THE HEAVENS IN SEPTEMBER.

BY HENRY NORRIS RUSSELL, PH.D.

The shortening days of September bear witness to the sun's continued southward progress. On the morning of the 23d the sun enters the sign of Libra, and, in the language of the almanacs, "Autumn begins." With the change of season it is as well to take our monthly glance at the stars at an earlier hour—9 P. M. in the middle of the month.

Right overhead is Cygnus, with Aquila on the south along the Milky Way, and Sagittarius setting below. Lyra is west of the zenith, and Hercules, Corona, Boötes, and Ophiuchus fill up the western and northwestern sky. The Little Dipper extends horizontally to the left of the pole, and the Great Dipper is just below it.

Due south of Cygnus, and east of Aquila, is the little lozenge of Delphinus, or "Job's Coffin." Capricornus and Aquarius are to the south and east, and low down on the southeastern horizon the solitary first-magnitude star Fomalhaut marks the constellation of the Southern Fish. Aries and Pisces are low in the east, and the Pleiades have just risen. Higher up is the brilliant array of Pegasus, Andromeda, and Perseus, and far to the northward Capella is once more visible.

THE PLANETS.

Mercury is morning star till the 13th, when he passes superior conjunction and becomes evening star. He is too near the sun during the month to be well seen with the naked eye.

Venus is by far the most conspicuous ornament of the morning sky, rising before 2 A. M. all through the month. On the 16th she reaches her greatest eastern elongation. Though past her time of greatest brightness, she is still very brilliant, and can be easily seen in the daytime when properly pointed out. At noon on the 19th she is about 3° due north of the waning crescent moon, and should be easy enough to find.

Mars is a morning star in Gemini, rising about 1 A.M. in the middle of the month, but is not yet conspicuous. He is less than 10° west of Venus on the 1st, but since Venus is moving eastward much more rapidly than he is, the distance increases to over 20° during the month.

The presence close together in the morning skies of the two planets which are nearest our own may furnish occasion for speculations about their possible habitability.

Far as we are from any definite conclusion on the subject, it is interesting to note that the results of certain recent investigations seem to reverse generally accepted notions by indicating that forms of life similar to those of the earth might have a better chance of surviving on Venus than on Mars.

Among the conditions evidently essential for such a survival are, first, a rotation of the planet sufficiently rapid to avoid overheating by day and undue cooling at night; second, the presence of an atmosphere and of water; and, last but not least, a mean temperature of the planet's surface between the freezing point and about 150° Fahrenheit.

The first of these conditions is fulfilled for both planets, as has long been known in the case of Mars, and as the recent spectroscopic work of Belopolsky proves in the case of Venus.

It has recently been shown that the density of the atmosphere of Venus at her visible surface is much less than that of the earth's at sea level. But if, as is often supposed, the visible surface of Venus is a continuous layer of clouds, the lower layers of her atmosphere beneath this veil may be as dense as the earth's, or even much denser; and such extensive clouds imply abundant water.

The atmosphere of Mars, on the other hand, is shown by spectroscopic evidence to be very much less dense than the earth's, and there are very few, if any, clouds in it.

But the most important of the recent investigations in this connection deal with the question of temperature.

Venus receives twice as much light and heat from the sun as does the earth and Mars less than half as much as the earth. A part of this light and heat is reflected by each of the planets, and does not warm it. The rest is absorbed, warming the planet, and is then slowly radiated into space again. The rate at which this radiation takes place depends upon the planet's surface temperature according to a known law, so that, if we know the amount of heat that the planet absorbs and then radiates, we can attain a fair approximation to its surface temperature.

Now, it has been determined that Venus reflects 60 or 70 per cent of the light falling on her, and, consequently, absorbs from 30 to 40 per cent, and that Mars reflects about 25 per cent and absorbs 75 per cent; and it is estimated that the earth reflects about 30 per cent and absorbs about 70 per cent.

So, taking the amount of heat received by the earth from the sun as a unit, we find that Venus absorbs 30 to 40 per cent of twice that amount, or from 60 to 80 per cent of the unit.

