confirmed "because he hath a tayle," and for that reason only; but Julius Schiller, another of the same school, saw here the royal **Saint David.**

Gould catalogued 178 stars down to the 7th magnitude.

Hail, mighty Sirius, monarch of the suns!
May we in this poor planet speak with thee?
Mrs. Sigourney's *The Stars.*

α, Binary, —1.43 and 8.5, brilliant white and yellow.

Sirius, the **Dog-star,** often written **Syrius** even as late as Flamsteed's and Father Hell's day, has generally been derived from σείριος, sparkling or scorching, which first appeared with Hesiod as a title for this star, although also applied to the sun, and by Abychos to all the stars. Various early Greek authors used it for our Sirius, perhaps generally as an adjective, for we read in Eratosthenes:

Such stars astronomers call σειρίους on account of the tremulous motion of their light;

so that it would seem that the word, in its forms σείρ, σείρος, and σείριος,—Suidas used all three for both sun and star,—originally was employed to indicate any bright and sparkling heavenly object, but in the course of time became a proper name for this brightest of all the stars. Lamb, however, thought it of Phoenician origin, signifying the Chief One, and originally in that country a title for the sun; Jacob Bryant, the mythologist, said that it was from the Egyptians' **Cahen Sihor;** but Brown considers it a transcription from their well-known **Hesiri,** the Greek **Osiris;** while Dupuis distinctly asserted that it was from the Celtic **Syr.**

Plutarch called it Προόπτης, the Leader, which well agrees with its character and is an almost exact translation of its Euphratean, Persian, Phoenician, and Vedic titles; but Κύων, Κύων σείριος, Κύων ἀστήρ, Σείριος ἀστήρ, Σείριον ἄστρον, or simply το ἄστρον, were its names in early Greek astronomy and poetry. Προκύων, better known for the Lesser Dog and its *lucida,* also was applied to Sirius by Galen as preceding the other stars in the constellation.

Homer alluded to it in the *Iliad* as Ὀπωρινός, the **Star of Autumn;** [1] but the season intended was the last days of July, all of August, and part of September — the latter part of summer. Lord Derby translated this celebrated passage:

A fiery light
There flash'd, like autumn's star, that brightest shines
When newly risen from his ocean bath;

1 The Greeks had no word exactly equivalent to our "autumn" until the 5th century before Christ, when it appeared in writings ascribed to Hippocrates.

while later on in the poem Homer compares Achilles, when viewed by Priam, to

> th' autumnal star, whose brilliant ray
> Shines eminent amid the depth of night,
> Whom men the dog-star of Orion call.

The Roman farmers sacrificed to it a fawn-colored dog at their three festivals when, in May, the sun began to approach Sirius. These, instituted 238 B. C., were the Robigalia, to secure the propitious influence of their goddess Robigo in averting rust and mildew from their fields; and the Floralia and Vinalia, to ensure the maturity of their blooming flowers, fruits and grapes.

Among the Latins it naturally shared the constellation's titles, probably originated them; and occasionally was even **Canicula**; indeed, as late as 1420 the *Palladium of Husbandry* urged certain farm-work to be done "Er the caniculere, the hounde ascende"; and, more than a century later, Eden, in the *Historie of the Vyage to Moscovie and Cathay*, wrote: "**Serius** is otherwise cauled Canicula, this is the dogge, of whom the canicular dayes have theyr name."

It has been asserted that Ovid and Vergil referred to Sirius in their **Latrator Anubis**, representing a jackal- or dog-headed Egyptian divinity, guardian of the visible horizon and of the solstices, transferred to Rome as goddess of the chase; but it is very doubtful whether they had in mind either star or constellation.

