacious English sparrow, unable to withstand the storm-beating received in the great March blizzard. But counter to this explanation comes information from Illinois that the attention of all is attracted to the remarkably large number of birds that are to be seen. The groves, the woods, and the meadows in the country, and the many trees in the city, are peopled with these feathered visitors. The oldest inhabitant does not remember to have seen so many and such a variety of birds. And yet the great blizzard did not visit Illinois. The July *Auk*, the quarterly organ of the ornithologists, contains no hint as to the cause of this sudden return of the old birds, which we had been led to believe were so vastly reduced in numbers that only after a long respite from the attacks of the sparrows and the country's shotguns could they possibly be restored to us in their former numbers. The birds are here, as numerous as ever, and have returned *en masse*.

THOMAS HUMPHREY WARD has published a 'Letter to the American People' on international copyright in works of art. The special occasion of this letter was the placing in his hands by a friend of a parcel of 'process' engravings and a number of trade catalogues issued by American publishing houses. These process engravings, and the grievance to which they have given rise, are an entirely new fact in the world of art. They are the result of the most modern improvements in the art of reproducing pictures. They bear many names. They are called 'artotypes,' 'heliotypes,' 'albertypes,' but they are all varieties of the same method, — the method of applying photography to the purposes of engraving. They are, in fact, reproductions in photo-engraving of the best, the costliest, and the most popular modern English and French engravings and etchings. They are of imposing size, the artotypes measuring, when mounted, thirty inches by forty, and thus approximating to the dimensions of the engravings which they copy. They are showy, effective, and, to use the language of the workshop, 'well got up.' They are in no sense botched or bungled. They are quite a different thing from the German lithographs of our childhood, those *naïve* attempts in art by which the last generation of continental contrabandistas used to impose upon an unsophisticated world. These things are as like the works they counterfeit as the sun and the printing-press can make them. During the past ten or fifteen years, that is to say, since the recent great development of 'processes' has enabled American publishers to destroy the American demand for the first-hand works of European artists, their remuneration has fallen to a great extent. Fifteen years ago it was quite a common thing for an artist like the late Mr. Cousins to be paid a thousand pounds for a mezzotint plate, for the publisher who commissioned him knew that there were a sufficient number of buyers in Europe and America, taken together, to make such an outlay remunerative. It is not asserted that there are no longer men who can command a similar price, but they are so few that their existence hardly makes a difference in the question. In the case of one or two Englishmen, and one or two French or Dutch etchers, it is still possible for the publishers to give these heavy commissions. Fashion still points that way, and while the fashion lasts these men can be employed; but in the case of the great majority, even of distinguished engravers, the demand for their work is lamentably less than it was, not from any failure of appreciation on the part of the public, not from any failure of power on the part of the engravers, but simply because the returns are less than they used to be, and less almost exclusively on the American side.

IT IS THE CURRENT BELIEF that there has been nothing like the present Cincinnati Exposition since the great one at Philadelphia in 1876. People who were at New Orleans is 1885 say that this is enormously superior in all the arts, especially upon the mechanical and industrial side. The Exposition covers fifteen acres in the very heart of the city, and in every part of this large area one meets evidences of taste, skill, ingenuity, and perseverance in adapting means to ends, which form a series of apparently never-ending surprises as one passes from one exhibit to another. The government exhibits are all good and all characteristic. The Smithsonian Institution and the Geological Survey exhibits attract crowds. In the latter Prof. F. W. Clark has some transparent photographic views, represented in colors by some new and as yet undisclosed process. The effect is wonderfully natural and beautiful, and if it is found to be durable it will prove a great discovery. The very fine models of the new classes of naval vessels now building attract crowds daily, as do the various forms of weapons for wholesale slaughter in case we ever have another war. In close juxtaposition are the ingenious devices for saving life in cases of shipwreck, of the Life Saving Service. The Fish Commission exhibit is not as yet complete. In such elaborate displays, requiring much preparatory work, more time should have been allowed for preparation. The Post Office Department and the Army exhibits are also incomplete, but a few days will find every thing in order.

IN A RECENT NUMBER of *The Forum*, Mr. Lester F. Ward has an article on 'What shall the Public Schools Teach?' In this article Mr. Ward maintains that in refining upon the blessings of education we forget altogether what knowledge is for. His definition of civilization being that it consists in 'the utilization of the materials and forces of nature,' he holds that so far as the improvement of man's estate is concerned we know only in order to do, that knowledge unapplied is sterile, and is only fruitful when it makes two blades of grass grow where only one grew before, when it converts 'raw material' into useful objects, or when it directs into some useful channel the forces of nature which were previously running to waste or doing injury to man. Mr. Ward believes that nowadays all inventions are in the nature of 'improvements' upon pre-existing inventions, and are chiefly made by the mechanics or artisans of the higher grades, who are constantly using the original devices, and who, through an intimate acquaintance with these, eventually perceive how they may be improved; that as artisans become more intelligent this class of inventions will increase, and that nothing but the stolid ignorance of the working-classes in the past has prevented this from having always been the chief mode of advancing the useful arts; and the hope is expressed that in the near future the artisan as well as the engineer may not only receive a good education in the hitherto accepted sense of the term, but may also have such a training of the eye and the hand as will enable him to perceive and to effect all possible reforms in his chosen field of labor. Everywhere we see the lack of thought directed to the improvement of our material surroundings. If this is because the importance of improving those surroundings forms no part of the education which is given to the youth of the country, there is reason to believe that any system of education which will tend to develop the human powers of dealing with materials and forces will tend to raise the plane of civilization as defined. Mr. Ward even looks forward to the day when the need for the use of the human animal for the lowest forms of unthinking labor will be done away with, which would simply mean that there would be less opportunity for life among those of low intelligence, and that the 'average man' would be on a higher plane than at present.

