

THE HEAVENS IN SEPTEMBER.

BY HENRY NORRIS RUSSELL, PH.D.

Daniel's comet, which has been visible to the naked eye in the morning sky for some weeks past, is still increasing in brightness, and has become a conspicuous object, much surpassing anything of the sort that we have had the chance to see in the last fifteen years.

At the date of writing, its head is almost of the second magnitude, and its tail is fully ten degrees long, and is growing rapidly. For the next few weeks it will be a fine sight, though the neighborhood of the moon has interfered with it somewhat during the latter part of August. But early in September she gets out of the way, and at this time the comet will probably appear to great advantage, as it will be just past perihelion, when comets' tails usually reach their greatest development.

The comet has already passed its nearest approach to the earth—70 million miles—which was reached on August 1, when it was 85 million miles from the sun, but it will not be near the sun till September 4, when its distance will be 48 million miles. At this time it will be about 100 million miles from us, but the resulting loss of brightness will be more than balanced by the gain due to its approach to the sun.

At the date of writing the comet is in Gemini, in R. A. 7h. 15m., and about six degrees south of the ecliptic. It is moving rapidly eastward, nearly parallel to the latter, and its elongation from the sun is diminishing, but it will remain well visible before dawn till after perihelion passage.

It is so conspicuous that no special directions for finding it are really necessary. All that is needful is to get up about half past three in the morning, and look from any window that commands an unobstructed view of the eastern sky. The comet will be below and to the left of Orion (or, later on, below Jupiter) and can be known at a glance by the long tail, sweeping upward to the right. It is well worth getting up to see at present, and will probably be better yet early in September.

Toward the end of the month it begins to recede rapidly from both earth and sun, and it will not remain a naked-eye object for more than a few weeks, though it should be visible telescopically for many months to come.

It is natural that the appearance of this fine comet should lead us to ask some questions about comets in general. What they look like anyone can now find out for himself by getting up early enough—a bright star-like point or nucleus, surrounded by a hazy light called the coma, which extends on one side into a long beam of light, gradually growing fainter, called the tail. This description applies, of course, to the bright comets; the faint telescopic ones are often mere clouds of luminous haze, with neither nucleus nor tail.

The orbits of comets, in accordance with the law of gravitation, are conic sections. About four-fifths of them have very nearly, if not exactly, the form of a parabola—they come toward the sun from a very great distance, swing round it, and recede again in the same direction from which they came, not to return for an incalculably long time. Almost all the remainder of the comets move in elliptic orbits, usually much elongated, and return regularly to the sun at intervals varying from three years (in one case) to many thousands. A very few appear to have hyperbolic orbits, going off into space, never to return, in a slightly different direction from that whence they came.

It takes a large number of observations and a deal of laborious calculation to determine with accuracy to which of these classes a given comet belongs. At the start, astronomers always assume that a newly-discovered comet is moving in a parabola, for in all cases this will enable us to predict their motions with sufficient accuracy to find them when we wish to observe

them further, and then our later observations can be used to determine just how they are moving.

In the present case it is too soon to say what the exact character of the comet's orbit is. We can, however, be sure that it is not of short period, for so conspicuous a body would certainly have been seen at an earlier return to the sun, if it had made one in recent years.

Of the physical characteristics of comets, and the explanation of the formation of their tails, we will speak next month.

THE HEAVENS.

Our map shows the principal constellations of the evening skies. The Lyre and the Swan are overhead. South of them are the Eagle, with the bright star Altair and the little Dolphin. Low in the south and southwest are the Scorpion, with the bright red star Antares, and the Archer, which now contains the still brighter red planet Mars. In the southeast are the Sea Goat and the Water Bearer, which now bears Saturn as well within its limits. Below them is the lovely bright star Fomalhaut, in the Southern Fish.

Pegasus and Andromeda are in the east, with the Ram, the Fishes, and the Whale rising below them. Perseus and the Charioteer are just rising farther north. Cepheus and Cassiopeia are above the pole on

the meridian about 7 P. M. on the 15th. Neptune is in Gemini, observable in the early morning.

