Aurora Borealis.

BY PROF. E. R. PAIGE.

The cause of this singular phenomenon has been a prolific subject of both scientific and unscientific discussion for many years.

To the mind educated in cause and effect the canopy of night, lighted up by the dancing specter, presents a most alluring sight. While the unenlightened are filled with dark forebodings of a visitation of God's wrath, the scientist sees only the grand workings of the immediate laws of nature. The heavens illuminated with red light is to the superstitious a sure harbinger of impending wars. While the careful observer looks with delight upon the scene, and is impressed only with the sublimity of nature, poor unreasoning man is tortured with fears of coming evil.

In the slow development of scientific knowledge many and varied have been the theories put forth as to the origin of the Northern Lights, as we in this hemisphere call them. It is the reflection of sunlight by the ice at the pole, says one, while another contends that it is produced by great and internal fires whose chimney occupies the space devoted by Dr. Kane to an open polar sea; but the more patient observers have pronounced it electric light. It is my present purpose to look out through the light of a few known facts in search of the origin of this great wonder. Not that any direct good will follow a successful inquiry in the matter of utilizing the light for street purposes or for private illumination, but if we can find the cause to be natural, and not supernatural, then one more old superstition that has haunted the memory and made life unhappy is gone—one more bugbear of tormenting fear is consigned to the shades of past ignorance. Newton discovered the law that controls the universe, and every child should be taught this law, for without it we can comprehend nothing in nature. How life is produced, how worlds, how suns and planets are formed and held in their orbits, is known only through this law.

"Each atom has an attraction for each other atom in the universe, and the attraction is proportionate to their size, and is lessened as the square of the distance which separates them increases." Late developments in scientific research lead to the conclusion that all the varied original elements in nature, so-called, are resolvable back to one, and that one to energy; also, that light, heat, electricity, and sound are only different phases of motion.

Heat is the arrest of motion, and all the warmth we get from the sun is produced by the stoppage of the heat waves sent out by its throbbing power. Chemical heat is created by the clash of little worlds of gas beating together, and no exception is known to the rule that heat is the arrest of motion.

All the heat and all the energy we get on the earth come from the sun. The rain clouds are lifted from the ocean; the winds sweep over the mountains and across the moors; the blood of life, the sap of vegetation, all propelled by the power of the sun. The visible power expended on our little globe passes all efforts of comprehension, but it is naught compared with the latent hidden energy. The decomposition of one drop of water produces a power equal to the most terrific thunderstorm ever witnessed, while the decomposition of one grain of water produces a force equal to the discharge of 800,000 Leyden jars. All this but shadows the vast amount of energy that comes to us from the sun. Our earth is but a speck in space, and not a two-thousand-millionth part of the energy thrown off by the sun strikes us, but is expended out in dark, empty space. This involves a vast waste by the sun, and experiments show that the sun would be exhausted and cooled down in 5,000 years if not replenished from some source. The earth is passing around the sun once a year over a path of 555,000,000 miles long, traveling at the rate of 68,000 miles an hour. The speed of our flight is eighty times more rapid than the swiftest flying cannon ball. If the globe should strike a dead wall passing at this great speed, the concussion, we are told, would burn it instantly, creating a heat of which we have no comprehension; and yet the heat produced by such a catastrophe would not be sufficient to last the sun's waste for a period of thirty days.

We are taught, however, that if the earth should let go its place in space and be attracted into the sun, that body being 325,000 times more than the earth, and, therefore, possessing 325,000 times more power of attraction, its immense pull would draw us in with such a velocity that the kinetic force gathered in the passage would produce an impact in striking that would give off heat sufficient to last the sun's waste for a period of ninety-one years.

