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Harla journal of Applied Science and Materials

Exploring the Interplay between Human Perception, Astrophysics, and the Nile River: Unravelling the Significance of Sirius

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Abstract

The Sirius star holds a significant historical significance and has captivated numerous civilization and individuals throughout time. Understanding the human perception and physics of Sirius can provide insights into the evolution of astronomy and its impact on the flora and fauna. Prehistoric astronomers believed that the appearance of Sirius in the sky was a signal for the Nile River to flood, and many cultures have depicted the star in their art and literature. Despite its significance, there is a lack of research on the connection between Sirius and the Nile River, and the impact of human perception on the study of astronomy. The aim of this study is to investigate the interactions between human cognition, astrophysics of Sirius, and the Nile River. Therefore, measurements of the wavelength, temperature, and brightness of stars as well as human impressions of their colors and patterns can influence physics (science). The results showed that 68 (45.33%) disagreed with the connection between the filling of the Nile River and the calendar and 82 (54.67%) believed that the Ethiopian calendar had a connection with the filling of the Nile River. Therefore, the majority of respondents agreed that 146 (97.33%) out of 150 respondents knew that the appearance of the star in the Northern Hemisphere is a signal that winter is coming. The mass of the star Sirius is about twice that of our Sun, while its diameter is about 1.7 times larger. Additionally, through image editing method, we improve star images by reducing noise. The results of this study will show that human perception and physics have played a significant role in shaping our understanding of Sirius and its impact on the world's flora and fauna.

Keybord: Astrophysics; Egyptian; Ethiopian; Nile; peoples'; Sirius; thought

1. Introduction

Venus, Jupiter, Mars, and Mercury (both the solar and lunar planets) are, of course, the brightest objects in the universe. You can see it even during the day by casting a shadow. It is not surprising that it has fascinated mankind for thousands of years, amassing an extensive terrestrial history in the writings and arts of various civilizations.

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 Received: March 2023; Received in revised form: May 2023; Accepted: June 2023

Egypt, the Ancient Near East, Greece, Rome, Africa, Arabia, India, China, Judah, America, and Australia are just a few examples. It also has a remarkable track record in modern science and some interesting mysteries. The brightest star in the night sky is Alpha Canis Major (CMa), better known as Sirius. He is a well-known figure in Greek mythology, folklore, and rituals, as he can be seen all over Greece on clear winter nights. The word “seirios” was originally translated as “spark, radiate, blaze, or burn” (Theodossiou et al., 2011).

Another brilliant star in the southern hemisphere is called Canopus (Arabic: Suhayl). It is the sky's second-brightest star after Sirius. Today, spacecraft use it for navigation. Before rising heliacally during the summer solstice, both stars disappear for approximately the same period (Assem, 2008).

The size is twice that of the Sun and 20 times brighter. The Dog Star is named for its prominent appearance within the constellation Canis Major. Because of star status, he was said to be married to Orion or her brother Osiris. Arabs, on the other hand, described Sirius as "Alpha Carina," the sister and wife of Canopus, but experts say the name "Sir" associated with the king's soul in the Pyramid Texts is said to be a variant. of Suhail. Furthermore, they argue that Sirius is not a constellation but a star connected to another star (Assem, 2008).

It is a binary star, not a single one. This was discovered in 1862, when Alvan Clark, while testing a new lens he had made for an 18 1/2-inch refracting telescope, noticed another, smaller star orbiting Sirius. He thought there was a flaw in the lens until he realized he had discovered Sirius' companion star. Astronomers named them Sirius A and Sirius B. Although B is a dwarf star, it is extremely dense (120,000 tons per cubic centimeter). It was discovered in 1926 that it revolved in an elliptical orbit around Sirius A once every 50 years. At the beginning of the twentieth century, astronomers discovered the existence of white dwarfs like Sirius B, which were small, heavy, and bright (Sirius B is 10,000 times dimmer than A) yet massive (Assem, 2008).

It is the brightest star in the constellation Canis Major and means "big dog" in Latin. Canis Major is to the left and below Orion, the Hunter. Figure 1 shows how the small dog, Canis Minor, wins over Canis Major. These two Canis are loyal companions and devoted hunters who chase and bring back Orion's prey. Near the base of Orion, Canis Major is often seen leaping towards Lepus the Hare. Procyon, the prominent Star of Dogs in Canis Minor, is also known in Greek as "the one who precedes or precedes the dog."

