Union Iron Works, with G. W. Prescott, president; Henry T. Scott, vice-president and treasurer; and Irving M. Scott, general manager.

The full equipment of the works for the special purpose of building iron and steel ships, and armored war vessels of the greatest power, has been so recent that it is believed the plant in these respects is fully equal to that of any other establishment in the United States, and will compare favorably with any other in the world. The buildings, except the sheds, are all of brick, and cover an area of more than four acres, the covered works, including ship yard, slips and dry dock, embracing an area of nine acres. The fitting, erecting, boiler shops and foundry are all spanned by heavy traveling cranes, to lift from twenty to fifty tons each, and the equipment includes special machine tools in large variety, some of them weighing over 100 tons each. The works are underlaid throughout with a high pressure hydraulic system, employed in lifting, forging, riveting, shearing, etc., and an ample electric light plant supplements the abundant light and ventilation afforded by well planned construction. An interesting feature of the works is the great hydrulic dry dock and slip, having an area of 30,450 square feet. A working force of fifteen hundred hands is employed in the various departments.

The building of mining machinery was for a long time the principal business of the establishment, and in this specialty the Union Iron Works continues to hold a leading position. From these works have been sent out the principal proportion of the mining machinery for the great Comstock mines, and most of the other mines in Montana, Utah, Mexico, and all through the Pacific Coast and Territories, as well as in South America and other parts of the world where mining operations are carried on upon a large scale. The making of compound engines, stationary and marine, early formed a leading branch of the business, and it is one in which the company have, in late years, obtained a degree of excellence which places them, by general acknowledgment, among the prominent engine builders of the country.

But it is rather on account of the contracts undertaken by the Union Iron Works in the building up of our new navy that the establishment now occupies a position of so much general interest. Here were built and equipped the highly successful cruisers Charleston and San Francisco, and here also was built the monitor Monterey, now receiving her finishing touches, and being supplied with what are believed to be some of the most perfect of high-powered guns yet made anywhere. In addition to this work there is now on the ways one of the largest of the new battle ships, the Oregon, to have a displacement of 10,000 tons, and to cost, exclusive of armament, nearly four million dollars. She will carry four 13-inch breech-loading rifles, weighing sixty tons each, and protected by seventeen inches of armor, and will have seven tubes for the discharge of torpedoes. Work upon this vessel is now being energetically pushed forward, and the company will unquestionably be active competitors for any further work the government may have to offer upon the various war vessels yet to be built.

The Tinkering Crank.

There is a great deal of truth in what the *Manufacturers' Gazette* says about some men who never seem to be happy and contented unless they are tinkering. They are always watching for a chance to use a monkey wrench or hammer, and not only waste valuable time, but do more toward spoiling the machinery in their charge than years of constant wear will ever do. If a machine is out of order, or there is some part that needs tightening up or repairing, the tinkerer takes his monkey wrench and screwdriver and goes at it, regardless of where or what the trouble is. He spends an hour or two twisting and turning nuts and bolts, and when he gets tired of this amusement concludes that everything is all right and starts up the machine, only to find that he has not improved it any by tinkering. Then he goes at it again. Such men are not profitable workmen. The competent and experienced man never tinkers. If the machinery needs fixing he does not go about it in a haphazard manner, but looks it over care fully until he locates the trouble, and then does what is needed, without making a bad matter worse by acting upon the supposition that because one part is out of order the whole machine needs tinkering.

Brooklyn Institute of Arts and Sciences.

According to the report of the Brooklyn Institute of Arts and Sciences, the present membership numbers 3,869, showing an increase of 1,039 over the membership of 1891.

The membership is divided up as follows among the different departments:

Archeology, 115; architecture, 255; astronomy, 113; botany, 154; chemistry, 135; electricity, 215; engineering, 126; entomology, 50; fine arts, 361; geography, 137; geology, 140; mathematics, 47; microscopy, 133; mineralogy, 117; music, 114; painting, 80; philology, 442; pedagogy, 206; photography, 170; physics, 154; political science, 404; psychology, 144; zoology, 67.

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Price 10 cents. For sale by all newsdealers.

A NEW SCHOLARSHIP AT SIBLEY COLLEGE.

