

# Popular Astronomy.

Vol. II. No. 5.

JANUARY, 1895.

Whole No 15.

## SIRIUS IN ANCIENT TIMES.

T. J. J. SEE.

FOR POPULAR ASTRONOMY.

It has been suggested that an account of the astronomical records of Sirius in the different ages would be of interest to the readers of POPULAR ASTRONOMY and especially if this would explain the season known as "dog days," whose origin is lost in antiquity. At the request of the editor we shall endeavor to place before the readers of POPULAR ASTRONOMY a simple *resumé* of the results of historical research so far as it bears upon this subject. And at the outset it may be stated that in our opinion, the terror of the "dog star" arose originally from the fact that Sirius was a red star, and this fiery object was naturally but incorrectly supposed to add fury to the heat of the Sun at the time of heliacal rising (July and August). This belief of the ancients was based on the red color of the star and the coincidence of this heliacal rising with the hottest season of the year, when the Earth was generally consumed with burning droughts, and fevers were prevalent through the ancient world.

Accordingly, we shall first give an account of the ancient observations of the color of Sirius, which, whatever be their explanation, must always remain of great interest.

Modern observers since the time of Tycho have uniformly regarded Sirius as a very white star, and we do not find among the Arabian astronomers from the eighth to the twelfth centuries any record that the color was different in the era of Saracen splendor. But on the other hand, the testimony of the ancients seems very conclusive that the color of the star must have been red in the time of the Roman emperors. We find (compare the writer's "*History of the Color of Sirius*," *Astronomy and Astro-Physics*, April and May, 1892) that the earliest certain allusions to Sirius are in Homer; and although the poet does not record any color, he compares it to Diomedes's shield (of copper), and says (in another place) that the "Dog of Orion is very brilliant, but of evil omen, and much fever (the word means something fiery) to wretched mortals brings." No great importance is to be attached to such a poetical allusion, but we may observe that Homer is acknowledged to be proverbially exact in his des-

criptions, and the above passage is especially interesting as showing that Sirius was looked upon as an evil omen in the earliest times.

Hesiod first uses the word *Sirius*, and it appears fairly well proved that this meant originally the "burning one," just as Mars was called *Puroeis* (the fiery one). Hesiod says "Sirius burns the face and knees"—an expression which only indicates that Sirius was closely associated with the hot season of the year.

It may be noted that in one place Euripides refers to Sirius as "sending flames of fire" from the heavens, while Appollonius Rhodius speaks of "Sirius burning the islands of Minos."

The Greek poet Aratus in his description of the constellations calls Sirius "colored," and Cicero translated the word used by Aratus into "shining with a ruddy light." Germanicus Cæsar also translated Aratus, and gives an equivalent expression—"the dog is urged in a ruddy course through the sky."

Now there is every reason to believe that Cicero was well acquainted with the appearance of the star, because of his study of the Greek philosophy which was so much occupied with the heavenly bodies; while on the other hand Germanicus is known to have been an observer who had a good knowledge of the sky.

Therefore it is hardly conceivable that both of these scholarly translators would have misled their readers regarding the familiar dog star.

The Greek astronomer Geminus thought it necessary to refute the common fallacy of his time, which ascribed the heat of the dog days to the influence of the burning dog star. He says: "For this star (*Sirius*) is of the same nature as all the other stars. And whether the stars are fiery or clear, all have the same power, and exhalations ought to proceed from the multitude of the stars rather than from *Sirius*." This contrast of *Sirius* with the multitude shows indirectly and hence the more conclusively that its color must have been fiery red, while the multitude of stars were white; and the way in which the statement is made indicates that this fact was well known to all observers.

The poet Horace says: "Here in a quiet valley, you will escape the heat of the dog star;" again "the fierce hour of the burning dog star cannot touch you." In another place he adds: "whether the red dog cleaves infant statues"—referring apparently to the effects of the great heat of dog days. Of course Horace is not astronomical authority, but there can be no doubt that he was familiar with the appearance of *Sirius*.

The philosopher Seneca, in discussing various natural phenomena, says: "It is not wonderful if all manner of earth and manifold evaporation exists; since in the heavens also there is not one color of things, but the redness of the dog star is deeper, that of Mars milder, that of Jupiter nothing at all, the splendor being turned into pure light." The deliberate way in which this statement is made must entitle it to the very highest consideration.