In this environment, Procyon seems to rise about an hour earlier than Sirius. The "Winter Triangle" is formed by the brightest stars Orion, Sirius, Procyon, and Betelgeuse. Many well-known facts about Orion, Sirius, Canis Major, and Canis Minor can be found in ancient Greek texts. The ancient Greeks identified 48 constellations, including Orion, Canis Major, and Canis Minor. However, early Greeks and Romans, as well as other large ancient societies, had many complex associations and ideas about Sirius (Holberg, 2007).

Figure 1 shows the positions of Canis Major, Canis Minor, Lepus, Orion, Sirius, and Procyon in the winter sky. Sirius, Procyon, and Betelgeuse (solid lines) form the Great Winter Triangle. Holberg, (2007).

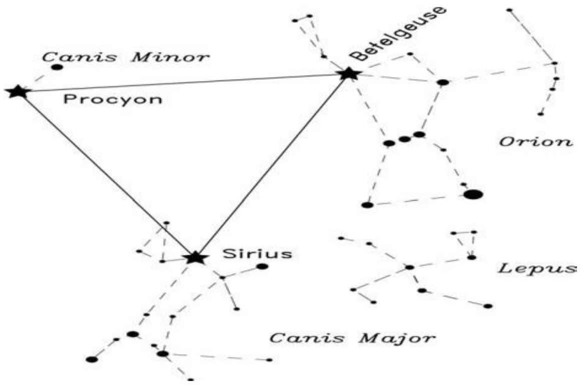

Figure 1. The three stars of the Winter Triangle Hamacher, et al., (2019); (https://www.en.wikipedia,2018).

Sirius, a star system, is the brightest star in the night sky above Earth. It is about twice as luminous as Canopus, the next brightest star, with a visual apparent magnitude of 1.46. Alpha Canis Majoris (CMa) is the system's trade name, according to Bayer. The Sirius B binary star system, which is what the unaided eye sees as a single star, is made up of stars of the spectral type DA2. The distance between Sirius A and its companion varies from 8.2 to 31.5 AU.

Due to its natural brilliance and closeness to Earth, Sirius seems to be bright. According to data from the Hipparcos astrometry satellite, the Sirius system is one of

Earth's close neighbors and is situated at a distance of 2.6 parsecs (8.6 light-years) from the planet. Over the following 60,000 years, Sirius' brightness will modestly rise as it slowly approaches the solar system. After that, it will move further away and get fainter, but it will continue to shine brightly in the night sky of Earth for another 210,000 years.

A is roughly twice the size of the Sun and has an absolute visual magnitude of 1.42. Despite being 25 times brighter than the Sun, it is significantly fainter than other bright stars like Rigel or Canopus. It is estimated that the system is 200–300 million years old. It started with two brilliant, bluish stars. The larger of these, Sirius B, depleted its resources, evolved into a red giant, shed its outer layers, and eventually collapsed into its current state as a white dwarf some 120 million years ago (https://www.en.wikipedia, 2018).

Sirius has spawned several "mysteries," including why Ptolemy called it "red," why th e Dogon tribe in Africa is said to know about Sirius B, whether there is a third star in t he Sirius system, and why a New Age cult committed mass "suicide" to travel to Sirius .

Due to Sirius' prominence in the constellation Canis Major, it is frequently referred to as the "Dog Star" (the Great Dog). The heliacal rising of Sirius signaled the beginning of wintertime for the Polynesians in the southern hemisphere, the "dog days" of summer for the ancient Greeks, and the flooding of the Nile in ancient times (Wikipedia, 2018).

The enormous river continued to shape what the Egyptians observed and how they explained occurrences, even when they turned their gaze away from the Nile and upward toward the heavens. In contrast to other potamologic activities, the Nile flooded in a predictable rhythm and quite peacefully. The sky's constellations could reliably forecast Nile flooding. A brilliant star in the constellation Canis Major caught the attention of the Egyptians in particular. This star would be visible at dawn and dusk, indicating the start of the Nile's flooding season.