The Frederick William Padgham Free Scholarship in Mechanical Engineering has recently been established in Sibley College by Mr. Amos Padgham, of Syracuse, N. Y., in memory of his son, lately deceased. The young man was a graduate of the public schools of Syracuse, an apprentice with Professor John E. Sweet, and, later, a graduate of Sibley College and Cornell University. He was employed after his graduation by the C. W. Hunt Co., of New York City, and made for himself an excellent record. He died suddenly, of typhoid fever. He was an only son, and this beautiful monument is erected by his father in his memory as the best and most permanent, as well as the most useful, possible.

The provisions of the deed of gift are that it shall be open to competition, first, to scholars from the public schools of Syracuse; next, none such appearing, to any competitors from the State of New York. The superintendent of schools of Syracuse and the principal of the high school in that city are to be kept informed of the opportunity thus offered their scholars to enter upon a course of study in mechanical engineering in Sibley College.

This adds one more to the already long list of scholarships at Cornell. The State provides one at each annual examination in each assembly district. Five hundred and more young men and women are enjoying these opportunities, for which the State pays simply the interest on about a half million dollars which it holds as the proceeds of the sales of the land grant of the Morrill Act of 1862. More correctly, the State receives, through the generosity of the United States, and at no cost to itself, 512 scholarships in Cornell University. The university receives about $50 each for them, and pays out about $300, annually, to provide them. The State has, as yet, contributed nothing to this cause out of its own treasury. There are, besides the above, about fifty other scholarships granted by the members of the early boards of trustees, by President White, and by other private contributors. The State scholarships give free tuition, and the others pay to the successful competitor for them $200 a year, which suffices, usually, to pay all necessary costs at the university. There are, also, at Cornell, fifteen university fellowships, paying from $400 to $500 each. Those taking the higher grade of fellowship are often allowed to travel abroad for study. There would seem to be little reason for the son or the daughter of any citizen of the State of New York failing to secure an opportunity to obtain a good education, either liberal or technical, or both, at Cornell University, if really possessing talent and character. All the university scholarships and fellowships are named for their givers, or in accordance with their wishes, and thus constitute the most beautiful and durable of monuments to the men thus honored.

NITRIC ACID BACTERIA.

The development of bacterial study during the last few years has been very striking. The methods of attack supplied by the gelatine culture, divided plate and microscope brought the subject within the scope of ordinary laboratory manipulation, and took it to a certain extent out of the region of the recondite, which is so unfavorable to rapid study and early acquirement of results. The most extensive processes of decomposition and fermentation are now found to depend upon these exceedingly minute beings. Insignificant as they are in size, they derive their importance from their numbers, from their enormously rapid propagation—twenty minutes sometimes answering for the lifetime of a complete generation—and from their power of bringing about with certainty some of the most difficult of chemical combinations.

The production of ammonia or of nitric acid from the nitrogen of the air has long been a dream with inventors. Hitherto neither combination has been practically effected, and they have seemed almost impossibilities. It was found inexplicable in view of this fact that some plants seemed to derive nitrogen from the air, for it was not easy to see how their green foliage could effect the fixation of nitrogen.

This problem of the fixation of atmospheric nitrogen by plants has been a much-debated subject for many years. Here the bacteria have appeared in the beneficent role of nourishing and supporting plant life. It has been found that plants undoubtedly do absorb the nitrogen of the air, so that it enters into the combinations of their tissues, and this power is dependent on the presence of certain bacteria about their roots. If the soil is void of these colonies of low organisms, then no fixation of atmospheric nitrogen occurs. The presence of these microbes is indicated by swellings and tuberosities on the roots, which tuberosities are thickly colonized with the microbes, but these swellings are to be taken rather as a sign of health than of disease.

Again, for different plants it has been found that different organisms are essential, or at least that for each plant there is an especially beneficial form of microbe that supplies it more thoroughly with nitrogen than any other. The importance of these operations cannot be overestimated. The nitrate beds of Chile, representing the accumulated wealth of geological ages, are being rapidly depleted to supply nitrogen to the crops of Europe. The distillation of coal in our gas works gives a small amount of ammonia as a by-product, which is saved and utilized also as a fertilizer. Slaughter house refuse and ground fish from which oil has been extracted are other sources of nitrogen which are used in fertilizers. To all this there must be an end, for it is all essentially destructive. But if we can cultivate microbes which will draw upon the exhaustless air for nitrogen, and will then feed plants therewith, the nitrogen problem of the future, one destined to be as serious as the coal problem will be, may eventually be disposed of.