The naturalist Pliny says the Etesias (northern winds) occur about the time of the rising of the dog, the hottest time of the year, and that the "vapor of the Sun, produced by the heat of the star, is believed to soften them."

In another place Pliny says that "at the time of the burning Sirius, mad dogs are troublesome to man, and fear water with the dread of death." To judge whether Pliny is reliable in matters of color, we may observe that in speaking of the star Canopus he calls it simply "large and bright," so that he ought not to be expected to call a star like Sirius "burning," if it were merely brilliant. Pliny also assigns correct colors to the planets, and observes that when the Sun is rising it is "burning," afterwards "bright."

The Romans held certain agricultural festivals in May, and from Ovid we learn that dogs were offered up in sacrifice for the dog in the sky.

The grammarian Festus says:—"There is a gate at Rome called the Catularia, because not far from it, to placate the dog star, which is hostile to fruits, ruddy dogs are sacrificed in order that the blooming fruits may be brought to maturity."

Again, Festus adds:—"Ruddy dogs, that is not far from a red color, are sacrificed, as Ateius Capito says, in the canine sacrifices for saving the fruits on account of the dog star."

Pliny says that these festivals were instituted at the bidding of the oracle of the Sibyl, in the year of the city 516 (B. C. 238); and we know that they continued for centuries. Now there is no conceivable reason why the Romans should sacrifice red dogs, except that Sirius was red, and dogs of the same color must be offered up to the dog in the sky. The object of the sacrifice seems to have been to placate the ruddy (angry) dog in the heavens, so that when it rose with the Sun some months later the heat and drought would not blast the fruits.

There can be no doubt that many of the ancients looked upon red stars as angry deities. Thus many of the philosophers praise the stars as blessed gods, and Cicero declares that Mars is "ruddy and terrible to the Earth." This planet came to be associated

with the god of war, because its color suggested blood. In like manner it is recorded that the astrologers assign all manner of evil to the Scorpion, owing, without doubt, to the ruddy Antares, which derives its name from Anti-Ares, the rival of Mars.

The astrologers maintained, we are told, that the "influences" of Jupiter and Venus were "salutary," because their clear brilliant light closely associated them with the sky, of which Jupiter was the principal deity. The astronomical writer Cleomedes has left us a record that Antares and Aldebaran "are of the same size and color as Mars." These results indicate with strong emphasis that the colors of the heavenly bodies were well known to the ancients, and, so far as the writer has been able to find, no important errors in color have been recorded by the authors who have described astronomical phenomena. *In no case is Sirius called white!*

But in several cases this color is ascribed to the planets (Mercury, Venus, etc.,) and Eratosthenes notes the whiteness of Vega, which is seldom observed at all, and if observed is ordinarily described as "bright."

But of all the ancient astronomical authorities, the astronomer Ptolemy is easily first. He classes Sirius as a red star, and thus puts it in the same category with Antares, Aldebaran, Betelgeux, Pollux and Arcturus, all of which are still conspicuously red. Ptolemy enumerates the stars in the constellation of the dog, and speaks of Sirius as:

"The very brilliant star in the month, called the dog, and fiery red."

Some years ago the celebrated Danish astronomer Schjellerup tried to show that this record of Ptolemy was not genuine, but had been accidentally falsified by the error of some scribe since Arabian times. The critical investigations of the writer (*Astronomy and Astro-Physics*, May 1892, p. 381) have, however, shown beyond doubt that Schjellerup was misled by a false translation in one of Albategnius' works published in the middle ages by Plato Tibertinus; and thus it is rendered apparently certain that Ptolemy classed Sirius as fiery red.

