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Contents.

(Illustrated articles are marked with an aster sk.)

TABLE OF CONTENTS OF

SCIENTIFIC AMERICAN SUPPLEMENT

No. 817.

For the Week Ending August 29, 1891.

Price 10 cents. For sale by all newsdealers.

THE FAST TRIP OF THE TEUTONIC.

Although it is by about an hour and a half only in a voyage of more than five days and a half that the Teutonic has beaten all previous passages across the Atlantic, the record is more impressive when we note in comparison the progress made in the past twenty-five years in increasing the speed of ocean steamships. In 1866 the Scotia was a record breaker when she made the trip in 8 days, 2 hours, and 48 minutes. From 1873 to 1880 the best records were between 7 and 8 days, but in 1882 the Alaska was styled the Atlantic greyhound on first making the trip in less than 7 days, her time being 6 days, 18 hours, and 37 minutes. This time was further successively reduced by the Oregon, America, Umbria, and Etruria, but it remained for the City of Paris to first make a record below 6 days, when, in 1889, she made the voyage in 5 days, 19 hours, and 18 minutes, a record first broken this month by both the Majestic and the Teutonic.

To those who, reasoning from these data, conclude that we shall continue to go on in the same ratio, lessening the time required to cross the Atlantic by the building of more powerful steamships, an extended consideration of the difficulties involved would be superfluous. Something will probably be gained, it is true, and it is semi-officially announced that the Cunard Company has prepared plans for the building of a twelve thousand ton steamer, designed to make the voyage in five days, but the greatly increased power that will be required, and the added strength called for in the machinery, to make this gain of a few hours in a ship designed to be commercially successful, present problems to be solved only by the highest engineering skill. The beautiful workmanship and the tremendous power of such great engines as those of the Teutonic and Majestic seem indeed to represent about the acme of present attainment, and the utilization of steam has reached a point hitherto unknown, but he would be a bold man who would, for these reasons, attempt to set a limit to the possibilities of the future.

"ALLEGED DECEPTIONS IN GERMAN STEEL WORKS" CORRECTED.

The proceedings in the Prussian courts of Essen, quoted in these columns, 8th inst., from a statement published on an erroneous report in the London *Iron and Steel Trades Journal*, were an action brought by the state to prosecute both the author and editor of a local partisan paper on charges of violation of the statutes regulating the privileges of the press. They were indicted for writing and promulgating articles assailing the honor and integrity of a number of citizens, residents of Bochum, both of private and of official standing, charging them with malice aforethought in incensory language with fictitious crimes against the fiscal laws for the purpose of disseminating hatred among the different classes and religious denominations of society and for inciting insurrection. One of the calumnies went to show that the Board of Assessors of Taxes, in connivance with the city authorities in all their numbers, including in their capacity as members of the Common Council the Director-General and some officers of the Bochum Verein, a society for mining and cast steel manufacture, to grossly undervalue the income of every one of their number, and many of their favorites, especially Protestants, some as high as 90 per cent, and to overestimate the people of the middle and lower grades of income, especially Catholics. All the libeled parties appeared on summons as witnesses for the state with straightforward, clear and overwhelming testimony.

The author in his defense evinced great antagonism in violent attacks upon one person especially, the director-general of the steel works, Louis Baare, who stood ready to support separate and aggravating charges of outrages committed upon himself and the great industrial institute he represents. To impair his testimony the defendant charged him with using counterfeit stamps upon inferior and rejected rails and other railroad material, thus making it pass for good. The state's attorney finding that a denunciation to that effect had been made before a magistrate the day previous, temporarily withdrew the separate charges concerning offenses against Baare, in order to avoid delay by postponing the case pending the investigation of the new matter. The latter resulted in the dismissal of the deponent's charge, which during the further course of proceedings was declared unfounded. The defendants were convicted of all the charges preferred, found guilty, and sentenced to a term of imprisonment. Baare, in behalf of the Bochum Verein, had in the meantime deposited in court documentary evidence proving that stamps were regularly and legitimately made at the works upon order and for the proper use and convenience of contracting parties and their representatives, who stamped with them their tested material on acceptation.

The Prussian ministerial department of railroads has published since a table, showing from railroad statistics the accidents which occurred each of the last six years, numbering in all 2,672 cases, of which there was only one wherein a broken rail was a cause, and that only from being struck by a broken wheel.