In any hour of a clear night that we watch we shall see at least six or eight stars fall. These stars are simply small pieces of iron gathered and formed in space that have fallen into our atmosphere in our flight around the sun; that is, have been attracted into the orbit of the world and picked up. Coming into our atmosphere when it is passing with such velocity creates a friction—a concussion—an arrest of motion, that immediately burns the iron. We see the explosion and call it a falling star. If an unaided eye can see six fall in one hour of the night, then what a vast shower must be constantly attracted by the whole earth. If the little earth, with its slight power of attraction, brings in such a constant shower of cosmic matter, how much more would be attracted by the sun, possessing 325,000 times more power of attraction than the earth. Such is the case, we are told, and our grand constant shower of cosmic matter is constantly falling into that body, forming a vast corona extending out from the sun 800,000 miles, by the clashing and impinging of particles and resultant burning. Thus, by virtue of the law of attraction, one constant stream of matter, which is energy, is pouring into the sun to replenish its waste. This matter must be formed in space, and is simply an aggregation of energy, or fire-mist, that pervades the atmosphere.

The cosmic matter that falls on the earth—that is, meteoric matter—is about 85 per cent iron, and is merely an aggregation of iron dust, which is itself an aggregation of invisible fire-mist. Great clouds of this fine iron dust gather in the heavens, and are occasionally attracted into our orbit. On striking our atmosphere, flying with such great speed, the concussion, the arrest of motion, instantly burns the iron dust and produces light colored according to the surrounding conditions that produce the refraction. This theory is not without its objections, and the chief one is, perhaps, the fact of these lights occurring toward the poles. This objection, I think, can be met, however, in the conditions that produce refraction of light, but our article affords no space to enter upon that field.

The facts I have alluded to as a basis for reasoning are, of course, not my own, and I shall not be deemed immodest, I hope, in saying that they are all well established and may be accepted as true grounds of reasoning.

This being so, it does seem that the wonderful aurora borealis may be fully accounted for in the burning of iron dust that gathers into great clouds, and floats into our flying atmosphere to be burned by the concussion.—*Inter-Ocean.*

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NICKEL PLATING.

THE PLATING BATH.

The nickel salts commonly used are the nickel-ammonium sulphate (called double sulphate) and the corresponding chloride. Other salts, such as the nickel potassium cyanide, the acetate and sulphate, have been used, but not so successfully as these.

The double sulphate bath may be prepared by dissolving three-fourths of a pound of the salt in each gallon of water (soft). The salt costs about sixty-five cents a pound, and is generally considered the best for this purpose. It should be kept neutral and up to about six degrees of hydrometer.

The double chloride bath requires about four ounces of the salt per gallon, and works better slightly acid, the tendency in working being toward alkalinity.

The bath should be filtered when freshly prepared, and should be kept in a separate room, or at least away from the apartment in which the buffing or polishing is performed, to avoid contamination by dust as much as possible. Exposed to the air the bath (the water) evaporates, and the water thus lost must be replaced from time to time. To retard this and keep out dust as much as possible, it is well to cover the bath when not in use. Its surface should be skimmed occasionally, and it should be frequently mixed together to preserve a uniform degree of strength.

The tank or vessel in which the bath is contained is usually constructed of smooth two inch white pine stuff, grooved and well bolted together, and coated on the inside with good asphaltum, applied in the melted state.

Instead of this form a clean tub or a half barrel or hogshead, with an extra hoop, may be used, though from the shape of such a vessel there is necessarily much waste space to be filled with useless liquid.

For small baths a neat form of vessel consisting in a square porcelain-lined (enameled) iron tank of suitable dimensions is sold by some of the dealers in electroplating materials.

ANODES OR FEEDING PLATES.

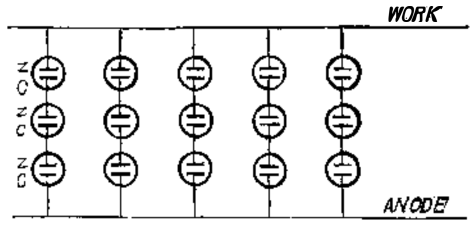
Good pure cast nickel anodes are now obtained at a moderate cost ($1.85 lb.), and are preferable to grain metal anodes. They usually come in sizes ranging from $1\frac{3}{4}$ x 4 inches, $\frac{3}{16}$ inch thick, to 8 x 12 inches, $\frac{5}{8}$ inch thick.

