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SCIENTIFIC AMERICAN SUPPLEMENT

No. 558.

For the Week Ending August 7, 1886.

Price 10 cents. For sale by all newsdealers.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The thirty-fifth meeting of the American Association for the Advancement of Science will be held at Buffalo, New York, from Wednesday morning, August 18, until Tuesday evening, August 24. This is the third time that the Association has accepted an invitation to hold a meeting in Buffalo, the previous occasions having been at intervals of ten years. The city offers such excellent facilities for a gathering of this kind, both in its spaceous auditoriums and hotels and in its general accessibility from either the East or the West, that it has grown to be a favorite locality with the members, and a large assemblage has been assured. Special attention will be given by the section on geology and geography to the problems connected with Niagara Falls and its gorge. The retiring President, Prof. H. A. Newton, of New Haven, will deliver his address on the first evening of the meeting. The President-elect is Prof. E. S. Morse, of Salem, Mass.

TRANSMISSION OF POWER BY ELECTRICITY.

The carefully conducted experiments of M. Marcel Deprez, on the transmission of electricity over long distances, have finally resulted in success. After many trials and difficulties, the conductors established between Creil and La Chapelle Station, Paris, begin to work satisfactorily.

The power transmitted, and rendered available at the receiving station, was found by measure to be 50 horse power, an efficiency of 47 per cent. As the distance between Creil and Paris is almost 32 miles, this result is not unsatisfactory. The line consists of a copper cable, the total cross section of which is equal to that of a solid wire having a diameter of three-twentieths of an inch. The cable is aerial, and supported on porcelain insulators. When near frequented spots, it is incased in insulating material, but at other places it is exposed.

The success of these experiments suggests the advantageous introduction of the practice into this country. In many localities, and particularly where water power is available, it would be possible to produce electricity under such favorable economic conditions that a loss of even fifty per cent in its transmission would still make the arrangement a profitable one when compared with the direct generation of electricity on the spot where it is needed.

It frequently happens, too, that power is available in one place at certain periods of the day, and, from the nature of its origin, must be wasted unless transmitted to a distance. Its conversion into electric energy and subsequent transmission would then represent a saving in the course of the year of no inconsiderable magnitude. Water power has been utilized in several localities in the United States and Canada for the generation of a current to be used in the electric illumination of towns and works located at a distance of perhaps two or three miles; but the limit has not nearly been reached, and even within these shorter ranges there have been as yet but few attempts to utilize the power at hand. There is room here for considerable ingenuity in securing the services of an agent which is at once convenient and economical.

THE CHARACTER OF THE NEW CRUISERS.

It has been said that the best thing after knowing a thing is to know where to find it; and in selecting designs for the cruisers provided for by the act of March, 1885, the Naval Board has, apparently, acted on the suggestion. It could scarcely have been expected that the Board would originate a new system of marine architecture or otherwise revolutionize naval warfare. The most that could reasonably be hoped for was that it would intelligently examine the best models of the Old World naval constructors, who have had large and varied experience of recent years, while we have been standing still, and discover which were best suited to the purpose Congress had in view. Among the cruisers built by Sir William Armstrong for the Japanese, Chinese, and Chilian governments are to be found by far the most successful models of unarmored and partly armored fighting ships afloat. They have speed, strength, and stiffness, work quickly, and are good sea boats. The Chilian cruiser Esmeralda, of which a picture and description were recently given in these pages, may safely be said to be the best of her class now afloat. She has made 18·4 knots speed on the measured mile; and while she can readily run away from such ponderous and slovenly monsters as the Devastation, Invincible, Imperieuse, Dandolo, or Duilio, and attack the merchant fleets they are supposed to protect, she can fight too, upon occasion—choose her own target and firing point, and get out of the way when she has got enough. The Japanese cruiser Naniwa-Kan is another of this class—a staunch, speedy, fighting cruiser; and the Chinese Tchao-Yong is likened unto her.

These are the craft that the Naval Board have, wisely it seems, selected as criteria for the new Yankee cruisers, modified in some respects as necessity and the demands of Congress required. The Board would seem to have left itself a certain amount of latitude as to decks, spars, barbette towers, and the like, and it remains to be seen whether Yankee ingenuity retains its pristine promptitude in selecting the best and improving by combination and innovation.