Contradiction of the felonious charge has followed from railroads named in the same. The stenographic reports of the court proceedings, and state documents published in German official papers, are the sources of the aforegoing narration of this much abused affair.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The first session of the fortieth meeting of this body was held in Washington, August 19. Prof. Goodale, of Harvard, relinquished the presidency to Prof. Prescott, of the University of Michigan. Eight addresses were delivered by the several vice-presidents before their respective sections, the subject of Vice-President Stevenson, of New York, being a study of the Chemung and Catskill groups in relation to the geology of the State of New York. E. W. Hyde, of Cincinnati, addressed the Section of Mathematics and Astronomy on "The Evolution of Algebra;" Prof. J. A. E. Nipher, of St. Louis, the Section of Physics on "Functions and Nature of the Ether of Space;" Prof. R. C. McKenzie, of the Agricultural College of Michigan, the Chemical Section on "Alchemy;" Prof. Thomas Gray, of Terre Haute, Ind., the Mechanical Section on "Problems in Mathematical Science;" Prof. Joseph Jastrow, of Madison, Wis., the Anthropological Section on "The Natural History of Analogy;" and Prof. John M. Coulter, President of the Indiana University, the Biological Section on "The Future of Systematic Botany."

The evening was devoted in part to the annual address of the retiring president, Prof. George L. Goodale, of Harvard, on "Some of the Possibilities of Economic Botany."

The programme of the second day included papers in all except the mechanical section. A technical paper on "A Measure of the Reliability of Census Enumeration" was read by Alexander S. Christie, of Washington. "A National University, Its Character and Purposes," and "The Science and Art of Government" were titles of papers by Lester F. Ward, of Washington. W. J. McGee read a paper on "The Southern Old Fields," followed by one by Colonel Hinton on "Agriculture by Irrigation; Some Social Economic Possibilities." C. R. Dodge read a paper on "The Needs of the American Flax-Fiber Industry," and exhibited samples of flax.

The Biological Section was much interested in "Another Chapter in the History of the Venus Fly Trap," by Dr. J. M. MacFarlane, of Edinburgh. Among other papers read in this section were "Notes on the Physiological and Structural Changes in Cayuga Lake Lampreys" and "The Transformation of the Vermilion Spotted Newt," Simon H. Gage; "On the Kinds of Motion of the Ultimate Units of Contractile Living Matter," John A. Ryder; "A New Nectria," Byron D. Halstead; "The Flora of Carmen Island," Joseph N. Rose; "Uses of the Fermentation Tube in Bacteriology, with Demonstrations," Theobald Smith; and "The Foraminifera, with a New Device for the Exhibition of Specimens," James M. Flint.

In the Geological Section the topics were: "Source of Supply to Lateral and Medial Moraines," by John T. Campbell; "New Meteoric Iron from Arizona containing Diamonds," A. E. Foote; "Post-Glacial Anticlinal Ridges near Ripley and Caledonia, New York," G. K. Gilbert; "Purposes of Mountain Building and their Relationship to the Earth's Construction," Warren Upham; "Notes on an Extinct Volcano at Montreal, Canada," Henry Lampard; "On a New Horizon of Fossil Fishes," E. D. Cope; "On the Age of the Mount Pleasant, Ohio, Beds," Joseph F. James; "Preliminary Report of Observation at the Deep Well near Wheeling, W. Va.," William Hallock; and "The Eureka Shale of Northern Arkansas," T. C. Hopkins.

In the Astronomical Section the topic was "Latitude of the Sayre Observatory," the title of a paper by C. L. Doolittle, and "The secular variation of terrestrial latitudes," by George C. Comstock. Among other papers in this section were: "On a digest of the literature of the mathematical sciences," Alexander S. Christie; "Groups of stars, binary and multiple," G. W. Holley; "Note on some recent photographs of the reversal of the hydrogen lines of solar prominences," by J. A. Brashear; and "Standardizing photographic film without the use of a standard light," Frank H. Bigelow.

Among the papers before the Chemical Section were: "Preliminary notes on the influence of swamp waters on the formation of the phosphate nodules of South Carolina," Chas. T. Reese; "Land and river phosphate pebbles or nodules of Florida," E. T. Cox; "A latent characteristic of aluminum," Alfred Springer; "The influence of negative atoms and groups of atoms on organic compounds," Paul G. Freer; "The calculation of the boiling points of isometrics from their moment of inertia," and "The determination of the true position of the carbon atoms in organic compounds by means of analytical mechanics," Gustavus Hinrichs;

"Distribution of titanic oxide on the earth's surface," F. P. Dunnington.