The earth absorbs 70 per cent of the unit, and Mars 75 per cent of less than half a unit, or about 35 per cent of a unit. So it appears that Venus and the earth have about equal amounts of heat to radiate, while Mars has only half as much. This makes it seem probable that the surface temperatures of Venus and the earth are about the same, while that of Mars is much lower—about as cold at its equator as at the earth's poles.

Of course, the internal heat of the planets may warm their surfaces up to any degree. But in its absence it can hardly be doubted that the earth's surface is much warmer than that of Mars.

The character of the true surface of Venus, below the supposed cloud layer, must, of course, remain a matter of conjecture. But it is to that hidden region, rather than to the ruddy planet, that in the present state of our knowledge our imagination is directed in the search for a possible inhabited world.

Jupiter is in Scorpio, and is being rapidly overtaken by the sun, so that he is only visible in the early evening. Saturn is in Sagittarius, and remains visible in the southwest about an hour and a half longer than Jupiter. Uranus is in Scorpio east of Jupiter, and Neptune in Taurus, very difficult to find without a telescope provided with circles.

The comet discovered late in July by Prof. Brooks is still in sight. Toward the end of August it passes close to the pole, and is visible all night long, but is too faint to be seen with the naked eye and is growing fainter, as it is receding from both earth and sun.

THE MOON.

First quarter occurs on the night of the 1st, full moon on that of the 8th, last quarter on the afternoon of the 15th and new moon on that of the 23d. The moon is nearest the earth on the 9th and most remote on the 23d. She makes an unusual number of conjunctions with the planets during the month, passing Jupiter on the afternoon of the 1st; Uranus the same night; Saturn on the afternoon of the 3d; Neptune on the morning of the 16th; Mars on that of the 18th; Venus at noon on the 19th; Mercury on the afternoon of the 24th; both Jupiter and Uranus again on the morning of the 29th, and Saturn on the night of the 30th.

POLYGLOT CHINA.

It is true, says the Ostindischer Lloyd, that the inhabitants of Peking, Canton, Shanghai, Futwa and Amoy speak Chinese; but, as to other parts of the country, it is also true that citizens of the places named cannot understand the inhabitants any more easily than can a Parisian a German. Thus, the position of the Chinaman in his own country, where various so-called dialects are spoken, is rather peculiar. The Chinese dialects have nothing in common with the patois, or conversation forms of the language. They are used by the highest and lowest classes, the savants and the uneducated, and the officials and the coolies. The dialect is a language of itself. The various dialect forms are related to one another in somewhat the same manner as the Arabic to the Hebrew and other Semitic tongues, or German to English, Dutch, Swedish, etc.

If it is desirable to classify the numerous dialects, they may be divided into the Canton, Hakka, Amoy, Swatow, Shanghai, Ningbo, Hainanese and Mandarin. The youngest of these is the Mandarin. This dialect is not, as generally supposed, the universal language of China. The Canton tongue resembles the ancient Chinese spoken 3,000 years ago more closely than does the Mandarin. The Hakka also shows traces of great antiquity. It is much older than the Mandarin, and almost equals in point of age the Canton tongue. The same may be said of the Swatow, Amoy and Shanghai dialects. In general, it may be said that the languages spoken in southeastern China show traces of the ancient Chinese tongue, while the Mandarin dialect is modern.

In addition to these main divisions, there are many quasi-dialects spoken, in some instances, by thousands of people. But the same word forms or dialects are not used by all persons in a single district, although the districts (civic divisions) are, as a rule, much smaller than those of the countries of western Europe. People only a few miles distant from each other often use totally different dialect forms. In some of the large cities, such as Canton, with more than 1,000,000 inhabitants, we often find several dialect forms in use. The variations in the Chinese tongue are so great, indeed, that it is not too much to say that there are as many dialect forms in the Flowery Kingdom as there are days in the year.

The most widely spread language is the Mandarin, which is used in one form or another in fourteen or fifteen of the nineteen provinces forming China. There are also northern and southern Mandarin tongues. The best northern Mandarin dialect is spoken in Peking, while the best southern is spoken in Nankin. A third marked form of the same tongue is spoken in West China, especially in Tsien-Kiang. People who speak the various Mandarin dialects, however, can readily understand one another. All persons, from whatever part of China, who desire to enter political or official life, learn this tongue.