While nitrogen in fertilizers is very often supplied in combination with hydrogen as some compound of ammoniacal type, the plant cannot absorb it until it has become oxidized into nitric acid. This process is termed nitrification. It has recently been found that nitrification is dependent on bacterial agency, and that to produce nitric acid from ammonia compounds two distinct bacteria are required. One performs the first and most difficult step, and combines the nitrogen with enough oxygen to form nitrous acid. The next microbe takes up the incomplete work and adds enough oxygen to the molecule of nitrou acid to form nitric acid. In this form it is quickly absorbed by the plant. The absorption is so rapid that only traces of it can be found in soil in which vegetation is growing.

The nitrification process is one of destruction as well as of building up. The ammonia type molecules are destroyed and in their place the nitric acid ones are built up. The offensive products of sewage, the products which nourish disease germs, and which with every probability we may recognize as the supporters of typhoid fever and other infections, are of the ammonia type. In the nitrifying organisms we have the agents for destroying the injurious products of sewage. If proper conditions are supplied, the army of microscopic beings will attack and destroy the disease germs, or at least their nutriment, and will transform the noxious sewage into a valuable fertilizing agent.

Some of the advanced processes of sewage treatment are based on these facts. The sewage is delivered over the surface of the land and allowed to percolate through it. If supplied in proper quantity, the nitrifying organisms are supplied with nutriment and dispose effectually of the sewage. The great point is believed to consist in a proper rate of supply of material. Too little sewage will starve the microbes, while too much must not be supplied for them to dispose of.

Potassium nitrate, or saltpeter, is made in nitrification beds. Animal refuse of all kinds is mixed with mortar and lime, and the heap is watered with liquid manure, and eventually the saltpeter formed is washed out of it, and is recovered by crystallization. The agents that produce the salt are the bacteria, whose part in settling the destinies of nations by making saltpeter may now be recognized. The great storehouse of nitrates, the South American nitrate beds, were probably produced in a similar way in the past, and wars are being fought, and sulphuric acid is being made, through the agency of the products of the work of the bacteria of the past.

The quick succession of generations, which are sometimes less than half an hour in duration, seems to offer the biologist a field for studying changes in life due to environment. But little has been done here. To a limited extent a change can be produced in the constitution of some microbes, but the degree of development is very small.

THE FORTY-FIRST ANNUAL MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The annual meeting of the A. A. A. S. for the present year will be held in the city of Rochester, N. Y. The University of Rochester will be the place of meeting, by the courtesy of the trustees of that institution. The meeting will begin on Tuesday, August 16, and daily sessions are recommended by the council for the 17th, 18th, 19th, 22d, and 23d of August, from 10 to 12 A. M. and 2 to 5 P. M. The meeting will be called to order by the retiring president, Prof. Albert B. Prescott, of Ann Arbor, Mich., who will introduce the president-elect, Prof. Joseph Le Conte, of Berkeley, Cal. The usual addresses of welcome, announcements of committees, etc., will be followed by organization of the sections under the vice-presidents as follows: Section A, astronomy and mathematics, J. R. Eastman; Section B, physics, B. F. Thomas; Section C, chemistry, Alfred Springer; Section D, mechanical science and engineering, John B. Johnson; Section E, geology and geography, H. S. Williams; Section F, biology, S. H. Gage; Section H, anthropology, W. H. Holmes; Section I, economic science and statistics, S. Dana Horton. Public addresses and excursions will be included in the programme, which is not yet fully formulated. Before the meeting, the American Microscopical Society will hold its annual meeting, August 9, 10, 11, and 12, under the presidency of Prof. M. E. Elwell, of Chicago, Ill., and the Geological Society of America, on August 15 and 16, will hold its annual meeting under the presidency of Mr. G. K. Gilbert, of Washington, D. C. On the two last named days the Society for the Promotion of Agricultural Science, under the presidency of Prof. I. P. Roberts, of Ithaca, N. Y., and the Association of Economic Entomologists, under the presidency of Dr. J. A. Lintner, of Albany, will hold their annual meetings. Further particulars may be obtained by addressing Secretary F. W. Putnam, Salem, Mass.