Among the papers in the Anthropological Section were: "The essentials of a good education, with a new classification of knowledge," M. H. Seaman; "The custom of kava drinking as practiced by the Papuans and Polynesians," Walter Hough; "A linguistic map of North America," J. W. Powell; "Jade implements from Mexico and Central America," Thomas Wilson; "On a collection of stone pipes from Vermont," G. H. Perkins; and "The importance and methods of the science of comparative religion," Merwin Marie Snell. Professor Powell's ingenious map attracted much attention.

Diamonds in Meteors.

BY H. C. HOVEY.

A remarkable paper was read at the Washington meeting of the A. A. A. S., by Prof. A. E. Foote, of Philadelphia, describing a new locality for meteoric iron near Canon Diablo, Arizona, fragments of which contained diamonds. The report at first was that a vein of pure iron, two miles long and forty feet wide, had been found, containing also gold, silver, and lead; and that surface iron could be gathered by the carload. That was in March of the present year. Prof. Foote explored the region thoroughly in June, without finding any such vein; but what he did find was of great geological and mineralogical interest.

Crater Mountain, 185 miles north of Tucson, is a peculiar circular elevation, strikingly like an old crater. It rises 432 feet above the surrounding plain, and its cavity is three-fourths of a mile in diameter. Its interior walls are so steep that animals once entrapped within them never escape, but leave their bleached bones at the bottom. The rim, of sandstones and limestones, is uniformly uplifted on all sides at an angle of 40°, while the bottom lies at a depth of from 50 to 100 feet below the general level of the plain. Although the cavity is thus crateriform, no lava, nor obsidian, or any other volcanic product was found. Small meteoric fragments were scattered over an area about a third of a mile in length and 120 feet wide, and extending northwest and southeast. Exactly in line with it, but about two miles from the base of the crater, were found two large masses, one weighing 154 pounds and the other 201 pounds, which were on exhibition, both of them deeply pitted, and the larger one perforated in three places. The latter is now the property of the Ecole des Mines, Paris. Smaller masses were also found, numbering 131 in all, ranging in weight from one-sixteenth of an ounce to 6 pounds 10 ounces. Several of them were coated with arragonite. About 200 pounds of angular sulphureted fragments, also of meteoric origin, were found near the base of the crater, a few of which showed a greenish stain from oxidized nickel.

A fragment of a mass weighing 40 pounds was examined by Prof. G. A. Koering, who found it to be extremely hard, a day and a half being taken in making a section and several chisels being broken in the operation. An emery wheel was ruined in trying to polish the section. This led to closer inspection of certain exposed cavities, where small black diamonds were found that cut polished corundum as easily as a knife might cut gypsum. These diamonds are mineralogically of great interest; the presence of such in meteoric having been unknown till 1887, when two Russian mineralogists found traces of diamonds in a meteorite mixture of olivine and bronzite. By treating with acid the amorphous carbon in the cavities, a small white diamond, one-fiftieth of an inch in diameter, was found, as well as troilite and daubreelite. The general mass was three per cent nickel. The Widmanstattian figures were not regular. The indications are that a large meteorite, weighing about 600 pounds, had become oxidized in passing through the air, and burst before reaching the earth. It is hardly credible that the crater could be accounted for by meteoric impact, and its origin is a problem unsolved. The fact of special interest may be accepted as proved, that diamonds have been found in meteoric fragments. The specimens were carefully examined by the geologists present at the reading of Prof. Foote's paper, and while there were many opinions expressed as to the so-called "crater," and as to its relation to the meteor, none doubted the genuineness of the diamonds.

POSITION OF THE PLANETS IN SEPTEMBER.

JUPITER

is morning star until the 5th, and then evening star. He is in opposition with the sun on the 5th, at 5 h. 12 m. P. M., when he appears on the eastern side of the sun, rises at sunset, is on the meridian at midnight, and is visible the entire night. It is the culmination of his career for the present year, and glorious is none too strong a word to give expression to the majestic grace with which the prince of the solar family treads his starry path during September nights.

