

comparison. The napkins and table linen for the dining service of one road mount up into the tens of thousands, and the towels and bed linen for the sleepers represent nearly as many more separate articles. The annual wash of the sleeper and dining-car service amounts to an expenditure of \$25,000, although it is nearly all done by steam and machinery. To keep up the supply of linen upward of ten thousand separate pieces of linen are purchased annually. On the great transcontinental trunk lines more money is spent on the table and bed linen than on such apparently important articles as car brackets for hats and coats or upholstered cushion seats for passengers. Yet so careful is the system that every napkin, towel, table-cloth, sheet, or pillow case must be accounted for, and not one can be lost without some adequate explanation accompanying the report of its disappearance. Strict business principles prevail throughout the whole department.

THE HEAVENS IN SEPTEMBER.

BY HENRY NORRIS RUSSELL, PH.D.

The clear evenings of autumn give us a good chance to study the heavens, which at this season are very full of interesting things.

The fine summer constellations, with whose outlines we have become familiar in the past few months, are now in the western and southwestern sky. Arcturus is low in the west, about ten degrees above the horizon at our regular time of observation (9 P. M. in the middle of the month). Above it are the other stars of Boötes, then the semi-circle of Corona and the "key-stone" in Hercules, and higher still shines the superb white star Vega. Scorpio is vanishing in the southwest, and Mars (which is at present in this constellation), will soon set. Sagittarius, with the Milk Dipper, is still well seen.

The Milky Way in this constellation, and higher up in Aquila and Cygnus, is one of the finest hunting-grounds in the heavens for a small telescope. It is full of star-clusters and nebulae—some of them visible to the naked eye—and abounds with magnificent telescopic fields, thickly spangled with stars.

The bright star on the meridian, rather more than half-way up to the zenith, is Altair. It is flanked by a fainter one on each side. The line of these three stars points downward to a pair of small stars, which are the brightest in the inconspicuous constellation of Capricornus. Both these stars are double, the upper one being resolvable with the naked eye, while the lower one requires a field-glass. East of Altair, at the same altitude, is the little lozenge-shaped constellation Delphinus, sometimes called "Job's Coffin." Above this, right overhead, is Cygnus, one of the finest of the constellations, abounding in double and variable stars, and other objects of interest.

About half-way up the eastern sky is Pegasus, which may be recognized at once by the "great square," composed of four second-magnitude stars, which has no counterpart in the heavens. This is a very large constellation, extending westward almost to Delphinus. The star at the northeastern corner of the square, however, does not belong to it, but is known as Alpha Andromeda. From this star a line of bright stars, about equally spaced, extends to the northeast. The first of these, Beta Andromeda, serves as a pointer in finding the great nebula of Andromeda. This lies a little above the second of two small stars which form a line extending up from Beta. It is easily visible to the naked eye, but the largest telescopes do not show in it anything like the detail which is shown on long-exposure photographs.

Gamma Andromeda, the next star in the line, is a very fine double star, the brighter component being red, and the fainter one green. They are much too close together to be divided with a field-glass, but can be well seen with a small telescope. The green companion is itself a very close double, separable only by powerful instruments. Still following the line of bright stars, we come to Perseus, and beyond it to Auriga, whose brightest star, Capella, has just risen in the extreme northeast. Above Perseus, in the Milky Way, is Cassiopeia, and Cepheus fills the gap between this and Cygnus. Ursa Minor and Draco are on the left of the Pole, and Ursa Major is below them, in the northwest.

The southeastern sky is dull. The little triangle which marks the head of Aries is due east, below Andromeda. Pisces, Cetus, and Aquarius fill the large vacant region in the southeast. The last constellation is brightened up at present by Saturn, which is the most conspicuous object in the whole neighborhood. Below it, far toward the horizon, is the lonely bright star Fomalhaut, in the constellation of the Southern Fish.

THE PLANETS.

Mercury is morning star throughout the month. He is best visible about the 15th, when he is at his greatest elongation from the sun, and rises about 4.30 A. M., so that he is easily seen before sunrise. He is in Leo, about 5 deg. southeast of the bright star Regulus, which he much surpasses in brightness.