POSITION OF THE PLANETS IN JULY.

MARS

is morning star. He is by far the most important member of the solar family in July, for, at its close, he is within four days of the opposition so long anticipated. The reason why he comes so near the earth at the present opposition may be simply stated, and, as these conditions occur only at intervals of fifteen or seventeen years, great importance is attached to them. The earth is in aphelion on July 1, when she is 3,000,000 miles farther from the sun than she was when in perihelion on January 1. Her eccentricity, or the distance between these two points, is comparatively small, and is of little account, her orbit being almost a circle. Such is not the case with Mars, whose eccentricity is the largest of any planet in the system excepting Mercury. Mars is in perihelion on September 7, when he is 13,000,000 miles nearer the sun than when in aphelion. If the earth is nearly at her greatest distance from the sun and Mars is nearly at his least distance from the sun when an opposition occurs, the two planets must approach each other. This is the situation of affairs in the coming opposition when Mars, the earth, and the sun are in line, with the earth in the middle, Mars being about 35,000,000 miles from the earth. Although near at this time, it is possible for him to approach nearer, as he would if his opposition and perihelion were coincident. The opposition of 1877 took place nine days after perihelion, and was made illustrious by the discovery of two Martian moons. The opposition of 1892 will take place thirty-four days before perihelion, the conditions not being quite as favorable.

Our nearest outside celestial neighbor will, however, make a majestic appearance as he comes into view above the southeastern horizon on July evenings, marvelous in size, glowing with ruddy light, and brilliant in the martial colors that denote his imperial rank. Observers with the unaided eye cannot fail to be impressed with his unusual size and luster. The chief interest of the occasion will, however, center around the telescopic Mars, and the most powerful instruments in the world will be directed toward his ruddy face. Much will be expected from the Lick Observatory, although the astronomers there have failed thus far to see the double canals on the Martian disk, which have been perceptible to four European observers, Schiaparelli, Perrotin, Terby, and Stanley Williams. It must be remembered that the Martian supremacy of 1892, which culminates at opposition, August 4, continues only about two months, through July and August, the months preceding and following the greatest event of the year. The planet is small and traveling rapidly away from the earth, soon becomes dwarfed by distance, and returns to his ordinary mediocrity. Many observers will remember the opposition of 1877, a few will remember that of 1862, the attention of the whole civilized world will be drawn to that of 1892; but when the next grand opposition of 1909 comes round, half of the present inhabitants of the earth will have looked their last upon the glory of the heavens as seen from this planet; half a generation will have passed on.

THE OCCULTATION OF MARS.

The moon increases the interest aroused by the near approach of Mars in occulting the planet, the phenomenon being visible in this vicinity, and the time favorable for observation. The occultation occurs on the 11th, when the moon, two days after the full, with her bright edge foremost, hides the planet from view. The immersion takes place on the 11th at 11 h. 5 m. P. M. The emersion takes place on the 12th at 0 h. 7 m. A. M., the occultation continuing 1 h. 2 m. We give the data in Washington mean time, as at other places the time will vary on account of the moon's parallax, or her difference in direction when seen from different points. Our satellite, in almost full-orbed radiance, will approach the ruddy planet, almost, if not quite, putting out his light when she is in near vicinity, as observers will note, unless the visual power is exceptionally good. An opera glass will be an effective aid in observing the phenomenon, but a telescope will be far better.

The right ascension of Mars on the 1st is 21 h. 25 m., his declination is 20° 32′ south, his diameter is 21″.8, and he is in the constellation Capricornus.

Mars rises on the 1st at 9 h. 53 m. P. M. On the 31st he rises at 7 h. 52 m. P. M.