Planets have two periods. The sidereal period is the time of a planet's revolution around the sun, from a star to the same star again, as seen from the sun. The synodic period is the time between two successive conjunctions of the planet with the sun, as seen from the earth.

Jupiter's sidereal period is 11.86 years, so that it takes him nearly 12 years to complete a revolution through the constellations of the zodiac, and he, therefore, requires a year to make his way through a zodiacal constellation. He will be found in Aquarius during the present year, in Pisces during the next year, and so on.

Jupiter's synodic period is 399 days, a little more than a year and a month, a number easily remembered, and one which makes it easy to calculate his successive oppositions. Jupiter's opposition occurs this year on September 5. It will occur 34 days later in 1892, or about October 9. It will thus be seen that the careful observer may readily keep the run of Jupiter's position in the zodiac, and the date of his opposition from year to year.

The moon is in conjunction with Jupiter on the 17th, the day before the full, at 0 h. 47 m. A. M., being 3° 45′ south.

The right ascension of Jupiter on the 1st is 23 h. 2 m., his declination is 7° 50′ south, his diameter is 47″.4, and he is in the constellation Aquarius.

Jupiter rises on the 1st at 6 h. 40 m. P. M. On the 30th he sets at 3 h. 33 m. A. M.

SATURN

is evening star until the 13th, and then morning star. He is in conjunction with the sun on the 13th, at 8 h. 38 m. A. M., when he passes to the sun's western side, and will soon be seen playing his part as morning star. Saturn is too near the sun to be visible, but an interesting epoch occurs in his September course. The rings will disappear on the 22d, when the plane of the ring passes through the earth, and is seen edgewise. It will not reappear until October 30, when the plane of the ring passes through the sun. The southern surface of the ring that has been illumined by the sun for fifteen years will now be in shadow for the same time, and the northern surface will be illumined in its turn for the same time, when the ring will again disappear. Saturn's sidereal period is 29.5 years. He is now found in the same position in the zodiac that he passed in 1862.

The three-hours-old moon is in conjunction with Saturn on the 3d, at 6 h. 26 m., being 3° 6′ north.

The right ascension of Saturn on the 1st is 11 h. 22 m., his declination is 6° 7′ north, his diameter is 15″, and he is in the constellation Leo.

Saturn sets on the 1st at 6 h. 58 m. P. M. On the 30th he rises at 4 h. 37 m. A. M.

MERCURY

is evening star until the 13th and then morning star. He is in inferior conjunction with the sun on the 13th at 0 h. 11 m. A. M., passing then between the earth and the sun, as the moon does at new moon. He reaches his greatest western elongation on the 28th, at 4 h. P. M., when he is 17° 53′ west of the sun. This is the last opportunity during the year for seeing Mercury as morning star with the naked eye. He must be looked for an hour before sunrise, and 8° north of the sunrise point, and is visible at elongation and for a few days before and after.

The right ascension of Mercury on the 1st is 11 h. 47 m., his declination is 3° 14′ south, his diameter is 9″.6, and he is in the constellation Virgo.

Mercury sets on the 1st at 6 h. 50 m. P. M. On the 30th he rises at 4 h. 26 m. A. M.

VENUS

is morning star until the 18th, and then evening star. She is in superior conjunction with the sun on the 18th at 10 h. 8 m. A. M., when she takes her first steps on the path which will make her during the winter months the radiant evening star. She is at present too near the sun to be visible.

Venus, four days before her superior conjunction, meets Saturn, the day after his conjunction. The event occurs on the 14th at 6 h. 32 m. P. M., Venus being 32′ south. The actors in the scene are of course too near the sun for terrestrial vision.

The right ascension of Venus on the 1st is 10 h. 32 m., her declination is 10° 44′ north, her diameter is 10″, and she is in the constellation Leo.

Venus rises on the 1st at 5 h. 3 m. A. M. On the 30th she sets at 5 h. 49 m. P. M.

MARS

is morning star. He rises about an hour and three-quarters before the sun, but it is hard to find him, for he is only a ruddy point in the sky.

The waning moon is in conjunction with Mars on the 2d at 0 h. 9 m. A. M., being 4° 5′ north.

The right ascension of Mars on the 1st is 10 h. 2 m., his declination is 13° 16′ north, his diameter is 3″.8, and he is in the constellation Leo.

Mars rises on the 1st at 4 h. 28 m. A. M. On the 30th he rises at 4 h. 7 m.

