THE HEAVENS IN JANUARY.

BY HENRY NORRIS RUSSELL, PH.D.

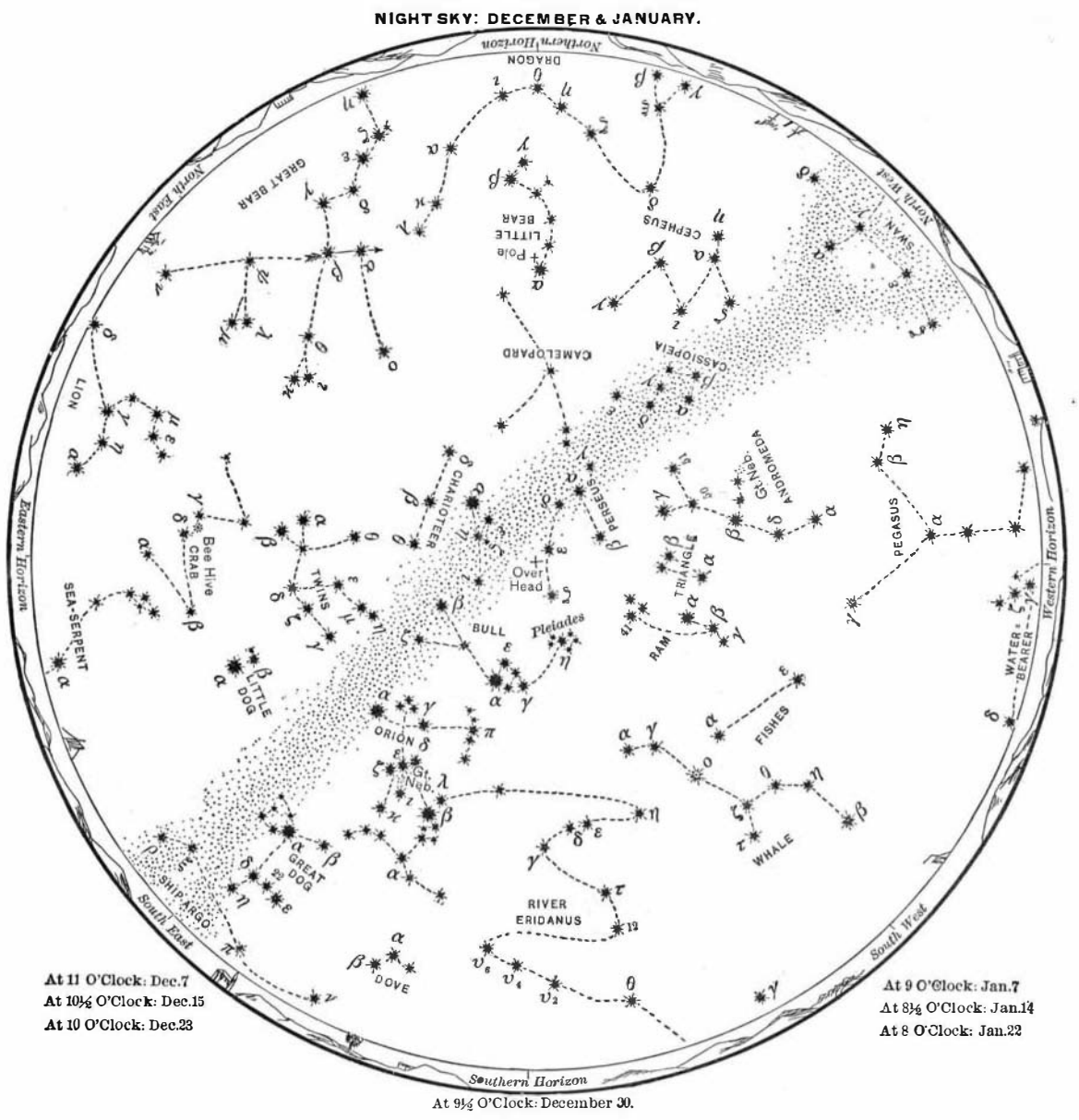
The principal astronomical event of this month is a total eclipse of the sun, which takes place on the 13th. The track of the moon's shadow is less conveniently placed than at some recent eclipses, as it lies almost entirely in central Asia. Beginning in southeastern Russia, the shadow crosses the Caspian Sea, and passes over Turkestan, then into the deserts of Mongolia, and leaves the earth in Manchuria. The only practicable stations for observation are in Russian Turkestan. The partial phase is visible over almost the whole of Asia.