The other Chinese languages are spoken by comparatively small numbers of people. About 20,000,000, for instance, speak Cantonese in one form or another. It is used in the greater part of the province of Quang-Tong. About one-third of the people of this province use the Hakka tongue. In its northeastern part, the Swatow dialect is also heard. Cantonese is also spoken in the Quang-si provinces. There are not so many dialectic forms of the Hakka tongue as there are of the Cantonese. Passing up the coast, we find about 3,000,000 people speaking Swatow. In all probability, 9,000,000 use the Amoy dialect, which resembles Swatow about as closely as Portuguese does Spanish. Still further up the coast, we find the Futwa dialect, which is used in a district about 150 miles long and 300 wide, containing a population of 5,000,000. The dialects of Ningbo and Shanghai, although only a few miles apart, differ greatly. The Hainanese is spoken by the people of Hainan. It is related to the Amoy and Swatow dialects—slightly resembling the Japanese—and is spoken by about 3,000,000 people. The inhabitants of the vicinage of Sutshu, between Japan and Formosa, also speak Hainanese.

The official language of China is the Pekingese (a Mandarin dialect), which is spoken by 200,000,000 people. The Court has to have interpreters.

All the Chinese who come to the United States are from Canton and its near neighborhood, and consequently speak the Cantonese dialect.

The Chinese are not generally educated. About one man in every hundred can read and write, and about one out of a thousand women.

Foreigners can seldom do more than learn one dialect in a lifetime. To speak one dialect, it is necessary to know at least 6,000 words. One well-known translator of the Chinese classics did not speak enough words to be understood by his Chinese servants.

THE DEATH OF PROF. J. E. KEELER.

The death of Prof. James Edward Keeler, Director of the Lick Observatory, at Mount Hamilton, on August 12, is an irreparable loss to that branch of science of which he was so conspicuous an ornament.

Born in La Salle, Illinois, forty-three years ago, he early manifested an inclination toward astronomical research. A graduate of Johns Hopkins University, he at once entered upon the practice of the profession to which he had determined to devote his life. In 1878 he participated in the Colorado expedition for observing the total eclipse, and was afterward a colleague of Prof. Langley in the famous expedition to Mount Whitney in California.

Later he studied with Quincke, at Heidelberg, and Helmholtz, of Berlin, and on his return attached himself to the Allegheny Observatory as assistant. When Prof. Langley retired from Allegheny, Prof. Keeler took his place as chief astronomer. Under his direction that observatory gained its highest position among astronomers in the field of original discovery, Prof. Keeler devoting his special talent to the advancement of the science of stellar spectroscopy, and achieved great fame for his discoveries in this abstruse and difficult branch. In 1898 he was chosen Chief Director of the Lick Observatory, and under his capable management the powers of its great instrument were devoted to the highest uses.

Prof. Keeler, while an enthusiast in his favorite science, was at the same time extremely conservative. The ambition to shine in popular estimation was entirely lacking; consequently, the work which he accomplished can be truly estimated only by the great ones in astronomy who work less for sensational applause than for established results.

Prof. Keeler's researches on the sun were profound and successful, and his lectures, given from time to time before the academical societies of the West upon this subject, were remarkable for their lucidity and brilliant conclusions.

Prof. Keeler's chief claims to distinction were based upon a work—not yet complete—of studies of nebulæ, from which much was hoped for. His observations upon the great nebulæ of Orion, published in the SCIENTIFIC AMERICAN of May 13, 1899, gives an impression of the scope of a work which was designed to distinguish the new epoch in astronomical research.

AWARDS AT THE PARIS EXPOSITION.

Forty-two thousand seven hundred and ninety exhibitors out of 75,531 have received awards at the Paris Exposition. The United States obtained 1,981 awards, of these 220 were grand prizes, 486 gold medals, 583 silver medals, 422 bronze medals, 270 honorable mentions, and a long list of gold, silver and bronze medals of collaborators. In the last Exposition only 1,000 prizes, including those for collaborators, were given. The prizes were as follows: Grand prizes, 55; gold medals, 214; silver medals, 300; bronze medals, 246; honorable mentions, 229. The names of those who received grand prizes or gold medals have been made public.