NEPTUNE

is morning star. He is in quadrature with the sun on the 1st at 3 h. P. M., when he is 90° west of the sun. His right ascension on the 1st is 4 h. 20 m., his declination is 20° 15′ north, his diameter is 2″.6, and he is in the constellation Taurus.

Neptune rises on the 1st at 10 h. 26 m. P. M. On the 30th he rises at 8 h. 31 m. P. M.

URANUS

is evening star. His right ascension on the 1st is 13 h. 47 m., his declination is 10° 32′ south, his diameter is 3″.5, and he is in the constellation Virgo.

Uranus sets on the 1st at 8 h. 25 m. P. M. On the 30th he sets at 6 h. 34 m. P. M.

Mercury, Mars, Saturn and Neptune are morning stars at the close of the month. Venus, Jupiter and Uranus are evening stars.

Edward Burgess.

The death of Mr. Edward Burgess, of Boston, on July 12, at the age of 43, removed one of the few persons in America who have made important contributions to insect anatomy.

His work was not voluminous, but it was very careful and exact. He was the author of, in 1880, an excellent review of the then recent literature in insect anatomy and physiology. His own most important and extensive paper was on the anatomy of the milkweed butterfly, but he worked out in more or less detail the anatomy of the perfect stage in Anabrus and Aletia, and studied minutely the male abdominal appendages of butterflies, the structure of the head of Psocidae, the mouth parts of the larva of Dytiscus, and the varied course of the aorta in Lepidoptera. He was also the first to show the precise structure and working of the apparatus for feeding in the imago of Lepidoptera.

A large part of his work was in aid of the researches of others, in which he was generous almost to a fault, and his unselfish devotion to his duties for sixteen years as secretary of the Boston Society of Natural History, in whose publications most of his papers were issued, brought the office to a high state of efficiency—a devotion further signalized in his will, in which he made the society his contingent residuary legatee. Besides, although he published but a single short paper on Diptera, his knowledge of this group, in which he rendered large service to others, was unsurpassed among our countrymen.

To entomology, which he had cultivated with such signal success, Mr. Burgess, it is true, died several years ago when he parted from his collection and library and turned his attention exclusively to naval architecture, in which he had been interested from boyhood, and which offered far more promise of financial returns, then first absolutely necessary for him to consider. His world-known success in his new field (for he fairly leaped into fame) it is not the place here to consider, but, clearly the greatest genius our country has ever produced in this branch of science. his naturalist friends without exception will agree that in losing him from their immediate ranks science at large has been the gainer. They were indeed eager to applaud his success, his old scientific friends being, we believe, the very first to give him a tangible proof of their pride in his fellowship—a pride all the greater for the almost painful modesty with which he received every mark of his growing fame. Selfishness could not live in his sight. When the city of Boston gave him a public reception, his shrinking boyish figure as he rose to return his thanks, in which he tried to turn public attention rather to the one whose means, whose confidence, and whose sympathy had rendered the realization of his scientific genius practically possible, will not soon be forgotten by those who witnessed it. But the gentleness and sincerity of his character, the refinement of his life and manners, his truthfulness and loyalty, and all those other delicate traits which revealed his heart and rendered him so dear to his intimate friends, will remain to them a source of perennial inspiration.—*Psyche.*

The Battle of Bennington Monument.

On August 19 there was dedicated with appropriate ceremonies, marked by the attendance of the President and many distinguished visitors, a monument in commemoration of the battle of Bennington, Vt., in our revolutionary war. The monument has been in progress of building for several years, and has cost $100,000. It was paid for by appropriations. It was paid for by the States of Massachusetts, New Hampshire, and Vermont, and by private subscriptions. It is 301 feet 10½ inches high from base to the top of the capstone, and stands on a site 283 feet high. Its base is 37 feet 4 inches, and it is built of native stone faced with Sandy Hill dolomite. It has a lookout room, 188 feet above the fonndation, reached by an interior iron staircase.

THE coffer dams of cruisers 9 and 10, building at the Columbian Iron Works, Baltimore, Md., will be filled with cellulose, which has been adopted by the navy department. The living apartments and store rooms of the cruisers are being painted with cork paint, which consists of a heavy coat of white lead and varnish, over which is sprinkled cork. It forms a non-conducting material which keeps the ship dry in warm climates and moist atmospheres.