It seems fortunate, now that Congress and the country are in the humor to do something for our long neglected navy, that the naval constructor and expert, on whom we must depend for models, have not shown a disposition to fit us out with floating forts, such as the great powers have been building for many a year—monsters whose lagging prows will not admit of their approach to hostile ships on the high seas near enough to do them injury, and which, when they make the shore, may be made the prey of a torpedo fleet, whose sum total of cost will scarcely make up that of one of their number, as a school of whales is scattered an beaten off by a few resolute though comparatively insignificant thrashers.

Whoever has read the naval history of our civil war must remember the effective work of the swift-running, unarmored corsairs Alabama, Georgia, and Florida—at a time, too, when we had the greatest fighting fleet the world ever saw. Had these Confederate cruisers been slow-going, steel-clad batteries, it is not likely they would have done a tithe of the injury. Their drums would have been beating "to quarters" from sunrise to sunset, and they would assuredly have got more fight than booty.

One of these ships could overhaul a merchantman with celerity, and lie in wait in the tracks of the various trading fleets with the precision of a cat which knows that within a given time a mouse will issue from the crevice near at hand.

Again, the modern marine gun has advanced so much in efficiency that it will pierce the heaviest armor that can be floated, until now, when some of the best authorities believe that heavy armor is a less defense than light armor, because it lets a hostile shot in on one side and will not let it out on the other, as light armor will do, and it is under such conditions that a lucky shot often does its maximum damage.

OUR BOYS.

In glancing over the possible openings for boys, one is forced to admit that unless a lad have genius, perseverance, and a good, physical consititution, he will find the beginning of a professional life almost insurmountably difficult, if he be obliged from the start to depend upon his profession for a living. So large is the competition, even in our own comparatively new country, and still more so in England and on the Continent, that the inducements to enter the so-called learned professions are financially very small. The satisfaction of ultimate success, and the intellectual pleasures which such a course makes possible, are regarded by any true student as more than compensations for the early discomforts, and we would never urge considerations of a financial nature against a boy's following his natural bent. That is a fatal policy which advises him to choose his calling simply for the money returns it promises, for he will learn sooner or later that money is but a small factor in true success. But we would very strongly urge such considerations in attempting to dissuade those who have no natural qualifications for a professional life from entering upon so unpromising a career. There are many whose scholarly abilities are too meager to permit the hope of successful competition when pitted against their more gifted brothers. It is certainly unfortunate, if not pitiable, that these young men should, through mistaken notions of what is respectable and what is praiseworthy, rush into a course which can bring them only failure and mortification.

Each year, thousands of young men are graduated from our universities and schools of learning, only a very small proportion of whom are ever heard of afterward in the real contests of life. And it has become a notable fact that an advertisement for a man to fill any but a manual position will bring a number of college graduates out of all proportion to the total applicants. This proves nothing against our schemes of education, for the contrary evidence is too overwhelming. The men of whom as a nation we are most proud, the brightest minds in science, literature, law, medicine, theology, and the fine arts, have been for the most part educated in universities and colleges. But the failure of such a large proportion of college-bred men to attain even ordinary usefulness in the events of life does prove that, for them at least, some element was lacking which should have contributed to their preparation for subsequent duties. Had they been blessed with the three qualifications already enumerated, success would have been possible in almost any direction. But unfortunately very few have genius; a smaller proportion than should, have good health; and of the three, perseverance only appears to be a cultivable quality, and even this is largely limited by physical endurance. A very successful man of affairs, quoted by an English contemporary, *Industries*, when asked for the secret of his success, replied, "I had the physical constitution to begin work at six o'clock in the morning, and keep on till eight, nine, or ten at night, and that for twenty years." One would say that [illegible] was well deserved.