Of more interest to us is an eclipse of the moon, which occurs on the morning of the 29th. This eclipse is not total, but may be called a large partial eclipse, since seven-tenths of the moon's diameter is immersed in the earth's shadow. Observers in the eastern United States will see very little of it, for it begins at 7:06 A. M., Eastern standard time, and the moon sets soon after. On the Pacific coast most of the eclipse can be seen, and the whole course of it will be visible in Hawaii and Alaska, and over a large part of eastern Asia.

The splendid winter skies are now in their glory. The principal constellations now in sight are shown on the accompanying map. Starting in the north, we find the Little Bear hanging very uncomfortably head downward from the Pole star. Below him is the Dragon, whose head is close to the horizon. The Great Bear is climbing toward the zenith, and fills a large part of the northwestern sky. On the right is the Lion (Leo) just rising, and farther south the head of Hydra the Sea Serpent. Above these is Cancer the Crab, a faint constellation, containing a fine star cluster, visible to the naked eye, and marked on our map by the name of the Beehive. Higher up are the Twins and the Little Dog, both fine constellations, the first containing the two bright stars Castor and Pollux, and the second a single very bright star, which since the days of the Greeks has borne the name of Procyon.

Nearly overhead is Auriga the Charioteer, whose principal star Capella (marked with the letter α on the map) is even brighter than Procyon. South of it, and also near the zenith, is Taurus the Bull, to which belong the groups of the Pleiades and the Hyades, the latter including the red star Aldebaran. Below this is Orion, the finest group in all the heavens, which needs no introduction. Below again is the Great Dog. Sirius, its principal star, is so much brighter than any other in the heavens, that it throws its neighbors into the shade, but even if it was blotted out, the constellation would be a conspicuous one, especially the irregular cross of stars some 15 deg. southeast of Sirius. Below Orion are the small constellations of the Hare and the Dove. To the right and directly due south is the long curving stream of Eridanus, which extends southward below our horizon to stars that we never see.

In the southwest is another very large constellation, Cetus the Whale. The remarkable variable Mira belongs to this group, and bears the letter *o*, by which it is indicated on the map. At the beginning of December it was unusually bright, of the second magnitude, and the brightest object in the constellation. It is now fading slowly, and by the end of January will probably be barely visible without a telescope. We may expect to see it again in September or October, in preparation for the next maximum, which is due about November 1, 1907. Aries the Ram is north of Cetus, and north of it are Perseus and Andromeda. The great square of Pegasus is low in the west, and Cygnus the Swan is setting in the northwest. The bright group of Cassiopeia, the less prominent one of Cepheus, and the unimportant Camelopard—all three near the Pole—complete our list.



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 PLANETS.

Mercury is morning star all through January. He is, however, visible only in the early part of the month, when he rises about 6:30 A. M.

Venus is likewise morning star, and attains her greatest brilliancy on the 4th. She is in Scorpio, and rises between 4:30 and 5 A. M. all through the month. With the telescope she appears as a crescent, which rapidly widens until it becomes nearly a half-moon.

Mars is morning star in Libra, and rises at about 3 A. M. in the middle of the month. He is a long way from the earth, and pretty faint. Jupiter is in Gemini, just past opposition, and dominates the evening sky. The markings on his surface, ever changing with his rapid rotation and the motions of his four bright satellites, make him one of the most interesting of all telescopic objects.

Saturn is evening star in Aquarius, and sets at about 9 P. M. in the middle of the month. Uranus is morning star, too near the sun to be observed.

Neptune is in Gemini, and comes to opposition on the 2d. His position is then in R. A. 6h. 48m. 33s. Declination 22 deg. 4 min. north, and his apparent motion at the rate of —7s. in R. A. and +9 sec. in declination. He is about midway between the stars ϵ and ς Geminorum, but is too faint to be seen without a telescope, or identified without a good star map, except by his motion, or, with a telescope of some power, by his disk.