THE MOON.

New moon occurs at 4 P. M. on the 7th, first quarter at 11 P. M. on the 14th, full moon at 4 P. M. on the 21st, and last quarter at 6 A. M. on the 29th. The moon is nearest us on the 18th, and farthest off on the 2d and the 30th. She is in conjunction with Neptune on the 2d, Jupiter on the 4th, Venus and Mercury on the 7th, Uranus and Mars on the 16th, Saturn on the 21st, and Neptune once more on the 30th. At midnight on the 23d the sun crosses the celestial equator, and enters the sign of Libra, and in almanac phrase, "autumn commences."

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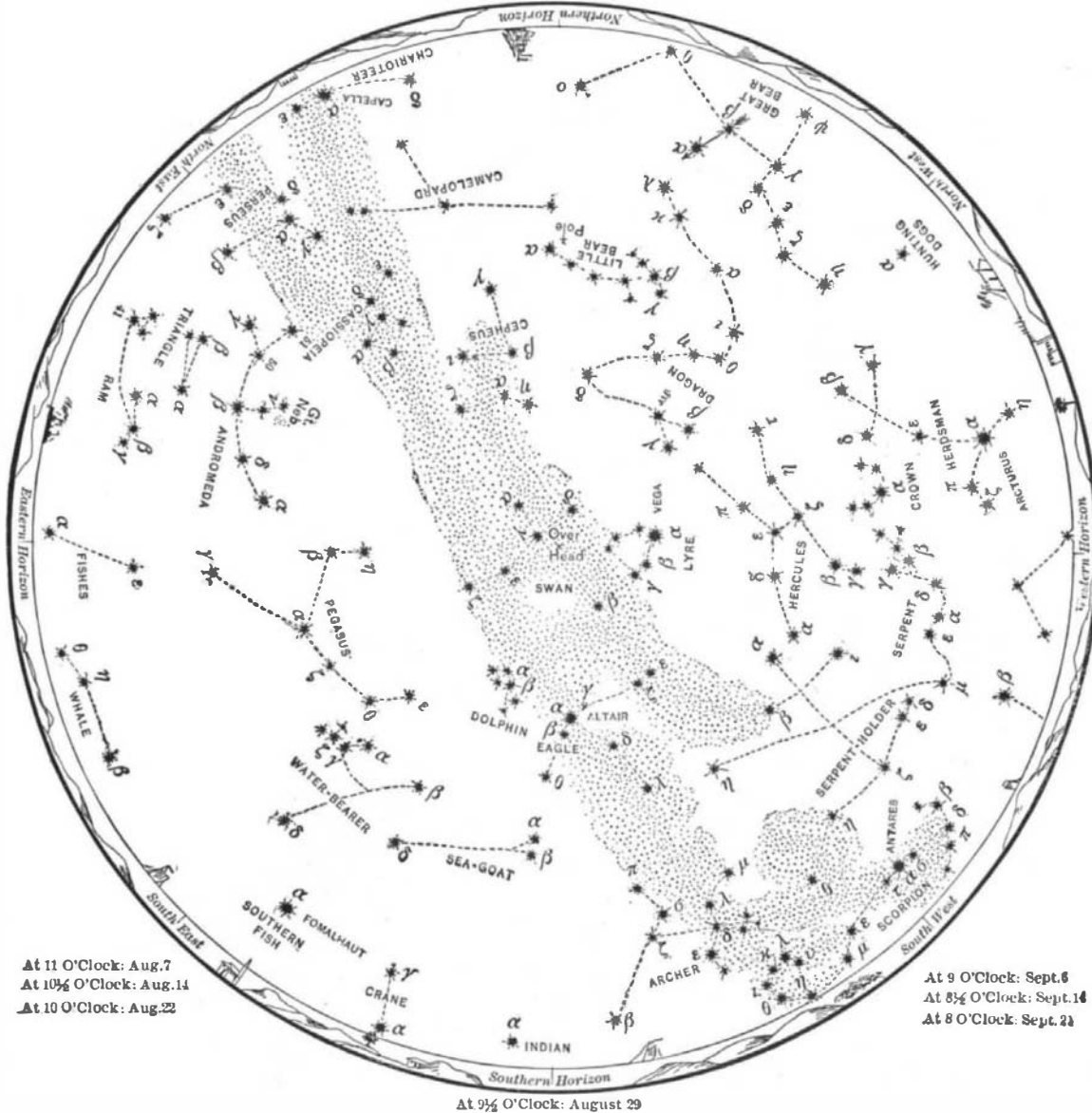
THE COMPETITION FOR THE SCIENTIFIC AMERICAN FLYING MACHINE TROPHY.