It is not a Utopian tenet that teaches the possibility

of success for all normally constituted men. The essential condition is the right choice of a vocation. It is a serious question, what to do with our boys, for it is just here that so many fatal blunders are made. The parent or guardian, actuated by the best motives in the world, is very apt to lay out a plan of life framed entirely from his own point of view, and unmindful that what may prove eminently successful in one case may be equally disastrous in another. And very often the decision is rendered more difficult by the necessity laid upon the boy of earning his daily bread as he eats it. Then, too frequently, circumstance usurps the place of decision, and what should be the result of careful thought is left to mere accident. Though one be of optimists the most extreme, it is impossible to deny that the plan of life pursued by the majority of men does not lead to success. And since this plan, whether it be of design or the mischievous fatalistic drifting which is no plan, begins when the man is still a boy, it is in the boy that our hope for the future lies. How is he to be trained, and his skill and character developed?

We are accustomed to believe that demand and supply regulate themselves, but in this very problem of the future of our boys, we are brought face to face with a curious incongruity. We see on the one hand the overcrowded professions, and hosts of clerks who are ready to apply for any vacant position, however low the salary, while on the other hand we see a market for labor which is so far from being glutted that its supplies must be brought from foreign countries. But between these unequally balanced classes, little or no exchange is possible, for it is a characteristic of the latter class that its members must be able to use their hands and eyes, as well as the brain, and must have a manual dexterity sufficient to place them among the ranks of the great industrial army of producers.

What is wanted to-day in our own country is skilled labor. Education in its highest form is wanted, but it must be coupled with an ability to do something, if it is to gain for its possessor any position in life. It must find some mode of expression, or the world is none the richer. Americans are noted for their ingenuity, but in how few has a thorough technical education brought out its highest powers of expression! Here is a field which can be heartily recommended to any boy who has decided to take the reins of life in his own hands instead of leaving them to the caprice of circumstances. If he has a taste for the mechanic arts, he has a splendid opportunity for the exercise of his powers. The acquisition of manual dexterity is not difficult. It requires little beyond intelligent perseverance. But when this skill of hand is once acquired, it brings an independence which many a man in apparently easier circumstances of life might well envy. Nor is it the humble calling which the drawing room is apt to picture it. The possibilities open to the skilled worker are almost unlimited. Some new and more excellent creation is always possible, and from the workshop the directors of large undertakings are commonly chosen.

An Electrical Silo Cutter.

We have before had occasion to place on record the work done by means of electricity at Hatfield, both at the Marquis of Salisbury's house itself and on the estate. In addition to the various operations of lighting, pumping, pile driving, weed cutting in the river, and others, another application of the power has just been perfected by Mr. Shillito, the resident electrician of the estate, one which, as far as our experience goes, is quite novel. Ensilage is being stored on a large scale for the use of stock at one of the farms, where, for this purpose, some of the old farm buildings have been converted into silos. This year it has been decided to chaff the green food before placing in the silo, and this arrangement has necessitated the placing of the chaff cutter used in cutting up the rough grass some 20 feet above the ground. The electrical power is used not only for driving the cutting machine, but also for elevating the grass to the level of the cutter. Some four tons of rough grass are raised and cut per hour by this means. The generator, a 16 light Brush machine, driven by a water wheel, is situated a mile and a half distant, on the banks of the River Lea; the electrical power being transmitted to one of Siemens Brothers D 2 type, specially wound to work as a motor with the Brush machine. The same source of power is also brought into use in working the elevators at the various hayricks on the estate.

Calorimetry with Compressed Oxygen.

With regard to the calorimetric testing of combustibles by burning them in apparatus like that of Mr. Lewis Thompson, MM. Berthelot and Vieille observe, in a communication to the *Comptes Rendus*, that the only really exact process consists in burning the substances in a great excess of compressed oxygen, in the authors' calorimetric bomb. The exactitude of this method proceeds from the fact that the process of combustion is total and instantaneous. Besides this, the experiment in question requires but one weighing. The authors declare that combustion under ordinary pressure is seldom, if ever, complete, and leaves some thousandths, or possibly more, of carbon monoxide and of hydrogen more or less carbureted. They claim that their method is especially applicable to solid bodies and such as are not volatile, which can scarcely be burnt satisfactorily by the old methods, even with free oxygen.