Because the spiraling rise of Sirius in mid-August each year was a natural sign that the great Nile was about to flood, it played an important role in all areas of Egyptian civilization ancient times and continued to play that role until the 20th century. Ethiopians did not make a correlation between the appearance of the star Sirus in the Northern Hemisphere and the rising water levels of the Nile River while the country was experiencing winter. As a result, the water levels of all rivers in the country are increasing Barber, (2008). The Ethiopian thinking in the Sirius Star is completely different from the Egyptian thinking Rodass and Getnet, (2008). The purpose of this work was to study what Ethiopians thought about the star Sirius and the physics of the star behind it.

2. Literature Review

Astrology, Astronomy, and Cosmology of Ancient Egypt

The earliest astronomy documents mention Sirius, the brightest star in the night sky. This heliacal rise is surprisingly regular compared to other stars due to its deviation from the ecliptic, with a period of almost exactly 365.25 days keeping it constant with the solar year.

Because of its prominent position in the constellation Canis Major, Sirius is frequently referred to as the "Dog Star" in common parlance (the Great Dog). Ancient Ethiopian astronomers believed that the Nile's inundation in ancient Egypt coincided with Sirius' heliacal.

Astronomy became more significant to ancient peoples as human society evolved from a nomadic one to an agricultural one. The patterns and cycles that the heavens underwent were apparent to various people as they observed the skies. They soon realized they could anticipate seasons and macro-weather patterns that would probably have an impact on them. The knowledge obtained from the sky was essential to their own and their communities' survival because their way of life depended on the success of the current year's crop and on knowing when the rainy season would start. Such observations of the sky served as the foundation for the entire ancient calendar and resource allocation system (Ely, 2012).

The Egyptians also noticed that Sirius' heliacal ascension and the flooding of the Nile River, which signaled the beginning of their new year, were related. The sun appears to travel eastward toward the background stars as the Earth revolves around it. Over time, because of this eastward journey, stars in the western skies gradually fade away, only to resurface in the eastern ones. The heliacal rising takes place when the Earth orbits the Sun far enough for a star to temporarily rise before the Sun does.

The brightest star seen at night is Sirius. Sirius represented a component of the goddess Isis to the ancient Egyptians. Sirius is described as "a feminine sun that appears in heaven at the beginning of the year as a holy star, whose rays light the earth like the morning sun," inscribed in the Dendera Temple. It is the mistress of the new year and tempts the Nile to emerge from this source hole so that it can sustain its existence (Krupp, 2011). For the ancient Egyptians, Sirius was a crucial star. The heliacal rising of Sirius signaled the start of their new year. For someone to have known when the heliacal rise took place, someone had to have been keeping an eye on the skies.

They were known as "hour watchers" in ancient Egypt (Krupp, 2011). These people were actual astronomers. They found that they could line up Sirius' heliacal rise with the Nile River's rise. In the days, or rather, nights that followed, they also noticed that Sirius rose earlier. It was challenging to connect Sirius' ascension to the sun's rising after ten nights. It was done using a brand-new star or group of stars. It was soon obvious that another bright star or starry pattern could be used. Ten nights separated these stars, or constellation patterns. The sky was divided into 10-degree sections by these patterns, which were referred to as "decans.".

Thus, there were 36 decans in the sky. A new decan would rise after Sirius' heliacal rising, which heralded the start of the New Year eleven days later. After another ten days, another decan is added, and so on. This accounted for 360 days, and the final five days might have been filled by an ephemeral star cluster. The pharaohs' coffin lids reflect this counting of decans and monitoring of their heliacal ascent. These "diagonal calendars" make the progression of the decan-related patterns quite evident (Neugebauer, 1955). There is a clear pattern extant, as seen below, even if the patterns portrayed may or may not match the constellations visible today in increments of degrees (Dobek, 2018).

In ancient Egypt, a new year began when the star started to flicker low on the horizon. The festivities are ready to begin. The heliacal rising and its related festival were known to the Egyptians as prts-pdt, or "the going forth of Sopdet."