They may be suspended around the sides of the tank or across and facing the work (care being taken to avoid bringing them into such close proximity to the work that contact is likely to occur under any circumstance). They may be suspended by clean copper trusses or hooks—which should not be permitted to touch the liquid—from stout copper rods, to which connection with the battery is made.

THE BATTERY.

In nearly all large electroplating establishments some form of dynamo-electric machine is now used instead of the battery. They are cleanly, require little attention and space, and afford a current more easily adapted to the work, and at a much smaller cost.

But as their first cost is considerable, and they require power to operate them, the old battery is still in requisition in smaller establishments. The carbon or chromic acid battery* is more commonly used, as it admits of more rapid work with a smaller number of cells; but as it supplies a very intense current it often becomes necessary to introduce resistance coils to reduce it where small work is on hand. Some of the best work we have ever seen has been produced with the current derived from two or three Smee or sulphate of copper cells (in series). The amount of battery power for a given amount of work should be in zinc surface (exposed) about equal (when in proper working order) to the surface of the work exposed in the plating bath, with care to preserve the tension. If one cell has a zinc surface (exposed), of, say, one hundred square inches, and the work, say, five hundred, the one cell will require to be multiplied by five for quantity and (if the original tension was, say, three) by three to preserve the tension. Thus:



Of course this is equivalent to three large single cells, each exposing five hundred square inches of zinc (equal to a plate about sixteen inches square, exposing both sides). Large batteries of the dipping form, admitting of the immersion of the proper quantity of zinc, are often convenient.

If the current is too strong the deposited metal will present a dull (commonly termed burnt) appearance; if too weak it is apt to be imperfect, granular, or semicrystalline.

For practical purposes the electricity may be said to proceed from the copper or carbon pole of the battery, and care should be taken that this pole is invariably connected (by stout copper wires or rods) with the anodes or feeding plates in the plating bath, for if misconnected damage is done both to the work and the bath by the corrosion or partial solution of the former in the latter.

PREPARING THE WORK.

Before work can be plated its surface must be freed perfectly from all traces of oil or grease, oxides, lacquer, and other impurities. Oil, grease, etc., are removed by contact with a strong, hot aqueous solution of caustic potash, and, after rinsing off the adhering alkali, from oxide by an acid bath; or, if of brass, copper, or German silver, by scouring with fine pumice stone and strong aqueous solution of cyanide of potassium. Iron is pickled in dilute sulphuric or muriatic acid (acid 1, water 5 to 15), and scoured with fine white silicious sand or pumice stone. Brass or copper is sometimes brightened before entering to the plating bath by dipping it momentarily in nitric acid diluted with about twenty parts of water, and quickly rinsing it in running water. It should be placed in circuit immediately after this.

The hand must not come into contact with any part of the work after removal from the alkali, as the slightest touch may spoil all.

On removal of the plated work from the plating bath it should be quickly rinsed (without handling) in cold water, then transferred to hot water, which will cause it when taken out to dry quickly and perfectly. If the finished work is to present a smooth polishing surface it must present such a surface before entering the plating bath. Nickel is hard and will not readily submit to a burnishing tool.

When the work is placed in circuit in the plating bath (and it should not be permitted to remain many moments in the bath without being placed in circuit) it should be moved about to free it from bubbles.

The process of nickel plating is a simple one, and by a little practice and proper attention to the requirements the bath may be worked month after month, and the metal deposited smoothly and with certainty.

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Paper.—How it is Made.