It also dispenses with the complicated connections necessitated by the use of chlorate of potash. MM. Berthelot and Vieille have made a great number of determinations by their method, operating with oxygen compressed to 24 atmospheres in a calorimeter containing 1·800 kilos. of water, and with a quantity of material capable of raising the temperature about 2° C. The material is compressed into the form of small pastilles, and placed upon a piece of dished platinum foil, with a spiral of iron wire weighing 0·018 gramme suspended above it. The oxygen is not previously dried. When the arrangement is complete, the iron wire is rendered incandescent by a momentary electric connection, and at once takes fire and ignites the material to be tested. The latter burns instantaneously, without a trace of smoke, carbonic oxide, or hydrocarbon gases.

NIGHT SKY—JULY AND AUGUST.

BY RICHARD A. PROCTOR.

The Great Bear, *Ursa Major*, is now in the northwest, his paws near the horizon. The Pointers, α and β, direct us to the Pole Star, α of the Little Bear, *Ursa Minor*. A line from the Pole Star to the Guardians of the Pole is in the position of the minute hand of a clock about seven minutes before an hour. Below the Little Bear we see the Camelopard, a little to the east of due north. The Dragon, *Draco*, curves round from between the Pointers and the Pole, above the Little Bear toward the east, then upward to near the point overhead, its head, with the bright stars β and γ, being highest. Low down in the west we see Berenice's Hair, *Coma Berenices*, and one star of the Hunting Dogs, *Canes Venatici*, is seen in the chart between Coma and the Great Bear. The Herdsman, *Bootes*, occupies the midheaven in the west, the Crown, *Corona Borealis*, higher up, and due west, Hercules, between the Crown and the point overhead.

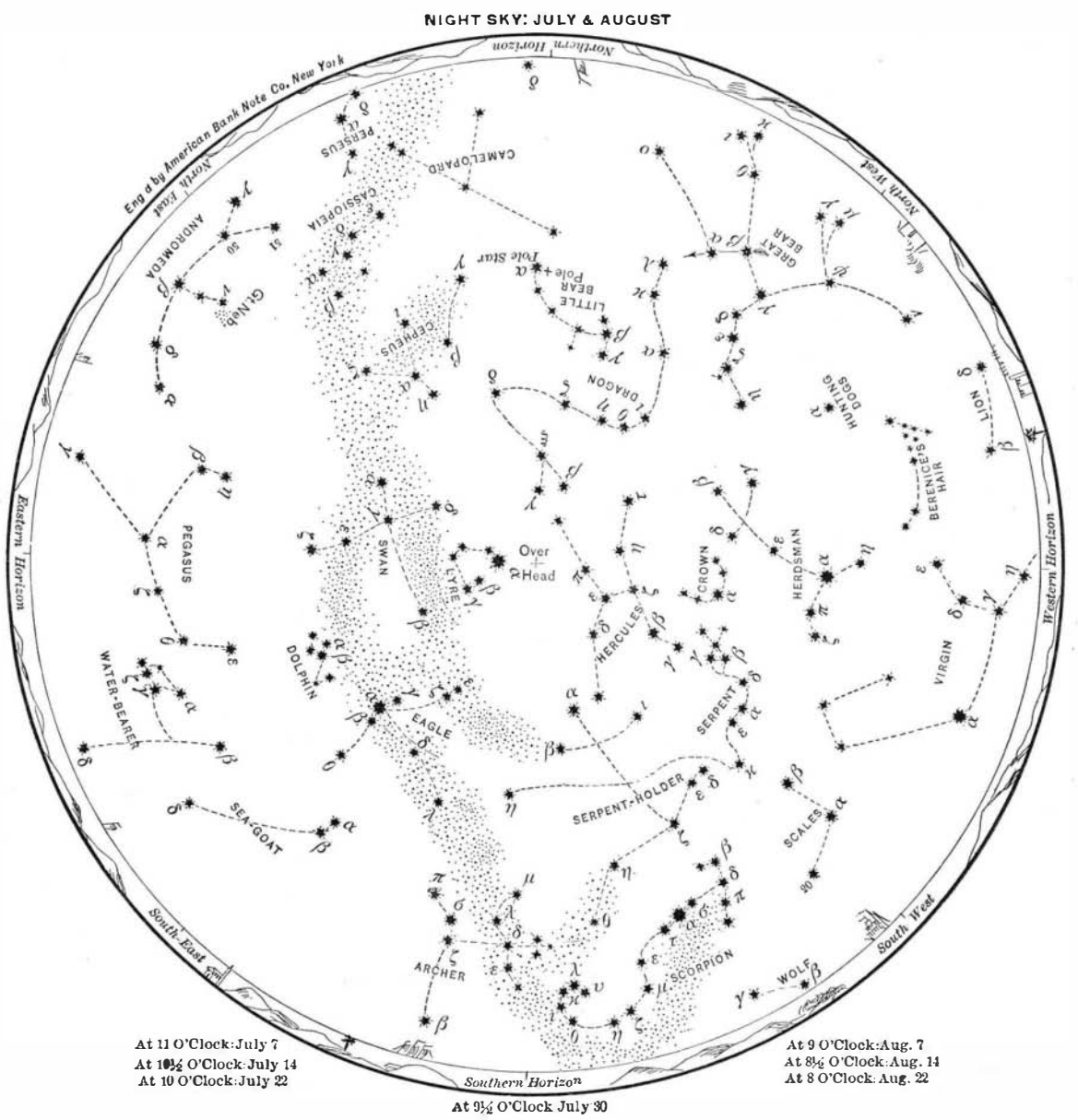
Low down, extending from the west to near the southwest, we find the Virgin, *Virgo*, the bright Spica near its setting place. In the southwest are the Scales, *Libra*, and father to the left, extending from the Scales to low down near the south we find the Scorpion, *Scorpio*, one of the finest of the constellations, Antares, the rival of Mars (as the name means), marking its heart. Above the Scorpion and the Scales are the Serpent Bearer, *Serpentarius* or *Ophiuchus*, and the Serpent, *Serpens*, extending right across him to near the Crown, after which the Serpent seems reaching.