After spending 70 days in hiding, the star has now emerged from the duathlon (underworld) to bring prosperity to the region and enable its people to bury their dead. The star is invisible for 70 days because sunlight predominates during this time. It is 11 degrees ahead of the sun when it begins its heliacal rise in the east and travels across the celestial sphere to set in the west. It moves away from the sun on the following nights by rising earlier and remaining in the night sky longer. Eventually, it loses phase with the sun and rises as the sun is about to set over the western horizon. After returning to the sun on succeeding nights, it remains hidden from the sun's light for 70 days before making a brief appearance right before daybreak, known as the heliacal rising. The color of the blue-white star, which also signals the flooding of the Nile, is significant. The Egyptians anticipate a bumper crop if the star is bright and clear. A poor harvest happens if it is drab and yellowish. The star was red, and the less red it was, the better the crop, according to the Egyptian astronomer Ptolemy in the second century AD (Assem, 2008).

There are 95 stars in the southern constellation Canis Major, which is average in size. The brightest star in it, Sirius, is about four times as brilliant as any other star that can be seen from Athens' latitude (38°, in central Greece). To observe Canopus, the next brightest star, which is just half as bright as Sirius, one must travel further south than 37° N, to Rhodes or Crete (Canopus is the brightest star of the constellation Carina and is Alpha Carina).

With a distance of only 2.64 parsecs (8.60 light-years) and an apparent magnitude of m = - 1.46, Sirius is currently thought to be one of the stars closest to Earth. At the same distance, our sun would appear 20 times brighter than this. Canopus glows with an apparent brightness of -0.72 and is located at a much greater distance of 96 pc (313 ly). Sirius is outshined only by the Sun, Moon, Venus, Jupiter, and Mars; in fact, Mars only outshines Sirius when it is close to the opposition, which happens once every two years (Theodossiou et al, 2011).

In ancient Egypt, certain stars were strongly correlated with favorable or unfavorable events. Rose explored this notion while observing Sirius. One of the most significant stars, Sirius, was out of sight for around seventy days a year due to being too close to the sun to be seen, according to the Egyptians. As Rose notes, Sirius initially became visible in Memphis or the adjacent city of Heliopolis; each July, Sirius would reemerge at sunrise in the eastern sky. The Egyptians dubbed this Sirius' helical rise, Part Spat, or "the Coming-Forth of Sopdet." (Rose, 1994).

According to Barber, "the early morning emergence of Sirius (the Dog Star)," as the Greeks called it, informed Egyptian farmers of the impending annual flood of the Nile. Due to their connection to reproduction, Sirius and Isis are frequently linked. Bearder (2018). Orofino further underlined to the audience that Barber had noted Sirius' significance in ancient Egypt, not only because it is the brightest star in the sky but also because of its connection to the start of the Nile River's flood, which coincided with Sirius' heliacal ascent (Orofino, 2011). Sirius, therefore, represented the flood and its blessings, which was a positive omen in ancient Egypt.

There was a strong relationship between some stars and good or bad events in ancient Egypt. When Rose discussed this idea by studying Sirius, he said: According to the Egyptians, Sirius was one of the most important stars; it was out of sight for about seventy days each year because it was too close to the Sun to be seen. The first appearance of it was in Memphis or nearby Heliopolis. Rose emphasizes that each July, Sirius would reappear in the eastern sky at sunrise. This was the helical rising of Sirius the Egyptians called it part Spat, "the Coming-Forth of Sopdet" (Rose, 1994).

There are two types of physical explanations for the red Sirius anomaly: intrinsic and extrinsic. The most popular intrinsic hypothesis, which holds that the white dwarf Sirius B was a red giant as recently as 2000 years ago, assumes that the Sirius system has undergone a significant alteration during the past two millennia. Extrinsic theories are concerned with the possibility of temporary reddening in a medium between the star and the observer. This could be caused by interstellar dust or particles in the atmosphere. The fact that ancient observers were obsessed with Sirius' heliacal rising and setting and naturally preferred to concentrate their attention on the star when it was low in the sky lends support to theories based on terrestrial atmospheric extinction (Whittet, 1999).

Humans have been captivated and intrigued by Sirius. This curiosity has deep roots in many civilizations' prehistory and antiquity. Two of these ancient rivers of myth and legend's most significant tributaries are the Dynastic and Egyptian civilizations. For the Egyptians, the goddess Isis, who was important to their mythology and religion, was represented fairly literally by Sirius. Sirius was utilized to control the Egyptian calendar and predict the annual flooding of the Nile River on a more practical level (Holberg, 2007).