The antiquity of the paper manufacture is, says the Boston *Journal of Commerce*, probably excelled by but few other products of civilization, Chinese historians carrying it back to a point far in the twilight of our history. In England it was first introduced near the close of the fifteenth century, and in this country in 1693, at Germantown, Pa. The materials from which paper is produced are numerous, but wholly of vegetable origin, neither wool nor hair possessing the capability of being reduced to fibrous pulp, a prerequisite to the formation of paper. Linen and cotton rags, straw, the leaves and stalks of the okra plant, jute stalks, manila, hemp, and even wood fiber, are all used in the manufacture of paper. No substance, however, can equal good linen rags, of which the toughest and finest paper is made. Next in rank are cotton rags, from which the best writing and note paper is made. In this manufacture great care is taken in the selection of the material and in every process.

Gathered from all parts of the country by tin peddlers and by peripatetic ragmen in cities, the rags arrive at the mill in bags, a portion of the stock, perhaps, coming in pressed bales from over the sea. The first process is sorting, and then the rags are cut, usually by girls, by means of a fixed blade in a bench, like a short upturned scythe, the operator picking them up by handfuls and drawing them over the edge of the blade. Each girl is furnished with a sandstone rifle, and when a large roomful of girls are at work the sounds remind one strongly of a gang of mowers at work before the days of the mowing machine. A second sorting, for the removal of all buttons, hooks and eyes, and hard seams, follows, and the rags are then dusted. The duster is a large cylinder, the surface of which is of fine woven wire, inside of which is a shaft carrying arms set around it in a spiral form, and revolving at a higher rate of speed than the cylinder. This difference in speed gives the rags a thorough stirring, while the spiral arrangement of the blades facilitates the exit of the rags, which traverse the cylindrical sieve from end to end. White paper can be made from colored as well as white rags, and for the removal of the color as well as the dirt they are submitted to a boiling with lime water. The

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*See SCIENTIFIC AMERICAN SUPPLEMENTS, Nos. 157, 158, and 159, for descriptions of batteries.

rags are placed in a large rotating boiler made of half-inch plate, mounted on journals and driven by proper gearing, as a worm and wheel. Through the hollow journal steam is admitted and kept at a pressure of from forty-five to sixty pounds, representing a heat from 292° to 308°. Lime water, in the proportion of about one part by weight to ten or twelve of the rags, is mixed with them, and the boiler is set in motion. Usually a charge requires from eight to twelve hours' boiling. Even this severe test does not fully purify the rags, which are next passed through an "engine."

To the uninitiated a brief description of this apparatus is necessary. It is a tank of oval form, the walls or sides rising two and a half feet from the floor. This is partially divided longitudinally by a straight upright partition, not extending to the ends, however, but leaving a space between its ends and the tank's sides, of a width corresponding to that between the sides of the partition and those of the tank. On one side of this partition, across the center of the tank, is a toothed drum, the teeth or blades of which alternate with fixed teeth at the bottom. These teeth tear the rags to tatters, but without destroying the fiber. A stream of water is constantly passing through the tank, and is constantly removed. This is done by a wheel of fine wire netting that revolves on the side opposite to the toothed drum, taking up the mass, but detaining the pulp, the water running off through the shaft of the wheel, which is hollow. Thus the water is used only while making a single passage around the tank, the current being produced and maintained by the rotary movement of the beater or tearer. The condition of the rag material when it comes from this cleansing engine is that of a coarse pulp, technically known as "half stuff," which is subsequently submitted to the action of another engine, known as a beating engine, but essentially the same as the cleaning engine.

But still further cleansing is necessary. The material is next mixed with chloride of lime and again passed through the engine. It is then heaped upon drainers, and looks like a mass of half-melted snow. The white, however, is a dead white, having no brilliancy. To receive this quality it must literally be colored. As the laundress blues her clothes to make them whiter, so must the paper stuff be blued, and when so tinted it has that same quality of whiteness as wind driven snow, which always shows a bluish tinge. This is quite different, however, from the blue writing paper so affected by the fashionable twenty and thirty years ago, and now the favorite tint in the South and in England. That is really blue paper, while our usual white paper is merely tinted sufficiently to remove the dead, yellow, lusterless appearance of absolute whiteness. The bluing is ultramarine, as used in calico printing and for other manufacturing purposes, made from silicate of soda, alumina, sulphurets of iron, and carbonate of soda, and not from lapis-lazuli. This is mixed in powder with the half stuff just before the final heating.