Two comets are now in sight, both telescopic. Thiele's comet, mentioned last month, is moving northwestward from Leo into Ursa Major. A fainter comet, discovered by the Rev. J. H. Metcalf at Taunton, Mass., is in Eridanus, moving very slowly. Both are receding from the earth and sun, and growing fainter.

THE MOON.

Last quarter occurs at 9:39 A. M. on the 7th, new moon at 12:49 A. M. on the 14th, first quarter at 3:34 A. M. on the 21st, and full moon at 8:37 A. M. on the 29th (during the eclipse). The moon is nearest us on the 12th and farthest off on the 25th. She is in conjunction with Mars on the 9th, Venus on the 11th, Uranus and Mercury on the 13th, Saturn on the 17th, Jupiter on the 26th, and Neptune on the 27th—none of the conjunctions being close.

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American Cement in India.

BY CHARLES A. SIDMAN.

The continued increase in the use of cement is making it one of the largest exports we have. In these days of modern and sanitary building, it is used to a great extent for foundations, taking the place of the old-fashioned style, that of thinking that stone walls were the best for this purpose. Its uses are unlimited, and every day sees some new application. Foundations, fancy columns, bridges, rustic seats, walks, and numerous other articles are made out of this commodity. Consul General Michael, of Calcutta, reports that in India the use of cement is very extensive. They consider it the best for all particular work. It is used in laying brick walls in foundations, and if wood is used for structural purposes, it is laid in cement wherever possible. Floors, moldings, cornices, and outside and inside trimmings are made of sand and cement. Wherever cement can be used to guard against vermin, especially the white ant, it is freely used. Houses that have flat roofs are covered with brick dust and particles of brick mixed with cement and stamped down hard. Pitched roofs are covered with corrugated iron or tile, and then solidly covered with cement and sand. These roofs last well and require little repair. Artificial stone is extensively manufactured and used for building purposes and for pavements and walks. Floors are laid in cement and made ornamental by imbedding broken glass and china in figures in the body of the cement. The outside of the temples are made in the same way and are very attractive. Thus it will be noticed that cement is in general use and always will be in India. The imports of cement as long ago as 1870 were valued at $50,342, advancing in the fiscal year 1900 to 729,478 hundredweight, valued at $500,332, and in 1906 to 1,778,428 hundredweight, valued at $1,070,275. The imports of cement for the first four months of the present calendar year were 574,006 hundredweight, valued at $333,427. The supplies of cement for India come mainly from the United States, Great Britain, Belgium, and Germany. Inferior cement is not wanted, but the best cement is in good demand at good prices.

A novel and interesting feature of the new United States mint at Denver, Col., is the sweeps room, which is entirely different from that at any other similar establishment in this country. This is the department where the precious metal is recovered from the sweepings and other waste matter. In all the other government plants, the dry process is followed, wherein crucibles, which have become worn out in service, old floorings which have been torn up, sweepings from the floor and from old tin roofs on the building itself and those of adjoining structures, are put through grinding machines provided for the purpose, and the usual practice is to sell this ground-up material to the highest bidder, the bidders having been provided with samples on which to base their estimate of its value. In the new establishment at Denver the wet process has been adopted, and so effective is it in the operation of reclaiming the fugitive metal, that the smelters who have formerly bought the waste will no longer have anything to do with it.

In following the wet process, the crucibles are broken under the sledge and then passed through a grinding mill. Upon being broken up to such a size that the pieces will pass through an 80-mesh screen, they are then fed over and through an amalgamator having forty-two plates, into two settling tanks, where the waste is chemically treated. All shot gold or clippings are rolled into flakes in the bed of the mill, and are recovered as such when the run is completed.

The amalgamator material is pressed out and is melted into bars. The wet method dispenses with a number of very objectionable features, which are necessary with the dry process—for instance, the black lead crucible dust, which in other mints has not only caused much discomfort, but has been the means of seriously damaging the building.