2.1. Astrology, Astronomy, and Cosmology of Ancient Greeks and Romans

Because of its prominent position in the constellation Canis Major, Sirius is frequently referred to as the "Dog Star" in common parlance (the Great Dog). The ancient Greeks used Sirius' heliacal rising to indicate the "dog days" of summer, whereas the Polynesians of the Southern Hemisphere used it to indicate winter and as a crucial navigational aid in the Pacific Ocean. The constellation Canis Minor and the Dog Star (Sirius), according to the Greeks, were signs that a drought was about to begin.

Humans have been captivated and intrigued by Sirius. This curiosity has deep roots in many civilizations' prehistory and antiquity. The later Greek and Roman civilizations are the two most significant and influential streams of this ancient stream of myth and legend. Sirius was never regarded by the Greeks and Romans as a god-like Mars or Jupiter, but rather as a symbol of some unique ideals and beliefs. Some of these are still present in their culture and language and occasionally manage to spark fruitful new directions in modern science. Indicate the origins of these fables and legends from prehistoric times up to the fall of the Roman Empire. This section of the journey is particularly fascinating because of the surprising ways in which seemingly outdated notions and findings regarding Sirius and the stars have been revived in more recent times (Holberg, 2007).

2.3. Sirius In Greek and Roman Mythology

Laelaps, the devoted canine companion of Orion the Hunter, is likely depicted in Canis Major. Nearby constellations include Orion. If we stretch the line created by the three stars of "Orion's Belt" to the east, we may locate Sirius on the celestial sphere. In a Greek myth, the goddess Artemis, who is the Greek version of Diana, was the object of Orion's affection. However, Apollo dispatched a massive scorpion, now symbolized by the constellation Scorpius, to murder the unfortunate hunter to prevent the union of mortal Orion with his twin sister. Procris, the daughter of Erechtheus and one of Artemis' succeeding nymphs, received Orion's gorgeous hound as a gift after he passed from his beloved Artemis. Later, Procris gave Laelaps to her famous hunter husband Cephalus. The dog Laelaps, the hound of Actaeon, that of Diana's nymph Procris, or the one given to Cephalus by Aurora and known for the speed that so pleased Jove that it caused its transfer to the sky were all represented by the word "Canis" in early classical times (Allen, 1963).

Laelaps is the dog that Zeus gave as a gift to Europa, according to Eratosthenes' Catasterismoi (1997) and Eratosthenis (1897). Later, Minos, King of Crete, presented it to Procris after she helped him recover from a medical condition. Once more, Procris gave it to her husband, Cephalus. Zeus put his dog in the constellation that bears his name after Cephalus mistakenly killed Procris. Less well-known tales associate Sirius with Cerberus, the ferocious three-headed canine that protected the entrances to Hades' underworld, or with one of Actaeon's hunting hounds, a great hunter and hero from Thebes who had the misfortune of straying onto Artemis' bathing grounds. Artemis was transformed into a deer after this dog saw him naked, and she made his hounds slaughter him. Seirios had several names in myth. Some claim that Maira, a Titanian named Atlas' daughter, or Maira, the devoted dog of King Ikarios, as portrayed by Boötes in the works of the Roman poet Ovid (43 BC–AD 17), were responsible. Additionally, Orthros (the morning twilight), the wolf of Geryon, and the giant of the west may have been connected to Sirius. The dog-goddess Hecate, a daughter of the Titans Perses and Asteria was likely likewise connected to the dog star. Aratus, Homer, and Hesiod all use the term to refer to it as Orion's hunting dog, following Lepus the hare or aiding Orion in combat with Taurus the bull (Theodossiou and Danezis, 1990).

There was only one dog mentioned by the ancient Greeks, but by the time of the Romans, Canis Minor appeared as Orion's second hound (Allen, 1963). According to Allen (1963), Canis Major was a southern Cerberus, the watchdog of the lower heavens, which were thought to be the abode of demons in early mythology. In Rome, Canis Major was also known as Custos Europae and Janitor Lethaeus. Custos Europae is an allusion to the story of the bull who, despite the dog's watchfulness, abducted that maiden.