Venus is morning star in Cancer and Leo, and rises at about 3 A. M. in the middle of the month. She is now about 100 million miles from us, and presents the same phase as the moon does two days after first quarter.

Mars is evening star in Scorpio, setting at about 10 P. M. on the 15th. During the first few days of September he is very near Antares, and it will easily be seen how well the star deserves its Greek name—which signifies *the rival of Mars*—by its resemblance to the planet in color and brightness.

Jupiter is in Taurus, between Aldebaran and the Pleiades, and rises at about 10 P. M. in the middle of the month.

Saturn is in Aquarius, and is well seen in the evening, coming to the meridian about 10 P. M. He is the most interesting telescopic object now visible. A very small telescope suffices to show his rings, and his brightest satellite, Titan. The latter is west of the planet on the 2d, north of it on the 6th, east of it on the 10th, and so on, the period of revolution being about 16 days. In looking for the satellite, the observer should first find out whether his telescope shows objects right side up (as all instruments for terrestrial observation do), or inverts them, as telescopes used exclusively for astronomical purposes do. In the latter case an object that looks east of the planet is really west of it, and so on.

Uranus is in Sagittarius in 18 h. 1 m. right ascension and 23 deg. 42 min. south declination. He is in quadrature with the sun on the 23d, and crosses the meridian at 6 P. M.

Neptune is in Gemini, and rises about midnight.

THE MOON.

First quarter occurs at 11 P. M. on the 5th, full moon at 1 P. M. on the 13th, last quarter at 5 P. M. on the 21st, and new moon at 5 P. M. on the 28th. The moon is nearest us on the 29th and farthest away on the 16th. The time of perigee, when she is nearest the earth, falls very near the time of new moon. We may, therefore, expect unusually high tides about the end of September. The moon's tide-raising force varies with her distance, and when she is in perigee it is nearly 25 per cent greater than its average value. When this happens at new or full moon, when the sun and moon are pulling together, we get very high tides. This year the epochs of such tides happen to fall near the equinoxes; but this is a mere coincidence, which will not occur two or three years hence, and so the high tides which we may expect at the end of this September (and in somewhat smaller measure in August and October, also,) have nothing to do with the equinoctial season.

The moon is in conjunction with Mars on the 5th, Saturn on the 11th, Jupiter on the 19th, Venus on the 26th, and Mercury on the 27th. The conjunctions with Saturn and Venus are fairly close.

On the morning of the 20th there is an occultation of the bright star Aldebaran, visible in the United States. The times and duration of the occultation are different for different places, but in the Eastern States the star will disappear behind the moon's bright limb about 2 A. M. and reappears from behind the dark limb an hour or so later.

At noon on the 23d the sun crosses the celestial equator, and enters the "sign" of Libra and, in the old-fashioned phrase of the almanac, "autumn commences."

LUMBER GRADES.

A subject of increasing importance to every lumber producer and consumer is that of grades. That these grades should be uniform where practical is well recognized, and many efforts to arrive at some general rules have been made. In view of these movements to standardize grades, the Forest Service has undertaken to bring together the specifications of the various lumber and manufacturers' associations and to put them in such a form that they may be compared.

The object of the study is not to devise a system of standard grades, but to make simply such a compilation of the grades now in use as will be of service to lumber producers and consumers, though it is hoped that a great deal of information may be accumulated that will be of value in eventually preparing the way for a standard system.

It is planned to get the views of those concerned partly by interviews and largely by correspondence. A representative of the Forest Service will endeavor to visit the secretaries and members of grading bureaus of various associations and learn their views in regard to the practical workings of the various rules. A large number of mill men and manufacturers will be reached by correspondence and their views sought. It is especially desired to find the important points of difference in grades from the view points of both producer and consumer of lumber, and also to ascertain the chief difficulties in the way of devising and executing a system of standard grades.

The assistance of manufacturers and consumers of lumber is earnestly desired in this work. Suggestions concerning it will be gladly received by the Office of Forest Products, Forest Service, Washington, D. C.

SCIENCE NOTES.