JUPITER

is morning star. If Mars take the precedence, Jupiter ranks next, for an important event occurs in his July course. He is in perihelion on the 24th at 7 h. P. M. The giant planet then reaches that point in his vast orbit when he is nearest the sun, being 42,000,000 miles nearer to him than when he is in aphelion. This event can occur only once in about twelve years, the time of Jupiter's revolution. His last perihelion passage was in 1880. If his perihelion and opposition occurred at the same time, the planet would be at his best and brightest, but as his opposition takes place in October, he will be more than two months past perihelion when he comes into line with the earth and the sun. In 1880, there were but eleven days between the two events, and Jupiter adorned the sky with a majestic grace that Venus at her brightest could scarcely surpass. He is in quadrature on the 15th, being 90° west of the sun. He then rises about midnight, and will be a superb object to those who watch for his advent.

The moon, on the day of her last quarter, is in close conjunction with Jupiter on the 16th, at 6 h. 26 m. P. M., being 29′ south. The conjunction is invisible, but when the planet rises about 11 o'clock on that evening, the moon will not be far away from the brilliant star.

The right ascension of Jupiter on the 1st is 1 h. 24 m., his declination is 7° 26′ north, his diameter is 37″.4, and he is in the constellation Pisces.

Jupiter rises on the 1st at 0 h. 14 m. A. M. On the 31st he rises at 10 h. 19 m. P. M.

MERCURY

is evening star. He is in conjunction with Venus on the 1st at 2 h. 50 m. A. M., being 4° 36′ north. He is at his greatest eastern elongation on the 29th, at 3 h. A. M., being 27° 14′ east of the sun, and is visible to the naked eye in the west as evening star. As his northern declination is small and he will be above the horizon only an hour after sunset, it will be difficult to find him unless observers are enthusiastic and possess unusually good eyesight.

The right ascension of Mercury on the 1st is 7 h. 40 m., his declination is 23° 22′ north, his diameter is 5″.2, and he is in the constellation Gemini.

Mercury sets on the 1st at 8 h. 23 m. P. M. On the 31st he sets at 8 h. 11 m. P. M.

SATURN

is evening star. There is nothing of special interest in his July course, and when the month closes he sets two hours later than the sun. The moon is in conjunction with Saturn on the 28th, at 0 h. 1 m. A. M., being 1° 39′ north.

The right ascension of Saturn on the 1st is 11 h. 43 m., his declination is 4° 15′ north, his diameter is 16″.0, and he is in the constellation Virgo.

Saturn sets on the first at 11 h. 12 m. P. M. On the 30th he sets at 9 h. 19 m. P. M.

VENUS

is evening star until the 9th, and then morning star. She is in inferior conjunction with the sun on the 9th, at 1 h. 24 m. P. M., closing her brilliant career as evening star and commencing an equally brilliant course as morning star. She takes a low rank on the July annals, but will not remain long in retreat. She rises at the close of the month two hours before the sun, as observers who are early risers may see for themselves.

The right ascension of Venus on the 1st is 7 h. 36 m., her declination is 18° 50′ north, her diameter is 57″.0, and she is in the constellation Gemini.

Venus sets on the 1st at 7 h. 59 m. P. M. On the 31st she rises at 2 h. 58 m. A. M.

URANUS

is evening star. He is in quadrature on the 24th at noonday, being 90° east of the sun. The moon makes a close conjunction with Uranus on the 3d, at 4 h. 3 m. P. M., being 47′ north. She makes a second conjunction with the same planet on the 31st, at 0 h. 33 m. A. M., being 31′ north. The moon occults Uranus on the same dates for observers who see her in her geocentric position.

The right ascension of Uranus on the first is 14 h. 0 m., his declination is 11° 43′ south, his diameter is 3″.6, and he is in the constellation Virgo.

Uranus sets on the first at 0 h. 37 m. A. M. On the 31st he sets at 10 h. 36 m. P. M.

NEPTUNE

is morning star. His right ascension on the 1st is 4 h. 34 m., his declination is 20° 27′, his diameter is 2″.6, and he is in the constellation Taurus.

Neptune rises on the 1st at 2 h. 35 m. A. M. On the 31st he rises at 0 h. 40 m. A. M.

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

Ovid's Recipe for Wrinkles.

Take equal parts of bean and barley meal and mix with raw egg. When the mass is thoroughly hard and dry, it should be ground to a fine powder and made into an ointment with melted tallow and honey. A thick layer of this applied to the face every night was warranted to smooth out all wrinkles and make the skin as soft as a baby's.