2.4. Astrology, Astronomy, and Cosmology of Ancient Ethiopia

When they got the Ark of the Covenant, the Ethiopians were jubilant. As they watched the new belief system emerge, they also observed the destruction of their previous one. Their idols, which they had crafted by hand and were in the shapes of men, dogs, and cats, fell, and tall structures were also destroyed. Because Zion blazed like the sun, its majesty surprised them (Chapter 55 of Kebra Nagast). The Dogon are an additional African ethnic group that illustrates energy utilization. They originate from a region that lies along the Upper Volta and Mali borders. They developed a very archaic knowledge system, using nothing but their eyes to see Sirius. The Pale Fox (1986), by French anthropologists Griaule and Dieterlen, provided proof that the Dogon have been observing Sirius' two companions since at least the 13th century and have developed ceremonies centered upon them. Extraterrestrial origins have been suggested as the cause of this occurrence (Temple, 1998). Sirius-related information among the Dogon has been hotly debated.

The Dogon also gives us a clear illustration of the dance of the creation and annihilation of spiritual energy, which is more significant to this analysis. This paragraph also shows that they had a wave-particle duality in their understanding of energy, which is comparable to Albert Einstein's. Examine their perception of reality in further detail. Their worldview holds that God initially created a seed, which is how they conceptualize the current universe as having emerged. The eight pieces are animated by a fluid and rigid motion, and they contain the essence of creation. It consists of the four basic "elements" (air, earth, water, and fire) as well as the "world" creator, or life manifesting itself within (Miriamma, 2002).

2.5. Classification of Stars

Despite being based on the relative intensities of several important spectral lines, the Cannon classification system was not intended to take star evolution into account. The system did, however, depict a relative temperature progression, with the reddish K and M stars at the cool end and the blue O, B, and A stars at the hot end, with the blue, F, and G stars in between. Since temperatures may well evolve, the Harvard coding system's letters came to be inextricably linked to the respective stellar ages of stars. The Harvard spectral classifications were often thought of as a cooling sequence, with the blue stars being the youngest. Astronomers frequently use the terms "early-type stars" to describe O, B, and A stars and "late-type stars" to describe K and M stars, even though this interpretation is no longer accurate.

Typically, stars are categorized using their spectra according to the Morgan-Keenan, or MK, method. From the hottest to the coldest, there are eight spectral classes, each comparable to a range of surface temperatures: O, B, A, F, G, K, M, and L. The ten spectral types that make up each spectral class range in temperature from 0 for the hottest to 9 for the coolest.

Under the Morgan-Keenan classification scheme, brightness is another way stars are categorized. The largest and brightest star classes have the lowest Roman numeral sizes: bright supergiant *Ia*, supergiant *Ib*, bright giant II, giant III, subgiant IV, and main sequence or dwarf V are other examples.

The spectral type and luminosity class are both included in a complete MK classification; for example, the sun is a G2V. The above-mentioned Annie Cannon Harvard classification system underwent a considerable change in response to the discovery of massive stars. A Roman numeral was added to the fundamental letter and number system, which essentially follows a temperature sequence, to denote the luminosity class to which a star belonged. The sun and Sirius, both dwarf stars, were given the designations G2V and A0V, respectively. In order of increasing luminosity, the big stars were divided into a set of subclasses IV, III, II, and I. Subgiant stars are those in subclass IV; giant stars are those in subclasses III and II. Supergiant stars were only allowed to be in subclass I. For instance, well-known stars like Betelgeuse and Arcturus are now designated M2I and K2III; hence, Betelgeuse is now classified as a supergiant and Arcturus as a giant star. The Hertzsprung-Russell, or H-R, diagram, which has come to be regarded as a representation of the development of stars, shows that each luminosity class represents a distinct stage of stellar evolution. This joint designation, which was established in the 1930s, honors Hertzsprung and Russell for their contributions to astronomical knowledge (Holberg, 2007).