After the final heating the material is apparently a thin, milky fluid, having no trace, to the unaided eye, of the fibrous character that it really possesses. Formerly the paper was formed by hand, the workman dipping a rectangular sieve into the fluid pulp, and depositing the sheet of pulp on a piece of felt to dry. But very little paper is made so now, the Fourdrinier machine having taken the place of the hand workman. This "machine," as it is called *par excellence*, is a wonderful production of skill; it is almost wholly automatic in action, and works with marvelous exactness. It is scarcely possible to describe it without detailed engravings, but a brief account of its work may aid in its comprehension. Some of these machines are not less than six feet wide and seventy-five feet long, requiring a building by itself, and making a sheet of paper over five feet in width. The pulp is pumped into an elevated tank, from which it is delivered to the machine through an adjustable gate opening from a reservoir. The amount of pulp fed to the machine regulates and determines the weight of the paper, and of course it must be governed absolutely and exactly, the speed of the machine being a constant. The pulp flows on to a roller, which deposits it on an endless apron of fine woven wire, which has a constantly jarring motion, tending to shake out the water and aid in the homogeneous union of the particles. Thick rubber straps on each side of the endless apron determine the width of the sheet. Passing between rollers which compress it, the sheet of pulp goes over perforated boxes from which the air is exhausted by a pump, and much of the remaining moisture is driven out by atmospheric pressure. A bath of liquid glue gives a proper sizing to the sheet after it is fully dried by cylinders heated by steam. The sheets, dampened by glue, are taken to a drying room, from whence, all wrinkled, they are submitted to a calender consisting of a stand of rolls, three of chilled iron and two of paper. These latter are made of manila paper cut in disks, with a hole for the axis or shaft, and compressed by hydraulic pressure. When turned and finished, these paper rolls are as smooth and almost as hard as iron, presenting a highly finished surface. The sheets are then trimmed by a machine suggestive of the guillotine, and ruled. The pens used on the ruling machine are of peculiar form, made of sheet brass and fed with ink by a wick. Most of those used in this country are made by one concern in Harrisburg, Pa.

Book paper is made of old paper entirely. The processes are similar to those employed in making paper from rags, except that, owing to the more pliable nature of the material, they are not so long continued.

Juted is used for making coarse paper, such as is used extensively for flour bags, for which it is well adapted, being very tenacious of fiber, a full grown man having been carried by four persons, each lifting a corner of a sheet of jute paper from which bags are made, designed to hold a quarter of a barrel of flour—forty-nine pounds. The jute stalks come in lengths of from ten to fourteen inches. They are imported from Calcutta, and are the same material from which gunny cloth and gunny bags are made. The stalks pass through a rotary cutter, with stationary knives and knives set in a cylinder, by which they are torn to coarse shreds. A boiling under steam pressure, in a rotary boiler, with lime, follows, when the mass is heaped and allowed to "sweat" a few days. It passes through the cleaning engine, as do the rags described above, is bleached with chloride of lime, and sized with a size made of rosin and washing soda. The after machining is similar to that used on writing paper.

Envelope paper and fine wrapping papers are made from old manila rope, and paper for paper collars from cotton rags. In both cases the processes are of a similar character to those employed in the manufacture of paper for writing purposes. A necessary requisite for paper making is pure water; so paper mills are never found on the banks of sluggish streams or the shores of a marshy, muddy pond. The coloring matter for tints is introduced into the beating engine when finishing the half stuff.

Petroleum as Fuel.