Its well-known name, **Al Shi'rā**, or **Al Si'rā**, extended as **al 'Abūr al Yamaniyyah**, much resembles the Egyptian, Persian, Phoenician, Greek, and Roman equivalents, and, Ideler thought, may have had common origin with them from some one ancient source: possibly the Sanskrit Sūrya, the Shining One,—the Sun. The 'Abur, or Passage, refers to the myth of Canopus' flight to the South; and the adjective to the same, or perhaps to the southerly position of the star towards Yemen, in distinction from that of Al Ghumaiṣā' in the Lesser Dog, seen towards Shām,—Syria,—in the North. From these geographical names originated the Arabic adjectives Yamaniyyah and Shamāliyyah, Southern and Northern; although the former literally signifies On the Right-hand Side, *i. e.* to an observer facing eastward towards Mecca.

In Chrysococca's *Tables* the title is Σιαὴρ Ιαμανὴ; and Doctor C. Edward Sachau's translation of Al Bīrūnī's *Chronology* renders it **Sirius Jemenicus.** Riccioli had **Halabor,** which the 1515 *Almagest* applied to the constellation; and Chilmead, **Gabbar, Ecber,** and **Habor**; while **Shaari lobur,** another

queerly corrupted form, is found in Eber's *Egyptian Princess.* In the *Alfonsine Tables* the original is changed to **Asceher** and **Aschere Aliemini;** while Bayer gives plain **Aschere** and **Elscheere** for the star, with others similar for both star and constellation. **Scera** is cited by Grotius for the star, and **Sceara** for the whole, derived from an old lexicon; and **Alsere;** but he traced all to Σείριος.

In modern Arabia it is **Suhail,** the general designation for bright stars.

The late Finnish poet Zakris Topelius accounted for the exceptional magnitude of Sirius by the fact that the lovers Zulamith the Bold and Salami the Fair, after a thousand years of separation and toil while building their bridge, the Milky Way, upon meeting at its completion,

> Straight rushed into each other's arms
> And melted into one;
> So they became the brightest star
> In heaven's high arch that dwelt —
> Great Sirius, the mighty Sun
> Beneath Orion's belt.

The native Australians knew it as their **Eagle,** a constellation by itself; while the Hervey Islanders, calling it **Mere,** associated it in their folk-lore with Aldebaran and the Pleiades.

Sharing the Sanskrit titles for the whole, it was the **Deer-slayer** and the **Hunter,** while the *Vedas* also have for it **Tishiya** or **Tishiga, Tistrija, Tishtrya,** the **Tistar,** or **Chieftain's, Star.** And this we find too in Persia; as also **Sira.** The later Persian and Pahlavi have **Tir,** the Arrow. Edkins, however, considers Sirius, or Procyon, to be **Vanand,** and Arcturus, Tistar.

Hewitt sees in Sirius the **Sivānam,** or Dog, of the *Rig Veda* awakening the Ribhus, the gods of mid-air, who "thus calls them to their office of rain sending," a very different office from that assigned to this star in Rome. Yet these gods, philologically, had a Roman connection, for Professor Friedrich Maximilian Mueller, writing the word Arbhu, associates it with the Latin Orpheus. Hewitt also says that in the earliest Hindu mythology Sirius was **Sukra,** the Rain-god, before Indra was thus known; and that in the *Avesta* it marked one of the Four Quarters of the Heavens.

Although the identification of Euphratean stellar titles is by no means settled, especially and singularly so as to this great star, yet various authorities have found for it names more or less probable.

Bertin and Brown think it conclusively proved that it was **Kak-shisha,** the Dog that Leads, and "a Star of the South"; while **Kak-shidi** is Sayce's transliteration of the original signifying the Creator of Prosperity, a character which the Persians also assigned to it; and it may have been the Akka-

dian **Du-shisha,** the Director — in Assyrian **Mes-ri-e.** Epping and Strassmaier have **Kak-ban** as a late Chaldaean title, which Brown renders **Kal-bu,** the Dog, "exactly the name for Sirius we should expect to find"; Jensen has **Kakkab lik-ku,** the Star of the Dog, revived in Homer's κύων; and it perhaps was the Assyrian **Kal-bu Sa-mas,** the Dog of the Sun; and the Akkadian **Mul-lik-ud,** the Star Dog of the Sun. Jensen also gives **Kakkab kasti,** the Bow Star, although this may be doubtful; and Brown has, from the Assyrian, **Su-ku-du,** the Restless, Impetuous, Blazing, well characterizing the marked scintillation and color changes in its light. Hewitt cites an Akkadian title **Tis-khu.**