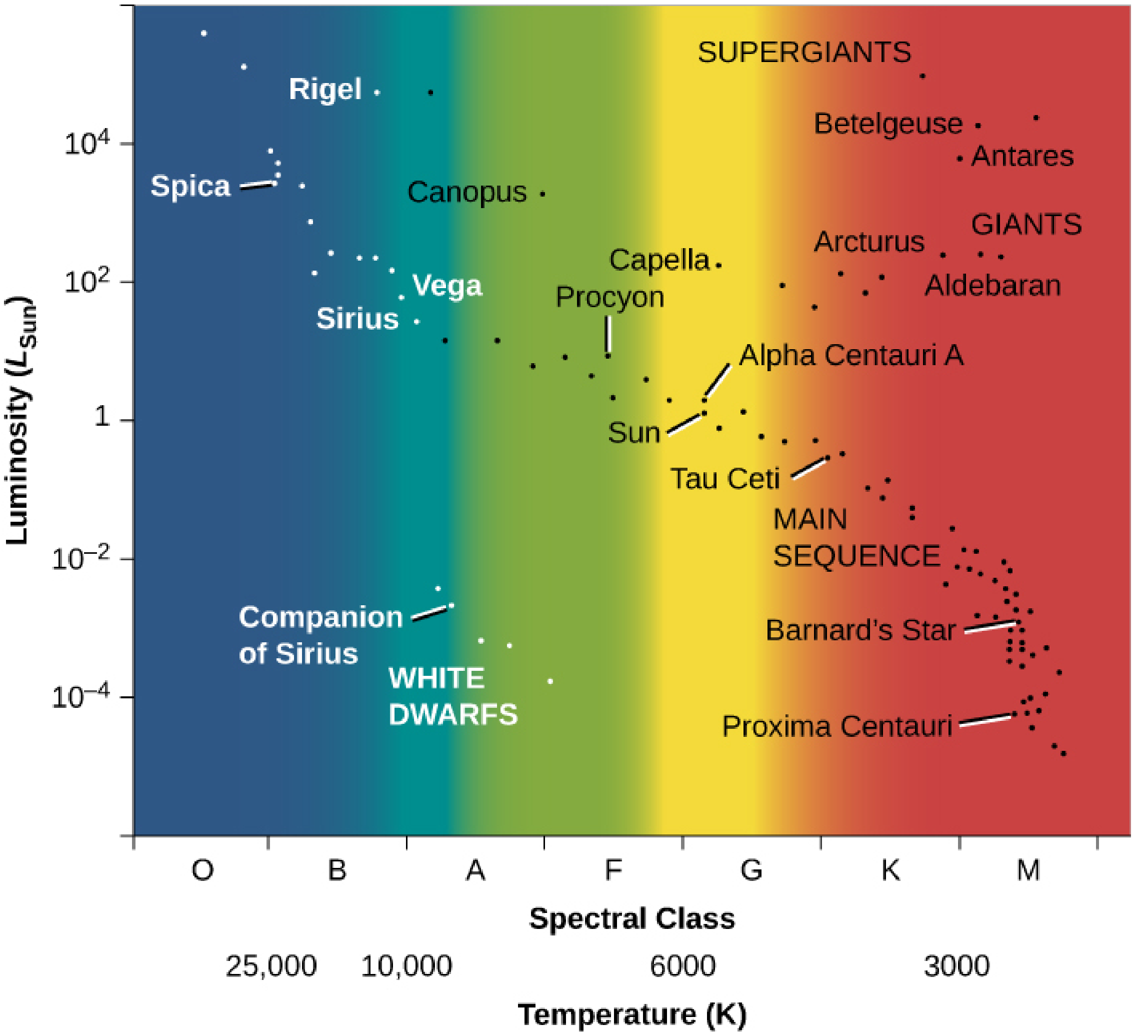

Figure 2. H–R Diagram for a Selected Sample of Stars. In such diagrams, Luminosity is plotted along the vertical axis. Along the horizontal axis, we can plot either temperature or spectral type (also sometimes called spectral class). Several of the brightest stars are identified by name. Most stars fall on the main sequence Source: Holberg, (2007); Aerts, et al., (2010).

The H-R diagram shown in Fig. 2 is the map of the evolutionary relationships between stars of various luminosities and temperatures, in addition to showing the static distribution of stars in terms of temperature and luminosity. For instance, it is now known that the dwarf stars, which Hertzsprung originally referred to as the main sequence stars, are stars of various masses that are in the hydrogen-burning stage of their evolution. However, when Hertzsprung and Russell first formulated their theories, such linkages were not known. The H-R diagram has had many different incarnations since it evolved into an all-purpose tool for astronomers. When plotted against other measures of luminosity, such as absolute magnitude or the total luminosity of a star, for instance, temperature, spectral type, and color can all be considered (Holberg, 2007).