On account of lack of sufficient time in which to complete their machines, several intending competitors for the silver trophy offered by this journal for the first public flight of one kilometer (six-tenths of a mile) to be made in this country by a heavier-than-air flying machine, have requested that the date of the closing of entries be made later than September 1, which was the date set. We have conferred with the Aero Club of America, and made arrangements to have the entries held open until September 11, or three days before the contest, which is to occur at the Jamestown Exposition on Saturday, September 14. This will give intending competitors another fortnight in which to complete their machines before making formal entry, and we hope that it may serve to bring out still other inventors who have been holding their machines in abeyance. The entries must be made in writing, and must be received by the secretary of the Aero Club of America at the club rooms, 12 East 42d Street, not later than September 10. With each entry there must be given a description of the machine, such as its dimensions, weight, supporting surface, horse-power, and description of motor, diameter and pitch of propellers, etc. Any inventor who intends to compete can obtain further information and entry blanks by writing to this office or to the secretary of the Aero Club. The trophy is nearing completion, and, when finished, it will be exhibited both in New York city and at the Exposition.

An interesting heliographic experiment will shortly be made at the suggestion of several captains of the North German Lloyd on the freship "Weser." Daily experience shows that sunlight reflected from glass plates will make houses and the like visible to great distances, which without this luminous reflex would be difficult and sometimes impossible. Starting from this principle, the promoters of the experiment in question will place at the top of the freship a polished glass body comprising a number of plane polyhedral surfaces. The apparatus itself is very simple in construction, comprising a frame about two feet in diameter, in which plane glass plates coated with mercury are fitted, it being left to chance when some glass surface will be struck by a sun ray. This apparatus will work as a heliograph in a low mist or in hazy weather for many miles, facilitating to a high extent the locating of the freship. In case of satisfactory results, the apparatus will be fitted also on other freships, etc.

**Packing for Steam Conductors.**—Asbestos 40 per cent, slag wool 20 per cent, wood cellulose 20 per cent, long fibers of hemp rope 20 per cent. Ropes are ground to half stuff, above quantities mixed, ground, poured into plates, saturated with water glass, and after drying cut into rings or slabs.

NIGHT SKY: AUGUST & SEPTEMBER



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 right, and the Little Bear and the Dragon on the left, with the Great Bear below them. Hercules and the Herdsman (Boötes) and the Serpent and Serpent Bearer fill the western sky and complete our list.

THE PLANETS.

Mercury is in conjunction with the sun on the 6th, and is not well placed for observation this month. Venus is likewise in conjunction with the sun (changing as does Mercury from a morning to an evening star) and is unobservable.

Mars is in Sagittarius, and comes to the meridian about 7:30 P. M. in the middle of the month. He is less than half as bright as he was in July, but is still conspicuous.

Jupiter is in Cancer, and rises at about 2 A. M. in the middle of the month.

Saturn is in Aquarius, and comes to opposition on the 17th, being visible all night long. He is an exceedingly interesting object in large telescopes at present, for his rings are turned edgewise to us, and appear as a very fine line of light, upon which the satellites, if they are near the planet, appear like beads on a fine wire. With small telescopes nothing of this can be seen, and the planet appears without appendages, as it did when it puzzled Galileo three centuries ago. Uranus is in Sagittarius, and comes to