Its risings and settings were regularly tabulated in Chaldaea about 300 B. C., and Oppert is reported to have recently said that the Babylonian astronomers could not have known certain astronomical periods, which as a matter of fact they did know, if they had not observed Sirius from the island of Zylos in the Persian Gulf on Thursday, the 29th of April, 11542 B. C.!

It is the only star known to us with absolute certitude in the Egyptian records — its hieroglyph, a dog, often appearing on the monuments and temple walls throughout the Nile country. Its worship, chiefly in the north, perhaps, did not commence till about 3285 B. C., when its heliacal rising at the summer solstice marked Egypt's New Year and the beginning of the inundation, although precession has now carried this rising to the 10th of August. At that early date, according to Lockyer, Sirius had replaced γ Draconis as an orientation point, especially at Thebes, and notably in the great temple of Queen Hatshepsu, known to-day as Al Dēr al Bahārī, the Arabs' translation of the modern Copts' Convent of the North. Here it was symbolized, under the title of **Isis Hathor,** by the form of a cow with disc and horns appearing from behind the western hills. With the same title, and styled **Her Majesty of Denderah,** it is seen in the small temple of Isis, erected 700 B. C., which was oriented toward it; as well as on the walls of the great Memnonium, the Ramesseum, of Al Ḳurneh at Thebes, probably erected about the same time that this star's worship began. Lockyer thinks that he has found seven temples oriented to the rising of Sirius. It is also represented on the walls of the recently discovered step-temple of Sakkara, dating from about 2700 B. C., and supposed to have been erected in its honor.

Great prominence is given to it on the square zodiac of Denderah, where it is figured as a cow recumbent in a boat with head surmounted by a star; and again, immediately following, as the goddess **Sothis,** accompanied by the goddess Anget, with two urns from which water is flowing, emblematic

of the inundation at the rising of the star. But in the earlier temple service of Denderah it was **Isis Sothis,** at Philae **Isis Sati,** or **Satit,** and, for a long time in Egypt's mythology, the resting-place of the soul of that goddess, and thus a favorable star. Plutarch made distinct reference to this; although it should be noted that the word Isis at times also indicated anything luminous to the eastward heralding sunrise. Later it was **Osiris,** brother and husband of Isis, but this word also was applied to any celestial body becoming invisible by its setting. Thus its titles noticeably changed in the long period of Egypt's history.

As **Thoth,** and the most prominent stellar object in the worship of that country,—its heliacal rising was in the month of Thoth,—it was in some way associated with the similarly prominent sacred ibis, also a symbol of Isis and Thoth, for, in various forms, the bird and star appear together on Nile monuments, temple walls, and zodiacs.

Sirius was worshiped, too, as **Sihor,** the Nile Star, and, even more commonly, as **Sothi** and **Sothis,** its popular Graeco-Egyptian name, the **Brightly Radiating One,** the **Fair Star of the Waters;** but in the vernacular was **Sept, Sepet, Sopet,** and **Sopdit; Sed,**[1] and **Sot,**—the Σήθ of Vettius Valens.

Upon this star was laid the foundation of the Canicular, Sothic, or Sothiac Period named after it, which has excited the attention and puzzled the minds of historians, antiquarians, and chronologists. Lockyer has an admirable discussion of this in his *Dawn of Astronomy.*

Sir Edwin Arnold writes of it in his *Egyptian Princess:*

> And even when the Star of Kneph has brought the summer round,
> And the Nile rises fast and full along the thirsty ground;

for the Egyptians always attributed to the Dog-star the beneficial influence of the inundation that began at the summer solstice; indeed, some have said that the Aethiopian Nile took from Sirius its name Siris, although others consider the reverse to be the case. Minsheu, who dwells much on this, ends thus: "*Some thinke that the* Dog-starre *is called* Sirius, *because at the time the* Dogge-starre *reigneth*, Nilus *also overfloweth* as though the water *were led by that Starre.*" Indeed, it has been fancifully asserted that its canine title originated in Egypt, "because of its supposed watchful care over the interests of the husbandman; its rising giving him notice of the approaching overflow of the Nile."