This tendency to educate youth so that man may be the better able to deal with his material surroundings is doubtless wise, but brings forth a remonstrance occasionally from those versed in the old ways, who hasten to point out the other sides to a man's nature which come in contact with other conditions which he should be equally ready to contend with, or perhaps better to appreciate. The recently published life of the most illustrious and most amiable man of science of this scientific age has suggested to many readers doubts of the all-sufficiency of science to build up, not theories, but men. Mr. Darwin's admirably candid avowal of the gradual extinction in his mind of the æsthetic and religious elements has proved startling to a generation which, even when it is ready to abandon religion, would be direfully distressed to lose the pleasures afforded by art and nature, poetry and music. Instead of lifting the scientific vocation to the skies (as was probably anticipated), this epoch-making biography seems to Miss Frances Power Cobbe, writing of 'The Scientific Spirit of the Age,' in the *Contemporary Review*, to have gone far "to throw a sort of dam across the stream, and to have arrested not a few science-worshippers with the query," as Darwin wrote: "What shall it profit a man if he find the origin of species and know exactly how earth-worms and sun-dews conduct themselves, if all the while he grow blind to the loveliness of nature, deaf to music, insensible to poetry, and as unable to lift his soul to the divine and eternal as were the primeval apes from whom he has descended? Is this all that science can do for her devotee? Must he be shorn of the glory of humanity when he is ordained her priest? Does he find his loftiest faculties atrophied when he has become a 'machine for grinding general laws out of large collections of facts'?"

THE COAST AND GEODETIC SURVEY EXHIBIT AT CINCINNATI.

THE exhibit of the United States Coast and Geodetic Survey at the Cincinnati Exposition shows the principal instruments used in the geodetic, astronomical, topographical, hydrographic, and magnetic work of the Survey, with illustrations of the results of their use, as shown by a series of the annual reports, a number of the principal charts published, a collection of the more important scientific papers or works printed by the Survey, a model of an observing tripod as used in geodetic work, and models showing the basins of the Gulf of Mexico and of the western Atlantic, or 'Bay of North America,' constructed from the data furnished by the elaborate hydrographic surveys of those waters. The collection further includes an exhibit from the United States Bureau of Weights and Measures, which is under the care and direction of the Superintendent of the Coast and Geodetic Survey.

The Exposition occurs at a period of the year when many of the best instruments of the Survey, containing the latest improvements in their several departments of use, are in the hands of field parties and cannot be exhibited. To aid those interested in the exhibit, a pamphlet has been issued by the Survey explaining the instruments shown and their uses.

The great end and chief object of the Survey is, and has been, for a period of half a century, to furnish good and reliable charts of the coasts of the United States, and of its harbors and navigable rivers. These require in their construction a combination of skilful labor, differing greatly in means, appliances, and methods.

First in order is the reconnaissance and triangulation. Next comes the topographical survey of all that portion of the earth's surface which lies above the water. It includes all accidents of ground, all natural or artificial developments of surface, and every thing useful for purposes of commerce or defence.

Third in the chronological order of conducting a survey, but equal in its usefulness, is the development upon the chart of all that portion of the earth's surface which lies beneath the water. This important work is carried on by officers and enlisted men of the navy of the United States. There are 67 officers and 280 petty officers and seamen now engaged upon this duty. The instruments used in the work are only partly shown.

Although one of the minor branches of the operations of the Survey, the study and the application of the results of terrestrial magnetism from a practical point of view are of great importance, not only to the surveyor, but also to the mariner, to whom they are indeed indispensable.

This will be readily understood by simply referring to the extended use surveyors have made of the magnetic needle for the demarcation of land and the consequent frequent necessity of retracing old lines so laid out and recorded.

With reference to the use of the compass at sea, the charts of the Survey require the impress of the compass, they record the variation of the needle, and state the annual change so as to render the sailing directions applicable for other years than that of the issue of the chart. With reference to the adjustment of the compass on board ship, and the construction of deviation tables to answer for different directions, inclinations, and positions of the ship, a knowledge of the magnetic dip and the intensity is demanded. The labors of the Survey and their results may best be shown by a short historical review.

In the early years of the Survey under its first superintendent, the magnetic declination (the scientific term equivalent to the mariner's 'variation') was supplied to the charts as found by the ordinary nautical instrumental means then in vogue. In the Transactions of the American Philosophical Society (Philadelphia, 1825), he proposed to measure relative magnetic intensity by means of oscillations of a needle. The magnetic work of the Survey, however, may be said to have commenced in its three-fold aspects, the declination, the dip, and the intensity, with his successor in office in 1843. Professor Bache had previously made a magnetic survey of Pennsylvania, which, although a scanty beginning, was not followed until in quite recent years by the magnetic survey of Missouri. He imported new instruments suitable for more refined measures of the declination than could be secured by the older in-