New Rubber-Producing Plant.—The German periodicals describe a new plant which produces a gum similar to caoutchouc. It is a variety of *Landolphia thollonii*. It attains a height of 40 to 50 centimeters, and has numerous roots, from which a juice is extracted containing as much as 18 per cent of gum. It grows in sandy places and will bear drought. It is reproduced by sowing, and when the time of harvest comes, the large roots are cut, leaving the small ones to bud and multiply.

Preparation and Properties of Nitryle Fluoride.—MM. Moissan and Lebeau give, in a memoir presented to the Académie des Sciences, the results of the researches by which they have demonstrated that fluorine does not react at ordinary temperature on nitrous oxide and nitric peroxide, and that it gives with nitric acid a new gaseous compound, fluoride of nitryle, NO₂F. The density of the gas is 2.24; the fusing point, 63.5 C.; it is endowed with great chemical activity. Although it does not combine, cold, with hydrogen, sulphur, or carbon, it reacts at the ordinary temperature with boron, silicon, phosphorus, arsenic, antimony, and iodine. It decomposes, cold, with production of fluorhydric acid and nitric acid; it reacts on a large number of organic compounds.

Of the cereal crops of this country wheat suffers most from insect depredations. Of the large number of insects which depredate on this cereal, the three important species are the Hessian fly, the chinch bug, and the grain plant-louse, using the latter term to include several allied species which work in much the same manner. The chinch bug is notably a wheat pest, although its damage to other cereals and forage crops is very considerable. The losses from the depredations of this insect on wheat in single States have ranged between \$10,000,000 and \$20,000,000 in one year. A very reasonable average annual estimate of loss, taking the country as a whole, would be 5 per cent of the value of the wheat crop, which would indicate about \$20,000,000 a year chargeable to this insect.

Variable Composition of Firedamp.—M. Lidoff has made exhaustive investigations on mine gas, and has arrived at the conclusion that what is understood by the term "firedamp" is an essentially variable compound. According to Dingler's Polytechnisches Journal, instead of consisting chiefly of methane, it frequently contains 60 per cent of it, while 37 per cent is ethane, and some carbonic acid is present. In many English mines the proportion of methane varies between 77.5 and 98.2 per cent, whereas in the valley of the Donetz it is between 52 and 70 per cent. It cannot be affirmed positively that a small quantity of argon is invariably present, but it is noteworthy that sometimes the gas consists, so to say, merely of carbonic acid.

A Foster Family of Ducks.—A curious experiment in the hatching of ducklings by a turkey was made recently on a model farm at Willerhof, in the outskirts of Schlestadt, in Lower Alsace. It succeeded admirably, as attempts not dissimilar have succeeded elsewhere. The bird was placed in a basket in which were two plaster eggs, and it was kept there by means of a framework. In a couple of days the two artificial eggs were replaced with a dozen duck's eggs. In due time nine ducklings were hatched. The turkey showed much attachment to its brood and protected it devotedly. The first time the ducklings took to the water, the turkey followed them, but soon drew back and patiently awaited their return and its vigilance did not relax even when they had grown up. When the fowl could not share their nest any longer, it left them in the evening to rejoin its fellow-turkeys, but when the coop was opened in the morning, it quickly sought its strange family, all the members of which are in good health.—La Nature.

THE CURRENT SUPPLEMENT.

Mr. Day Allen Willey opens the current Supplement, No. 1548, with an interesting article on the new sea-going dredges which have been used for the deepening of the ship channel leading into New York harbor. Mr. R. S. Thompson writes instructively on the possibilities of heating with hot air. How Cognac brandy is manufactured is told in a short contribution. The excellent discussion of reinforced concrete which began in the last number is concluded. Prof. J. Joly writes on the latent image in photography. Wallingford, England, is a place of very considerable interest, although it can show no very striking relics of its former importance. Rev. J. E. Field, however, has managed to tell in an entertaining article much that is interesting about the old town. John S. MacArthur contributes an historical article on gold extraction by the cyanide process. The eclipse of the sun which occurred on August 30 lends peculiar interest to Sir Robert Ball's article on the subject, which is excellently illustrated with photographs. The cause of flower coloration is told simply and clearly by Dr. H. Mandoul.