Caesius cited for it **Solechin** as from that country, signifying the Starry Dog, and derived from the Egypto-Greek word Σολεκήν.

[1] According to Mueller, this Sed, or Shed, of the hieroglyphic inscriptions appeared in Hebrew as El Shaddar.

Perhaps it is the ancient importance of this Dog on the Nile that has given the popular name, the **Egyptian X,** to the figure formed by the stars Procyon and Betelgeuze, Naos and Phaet, with Sirius at the vertices of the two triangles and the centre of the letter. On our maps Sirius marks the nose of the Dog.

The Phoenicians are said to have known it as **Hannabeah,** the Barker.

The astronomers of China do not seem to have made as much of Sirius as did those of other countries, but it is occasionally mentioned, with other stars in Canis Major, as **Lang Hoo;** and Reeves quoted for it **Tseen Lang,** the Heavenly Wolf. Their astrologers said that when unusually bright it portended attacks from thieves.

Some have called it the **Mazzārōth** of the *Book of Job;* others the **H·aṣil** of the Hebrews; but this people also knew it as **Sihor,** its Egyptian name, and Ideler thinks that the adoration of the Sᵉērīm, or "Devils" of the Authorized Version of our *Bible*, the "He Goats" of the Revision, which, as we see in *Leviticus* xvii, 7, was specially prohibited to the Jews, may have had reference to Sirius and Procyon, the **Two Sirii** or **Shi'rayān,** that must have been well known to them in the land of their long bondage as worshiped by their taskmasters.

The culmination of this star at midnight was celebrated in the great temple of Ceres at Eleusis, probably at the initiation of the Eleusinian mysteries; and the Ceans of the Cyclades predicted from its appearance at its heliacal rising whether the ensuing year would be healthy or the reverse. In Arabia, too, it was an object of veneration, especially by the tribe of Ḳais, and probably by that of Kodhā'a, although Muḥammād expressly forbade this star-worship on the part of his followers. Yet he himself gave much honor to some "star" in the heavens that may have been this.

In early astrology and poetry there is no end to the evil influences that were attributed to Sirius.

Homer wrote, in Lord Derby's translation,

> The brightest he, but sign to mortal man
> Of evil augury.

Pope's very liberal version of the same lines,—

> Terrific glory! for his burning breath
> Taints the red air with fevers, plagues and death,—

seems to have been taken from the *Shepheard's Kalendar* for July:

> The rampant Lyon hunts he fast with dogge of noysome breath
> Whose balefull barking brings in hast pyne, plagues and dreerye death.

Spenser, however, was equally a borrower, for we find in the *Aeneid:*

The dogstar, that burning constellation, when he brings drought and diseases on sickly mortals, rises and saddens the sky with inauspicious light;

and in the 4th *Georgic:*

Jam rapidus torrens sitientes Sirius Indos
Ardebat coelo,

rendered by Owen Meredith in his *Paraphrase* on Vergil's Bees of Aristaeus:

Swift Sirius, scorching thirsty Ind,
Was hot in heaven.

Hesiod advised his country neighbors, "When Sirius parches head and knees, and the body is dried up by reason of heat, then sit in the shade and drink,"—advice universally followed, even till now, although with but little thought of Sirius. Hippocrates made much, in his *Epidemics* and *Aphorisms*, of this star's power over the weather, and the consequent physical effect upon mankind, some of his theories being current in Italy even during the last century; while the result of all physic depended upon the sign of the zodiac in which the sun chanced to be. Manilius wrote of Sirius:

from his nature flow
The most afflicting powers that rule below.