A little east of due south, low down, we find the Archer, *Sagittarius;* in the southeast, low down, the Sea Goat, *Capricornus;* and farther east, and lower down, the Water Bearer, *Aquarius*. Above the Sea Goat is the Eagle, *Aquila*, with the bright bluish-white star Altair; on its left the pretty little Dolphin, *Delphinus*, and above the Dolphin, nearly overhead, the Lyre, *Lyra*, with the bluish-white star Vega (even brighter than Altair) nearly overhead.

Below the Lyre we see the Swan, *Cygnus*, due east; and below the Swan the winged horse, *Pegasus*, upside down as usual.

In the northeast, *Andromeda* the Chained Lady, is rising, her head marked by the star α (which was also called δ of Pegasus. (The "Square of Pegasus" is formed by α of Andromeda and α, β, and γ of Pegasus.)

Between the north and northeast is *Cassiopeia*, the Seated Lady, and above her, her husband, King Cepheus. And lastly, Perseus is just rising, between the north and northeast.



In the map, stars of the first magnitude are eight-pointed; second magnitude, six-pointed; third magnitude, five-pointed; fourth magnitude (a few), four-pointed; fifth magnitude (very few), three-pointed, counting the points only as shown in the solid outline, without the intermediate lines signifying star rays.

The Telephone of 1664.

And as glasses have highly promoted our seeing, so 'tis not improbable, but that there may be found many mechanical inventors to improve our other senses, of hearing, smelling, tasting, touching. 'Tis not impossible to hear a whisper a furlong's distance, it having been already done; and perhaps the nature of the thing would not make it more impossible, though that furlong should be ten times multiplied. And though some famous authors have affirmed it impossible to hear through the thinnest plate of Muscovy glass, yet I know a way by which it is easy enough to hear one speak through a wall a yard thick. It has not yet been thoroughly examined how far Otocousticons may be improved, nor what other ways there may be of quickening our hearing, or conveying sound through other bodies than the air; for that is not the only medium. I can assure the reader that I have, by the help of a distended wire, propagated the sound to a very considerable distance in an instant, or with as seemingly quick a motion as that of light, at least, incomparably swifter than that, which at the same time was propagated through the air; and this not only in a straight line, or direct, but in one bended in many angles.—*From works of Robert Hooke, published in* 1664.