From the time of Ptolemy to the time of the Arabians, in the 9th and 10th centuries, the records of the heavens are rare and worthless, so that Ptolemy, who lived in the time of the emperors Hadrian and Antonine, is the last and greatest authority for the ancient redness of Sirius. The celebrated Arabian astronomers, Albategnius, Alfraganus, Al Sûfi, and Ulugh Beigh all note Sirius as "very brilliant," but say nothing of the color. Al Sûfi, who

wrote a description of the fixed stars similar to the catalogue of Ptolemy, notes the red color of Betelgeux, Aldebaran, Pollux, Arcturus, Antares and, wonderful to relate, Algol! Alfraganus speaks incidentally of the color of Antares, Pollux and Aldebaran, while Ulugh Beigh records the red color of Antares, Aldebaran, Pollux and Betelgeux. Thus the Arabians throw no light upon the ancient color of Sirius; and we ought perhaps to conclude from their silence that the star was white or at least not conspicuously red in the tenth century. When the change of color took place, or the physical cause of the change, is entirely obscure; but so remarkable a fact as this change of color must always remain one of the most wonderful phenomena recorded in the annals of science.

It is of course incredible that so many independent observers and writers of high authority would commit the colossal blunder of calling a bluish white star fiery red; and especially as they expressly compare it in several cases with Mars and other stars which are still red. So that we cannot doubt that the red color of Sirius was universally known and recognized in antiquity; but even if we did not credit Seneca, Pliny, Ptolemy, Geminus, Cicero, Germanicus and Horace, we should still have to explain the sacrifice of red dogs to "placate the dog star," of which Festus has left us such explicit record.

Moreover, by the legitimate principles of historical research, we must adhere to the evidence, unless there is reason to suspect its trustworthiness; and we could, on the evidence, more easily prove that Antares was white in antiquity than that Sirius was. But as Antares is red now, no one will doubt that it was red in Roman times. On the other hand many find it hard to believe that Sirius was formerly red, since it is now white, and we are unable to explain how so great a change could take place in the interval of time which has elapsed since classic antiquity. But we must always remember that our inability to explain a fact is no argument against the fact itself. If we cannot understand so great a change in the short space of 2000 years, we need only to recall that everything is possible in the heavens, and our ignorance of the physical causes which operate in the stars is immense. If an explanation of the cause is not forthcoming, we must at present be content simply to establish the fact, and leave the explanation to future ages.

Therefore it seems in the highest degree probable that the ancient color of Sirius was in a large degree responsible for the evil forebodings and superstitious terrors which have always pre-



vailed regarding the dog star and dog days. For of course the name dog days has descended to us from the Romans through the astrology of the middle ages, and although it happens that the evils (great heat, droughts, fevers, &c.) naturally attending that season of the year would make it a dreaded season, this dread in modern times is only of the season, and not of the star, or if a slight dread of the star still lingers, it is due solely to the influence of astrology, which will always flourish while ignorance of natural phenomena continues to exist.

Of course no one in our time except an astrologer would ever explain the heat of summer by the influence of Sirius, and not even an astrologer could now say the star is red. If Sirius had been white in antiquity we might understand how the dog days would be a dreaded season, just as our sailors now dread certain seasons of the year which are fraught with unusual disaster, but we could not understand why this star should be held responsible for all the evil, especially since a white star would have a "salutary" appearance like Venus and Jupiter.

On the other hand, since Sirius was probably red, it was looked upon as an angry deity, and forebodings of its evil influence would naturally arise and continue to flourish.

The season known as dog days (*dies Caniculæ*) is so called from two circumstances: (1) the heliacal rising of the dog star occurs at this time of the year (July 20th); (2) the ancients were accustomed to mark the seasons by the heliacal rising of certain bright stars near the zodiac.

The ancient priests observed these stars in the morning dawn, and a certain period (40 days) was fixed as dog days, because the dog star was at that time the principal star by which they reckoned the motion of the Sun or the flight of the season.

It would of course be some time after conjunction (now about July 1st) when the heliacal rising began, because Sirius is considerably south of the ecliptic; and the Sun and Sirius would come to the horizon together only when the Sun's right ascension had considerably surpassed that of Sirius, the exact time required for this gain in right ascension depending on the latitude of the place. Ideler, the historian and chronologist, who critically investigated the observations of the ancients, finds that the heliacal rising of Sirius took place at Heliopolis in Egypt on July 20th. This was the time of the inundation of the Nile, and the beginning of the fixed year, so that it was celebrated in Egypt from the earliest times.

THE UNIVERSITY OF CHICAGO, Dec. 12th, 1894.