But these expressions as to the hateful character of the Dog-star may have been induced in part from the evil reputation of the dog in the East.

Its heliacal rising, 400 years before our era, corresponded with the sun's entrance into the constellation Leo, that marked the hottest time of the year, and this observation, originally from Egypt, taken on trust by the Romans, who were not proficient observers, and without consideration as to its correctness for their age and country, gave rise to their *dies caniculariae*, the dog days, and the association of the celestial Dog and Lion with the heat of midsummer. The time and duration of these days, although not generally agreed upon in ancient times, any more than in modern, were commonly considered as beginning on the 3d of July and ending on the 11th of August, for such were the time and period of the unhealthy season of Italy, and all attributed to Sirius. The Greeks, however, generally assigned fifty days to the influence of the Dog-star. Yet even then some took a more correct view of the matter, for Geminos wrote:

It is generally believed that Sirius produces the heat of the dog days; but this is an error, for the star merely marks a season of the year when the sun's heat is the greatest.

But he was an astronomer.

The idea prevailed, however, even with the sensible Dante in his "great scourge of days canicular"; while Milton, in *Lycidas*, designated it as "the swart star." And the notion holds good with many even to the present time. This character doubtless is indicated on the Farnese globe, where the Dog's head is surrounded with sun-rays.

But Pliny took a kinder view of this star, as in the "xii. chapyture of the xi. booke of his naturall hystorie," on the origin of honey:

> This coometh from the ayer at the rysynge of certeyne starres, and especially at the rysynge of *Sirius*, and not before the rysynge of *Vergiliae* (which are the seven starres cauled *Pleiades*) in the sprynge of the day;

although he seems to be in doubt whether "this bee the swette of heaven, or as it were a certeyne spettyl of the starres." This idea is first seen in Aristotle's *History of Animals*. So, too, in late astrology wealth and renown were the happy lot of all born under this and its companion Dog. Our modern Willis wrote in his *Scholar of Thebet ben Khorat:*

> Mild Sirius tinct with dewy violet,
> Set like a flower upon the breast of Eve.

When in opposition Sirius was supposed to produce the cold of winter.

It has been in all history the brightest star in the heavens, thought worthy by Pliny of a place by itself among the constellations, and even seen in broad sunshine with the naked eye by Bond at Cambridge, Massachusetts, and by others at midday with very slight optical aid; but its color is believed by many to have changed from red to its present white. This question recently has been discussed, by See in the affirmative and Schiaparelli in the negative, at a length not allowing repetition here, the weight of argument, however, seeming to be against the admission of any change of color in historic times.

Aratos' term ποικίλος, applied to the Dog, is equally appropriate to Sirius now in the sense of many-colored or changeful, and is an admirable characterization, as one realizes when watching this magnificent object coming up from the horizon on a winter evening. Tennyson, who is always correct as well as poetical in his astronomical allusions, says in *The Princess:*

> the fiery Sirius alters hue
> And bickers into red and emerald;

this, of course, being largely due to its marked scintillation; and Arago gave **Barāḳish** as an Arabic designation for Sirius, meaning Of a Thousand

Colors; and said that as many as thirty changes of hue in a second had been observed in it.[1]

Sirius, notwithstanding its brilliancy, is by no means the nearest star to our system, although it is among the nearest; only two or three others having, so far as is yet known, a smaller distance. Investigations up to the present time show a parallax of 0″.39, indicating a distance of 8.3 light years, nearly twice that of *a* Centauri.

Some are of the opinion that the apparent magnitude of Sirius is partly due to the whiteness of its tint and its greater intrinsic brilliancy; and that the red stars, Aldebaran, Betelgeuze, and others, would appear much brighter than now if of the same color as Sirius; rays of red light affecting the retina of the eye more slowly than those of other colors. The modern scale of magnitudes that makes this star —1.43,— about 9½ times as bright as the standard 1st-magnitude star Altair (*a* Aquilae),— would make the sun —25.4, or 7000 million times as bright as Sirius; but, taking distance into account, we find that Sirius is really forty times brighter than the sun.