The mail steamer Cesarewitch is described by the special correspondent of the London *Daily News*. It is English built, and is the swiftest mail steamer on the Caspian, being only surpassed in speed by the Nasr Eddin Shah war steamer. To convey it from the Baltic to the Caspian, it was necessary that it should traverse the whole of the Neva ship canal, and afterwards descend the Volga to Astrakan. On the Neva Canal are fifty-four locks, and the Cesarewitch's length was too great to allow of her entering them. Her present chief engineer, Mr. Vine, an Englishman, cut her into two pieces amidships, and filling up the open extremities with iron bulkheads, floated her in this guise through the canal. At Astrakan the same gentleman put her together again, and has remained ever since in charge of her machinery. Her boilers are heated by petroleum refuse instead of coal, a system which effects an enormous saving of expense and labor, the heating apparatus being as thoroughly under control as a gas jet, and requiring but one man to manipulate it. It consists of two tubes, about an inch in diameter, terminating at the same point in a small oblong brass box. Through one of these tubes the black residual naphtha (*astatki*) drops slowly, being blown into spray by a jet of steam from the boiler, conveyed through the second tube. This spray, when ignited, forms a great sheet of flame, which is projected into the hollow of the boiler. It has the immense advantage of requiring no stoking, as no ashes are produced; and by turning down the flame to the required degree, the steam can always be kept up to the pressure required for immediate starting without the tedious and more or less wasteful process of "banking" the fires. An arrangement like this is invaluable for cruisers lying off an enemy's port, and requiring to hold their steam in readiness. It is intended to apply the same system of heating to the locomotives on the Tiflis Baku Railway, when completed; and it will, doubtless, play an important part in the steam communications destined at no distant period to traverse the Steppes to Khiva and Samarcand.

Pork Making in Brief.

A correspondent of the London *Miller* describes his visit to a Chicago pork packing establishment as follows:

The place where I was to witness the prosecution of one of the greatest of the industries of the latter city was Union Stock Yard, where I arrived by street car at 9:5 A.M., and was introduced to one of the pig killing establishments. The animals to be operated upon are driven up an incline, for which, if they suspected to what fate it was the introduction, they would have no inclination. This leads to a large pen, from which they are driven into a smaller one, where a man is placed for the purpose of slipping a chain on one of the hind legs of the unsuspicious porkers, which are hauled to a position whence they slide to the sticker, who dispatches them while hanging. The stuck pig is then passed on to a man who unhitches the leg, and the animal falls into the scalding tank, which holds twenty at a time, and three men are there engaged stirring the carcasses up with long poles, so that the bristles which are to be removed are acted upon by the scalding water. At the end of the tank there is a sort of scoop which the pigs slide into, and are lifted out of the water to a bench, where they are subjected to the scraping and shaving process by the active hands of a dozen men. They are then passed to a functionary by whom they are decapitated, after which they are cut open and disemboweled by other practitioners, the division of labor principle being carried out there to the letter. The cutting up process follows the whole operation, taking a great deal less time than I have taken to describe it. A pig is killed and made ready for the market in a few minutes. At the Messrs. B. F. Murphy Packing Company they now employ 210 men, have a 24 horse power engine and four 50 horse power horizontal boilers, eleven lead tanks, 8 feet by 6, and three 24 feet by 6. They kill 1,600 pigs a day, and in winter twice that number. After being cut up the pigs are salted and put in icehouses.

I also visited one of the cattle killing establishments, where the work of slaughter is conducted with equal dispatch, the mode of killing being the cutting of the spinal cord at the back of the head by means of a steel pointed spear sharpened somewhat like a drill, the animal falling instantaneously and without a struggle. Every part and product of the animals, I may mention, is utilized, nothing here being allowed to go to waste.

Astronomical Notes.

OBSERVATORY OF VASSAR COLLEGE.

The computations in the following notes are by students of Vassar College. Although merely approximate, they are sufficiently accurate to enable the observer to recognize the planets. M. M.

