

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 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

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 farther 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.

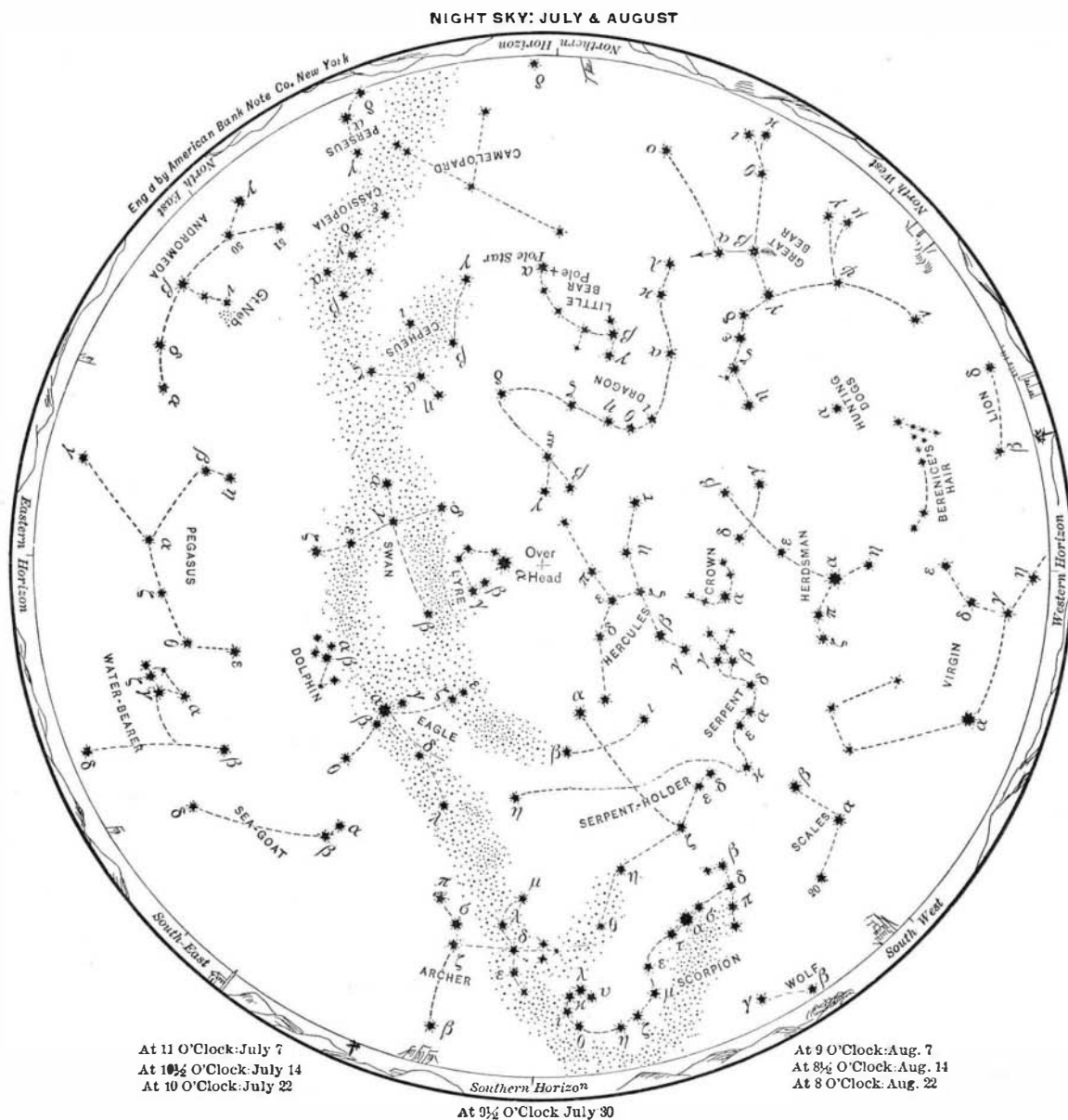
In the northeast, *Andromeda* the Chained Lady, is rising, her head marked by the star α (which was also called δ of *Pegasus*). The "Square of Pegasus" is formed by α , β , and γ of *Pegasus*.

Between the north and northeast is *Cassiopeia*, the Seated Lady, and above her, her husband, King Cepheus. And last-

ly, Perseus is just rising, between the north and northeast.

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.



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.

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 carburated. 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 1800 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.