Its spectrum, as type of the Sirian in distinction from the Solar, gives name to one of the four general divisions of stellar spectra instituted by Secchi from his observations in 1863–67; these two divisions including nearly $\frac{11}{12}$ of the observed stars. Of these about one half are Sirian of a

brilliantly white colour, sometimes inclining towards a steely blue. The sign manual of hydrogen is stamped upon them with extraordinary intensity

by broad, dark shaded lines which form a regular series.

It is found by Vogel to be approaching our system at the rate of nearly ten miles a second, and, since Rome was built, has changed its position by somewhat more than the angular diameter of the moon.

It culminates on the 11th of February.

The celebrated Kant thought that Sirius was the central sun of the Milky Way; and, eighteen centuries before him, the poet Manilius said that it was "a distant sun to illuminate remote bodies," showing that even at that early day some had knowledge of the true character and office of the stars.

Certain peculiarities in the motion of Sirius led Bessel in 1884, after ten years of observation, to the belief that it had an obscure companion with which it was in revolution; and computations by Peters and Auwers led Safford to locating the position of the satellite, where it was found as pre-

[1] Montigny's scintillometer has marked as many as seventy-eight changes in a second in various white stars standing 30° above the horizon, though a somewhat less number in those of other colors.

dicted on the 31st of January, 1862, by the late Alvan G. Clark,[1] at Cambridgeport, Mass., while testing the 18½-inch glass now at the Dearborn Observatory. It proved to be a yellowish star, estimated as of the 8½ magnitude, but difficult to be seen because of the brilliancy of Sirius, and then 10″ away; this diminishing to 5″ in 1889; and last seen and measured by Burnham at the Lick Observatory before its final disappearance in April, 1890. Its reappearance was observed from the same place in the autumn of 1896 at a distance of 3″.7, with a position angle of 195°. It has a period of 51½ years, and an orbit whose diameter is between those of Uranus and Neptune; its mass being ⅓ that of Sirius and equal to that of our sun, although its light is but $\frac{1}{10000}$ of that of its principal. So that it may be supposed to be approaching non-luminous solidity,— one of Bessel's "dark stars."

It is remarkable that Voltaire in his *Micromegas* of 1752, an imitation of *Gulliver's Travels*, followed Dean Swift's so-called prophetic discovery of the two moons of Mars by a similar discovery of an immense satellite of Sirius, the home of his hero. Swift, however, owed his inspiration to Kepler, who more than a century previously wrote to Galileo:

> I am so far from disbelieving in the existence of the four circumjovial planets, that I long for a telescope to anticipate you, if possible, in discovering two round Mars (as the proportion seems to me to require), six or eight round Saturn, and perhaps one each round Mercury and Venus.

Other stars are shown by the largest glasses in the immediate vicinity of Sirius, two additional having very recently been discovered by Barnard at the Yerkes Observatory.

β, 2.3, white.

Murzim, generally but less correctly **Mirzam,** and occasionally **Mirza,** is from **Al Murzim,**[2] the Announcer, often combined by the Arabs with β Canis Minoris in the plural **Al Mirzamāni,** or as **Al Mirzamā al Shi'rayain,** the two Sirian Announcers; Ideler's idea of the applicability of this title being that this star announced the immediate rising of the still brighter Sirius.

Buttmann asserted that it also was **Al Kalb,** the Dog, running in front

[1] His death occurred on the 9th of June, 1897, in the sixty-fifth year of his age, just after the completion and successful installation of the 40-inch glass in the Yerkes Observatory, the greatest of his many great lenses, and the last, excepting the 24-inch for Mr. Percival Lowell.

[2] Literally the Roarer, and so another of the many words in the Arabic tongue for the lion, of which that people boasted of having four hundred.