POSITIONS OF PLANETS FOR SEPTEMBER, 1880.

Mercury.

Mercury rises before the sun on September 1, and may possibly be seen in the early morning.

On September 30 Mercury sets so nearly with the sun that it cannot be seen.

Venus.

On September 1 Venus sets at 7h. 6m. P.M. It is in conjunction with the crescent moon on the 5th.

The "Nautical Almanac" gives the conjunction of Venus and Mars on the 7th at 1 P.M., Venus being 31′ north of Mars in declination.

Mars.

On September 1 Mars sets at 7h. 12m. P.M. On September 30 Mars sets at 6 P.M.

On September 7 Mars and Venus pass the meridian very nearly at the same time. Mars precedes Venus by ten seconds.

Jupiter.

Jupiter is becoming more and more brilliant.

On September 1 Jupiter rises at 8h. 2m. P.M. On September 30 Jupiter rises at 6h. 2m. P.M.

It passes its perihelion on the 25th. The near approach of Jupiter to the earth will give amateur astronomers an excellent opportunity to watch the motions of the moons and the changes on the surface of the planet. A good opera glass will show the moons.

If we take the hour from 9 to 10 P.M. for our watch, the first satellite may be seen to come out from behind the planet on September 1; to move into the planet's shadow on the 15th; to pass from the planet's face on the 16th, and to enter upon the planet's face on the 23d.

During the same hour the second, or smallest satellite, is hidden by the planet on the 7th; is in eclipse, by the falling of Jupiter's shadow upon it, on the 14th; is near the limb of Jupiter on the 23d, having left the disk, and will be unseen because projected upon the disk on the 30th.

The third satellite in the order of distance from Jupiter, which is the largest and which will be most easily followed by amateurs, may, on September 3, be seen to go behind the planet, and on 28th may be seen to pass on to the disk of the planet, coming between the earth and Jupiter. September 23 will be the most favorable for watching the changes of the satellites, as one of the moons may be seen to move off from the face of Jupiter, and another will be seen to move toward the planet and to enter upon its transit across the disk almost at the same time. Jupiter is in conjunction with the moon on the morning of the 20th.

A close study of Jupiter during the month of September will be the most instructive as well as the most pleasing occupation to which young astronomical students can give their evenings. If no means of measurement are at hand, careful drawings should be made of changes on the surface of Jupiter.

Saturn.

Saturn follows Jupiter throughout the month of September.

Saturn rises on the 1st at 8h. 32m. P.M., and on the 30th at 6h. 34m. P.M., between 3° and 4° north of Jupiter in declination.

Although Saturn is not, like Jupiter, at perihelion, it is approaching its best position for this year, and should share with Jupiter the attention of observers.

Saturn is in conjunction with the waning moon after midnight of the 20th.

Uranus.

Uranus rises nearly with the sun in the early part of the month; on September 30 it rises at 3h. 44m. A.M.

A Table Land Across the Gulf Stream.

In a recent dredging expedition from Charleston, S. C., across the Gulf Stream, Commander Bartlett, of the United States Coast Survey steamer Blake, was surprised to find the depths much less than he expected. This induced him, although the trip was one primarily for dredging, to extend the work of sounding; and he accordingly ran a line of soundings nearly along the warmest band of the Gulf Stream, commonly called the axis of the stream, for a distance of 150 miles from latitude 32° to latitude 33° 30′ north, on which he obtained depths varying from 233 to 450 fathoms, where it was supposed that the depths would range from 600 to 1,000 fathoms. At the northeast end of this line, in about latitude 33° 30′ north, the depth suddenly increased, in a distance of 15 miles, from 457 to 1,386 fathoms.

These depths obtained by Commander Bartlett appear to indicate that a submarine table land may extend from the coasts of North and South Carolina across to the Northern Bahamas. The development of this table land Superintendent Patterson proposes to have completed next spring, when the weather will be better adapted to such work than in the autumn and winter months.