2.6. Main–Sequence Binary Stars

The main-sequence binaries' frequencies, period distributions, and mass ratio distributions. Here is a current review of stellar diversity in pre-main-sequence and main-sequence stars. These frequencies, along with the effects of tides and mass loss, which can both shorten and prolong the orbital gap, bring two stars under each other's influence or enable them to escape interaction altogether, determining the proportion of stars that interact with their companions. Instead of the companion frequency, which might be greater than one when there is on average more than one companion per primary, we define the binary fraction in this context as the fraction of multiple systems. We employ the same naming practices as Solar-type stars have masses between 0.7 and 1.3 M sun (spectral types F through mid-K), low-mass stars have masses between 0.1 and 0.5 M_{sun} (spectral types M0 to M6), and very-low-mass stars and brown dwarfs have masses less than 0.1 M_{sun}. Massive stars have masses greater than 8 M_{sun}. Intermediate-mass stars have masses between 1.5 and 5 M_{sun} (spectral types M8 and later) Marco and Izzard, (2017)

3. Material and Methodology

3.1. Study area

Amhara, Ethiopia's most northern national regional state, is where the research area is located. It is situated in the nation's northwest. There were more than eleven administrative zones, with woredas within each. The Amharic language and culture are the most uniform in the area. One of the eleven administrative zones, the West Gojjam zone, is further subdivided into sixteen woredas. In the quarite woreda, there are 123 churches and a total of 4,200 deacons, priests, and marigetas; in the finoteslam, there are 200 shahs. Quarite is situated 370 kilometers and 100 kilometers apart from the main cities of the Amhara National Regional State and Ethiopia's capital city, Addis Ababa, respectively. The distance between Bahirdar to Finoteslam, and Quarite is 40 kilometers. In those woredas, there are thought to be 4400 religious' leaders (priests, marigeta, deacons, and Sheh), of whom 2200 are priests and marigeta, 2000 are deacons, and 200 are Sheh CSAE and ICF, (2011).

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3.2. Data Types and Sources

This study is an example of a descriptive research design since it discusses the connection between physics, people's perceptions of the Sirius star, and numerous explanatory variables. Primary and secondary data were both employed in this work. Additionally, the researcher combined qualitative and quantitative data.

To triangulate the analysis, the researcher created a questionnaire to collect quantitative information from the population. To collect qualitative information from religious individuals and places of worship (churches and mosques), the researcher conducted semi-structured interviews.A self-administered questionnaire and a semi-structured interview were used to collect primary data from concerned members of the religious establishment (the priest, marigeta, deacons, and shah). Additionally, texts such as the books Rodass and Getnet (2008) and Holberg (2008), as well as other pertinent internet sites, were examined to gather the necessary secondary data.

2.7. Target Population

All Priests, Merigeta, Deacons, and Sheh residing in Quarite wereda during the study period make up the population for this investigation.

2.8. Sample Size Determination

The sample size can be determined using a variety of methods. The size of each stratum or a specific stratum is represented by this sample level. Include the populations from the chosen groupings in the census (Mergata, Deacon, Priest, and Sheh).

The sizes of the samples taken from the various strata are maintained in proportion to those sizes. In other words, if n represents the overall sample size and Pi represents the percentage of the population contained in stratum I, then the number of elements chosen from stratum I is 4. The population size N = 4400 that is divided into four strata of sizes N_1 = 800, N_2 = 2000, N_3 = 1400, and N_4 = 200. We want to select a sample of size n = 150 from this population. The sample size is determined by the Eq.1.

$$n_i = n * \frac{N_i}{N} \quad (1)$$

Where N_i is the sample size from each data categories, n, is the total sample size, N is the total population data, and n_i sample size from each category. By using proportional allocation, we will obtain the following sample sizes for the various strata:

Table 1. Population sample size

Data categories	Total Size (N_i)	Sample size (n_i)
Mergata	800	27
Deacon	2000	68
Priest	1400	48
Sheh	200	7
Total	N=4400	n= 150

Thus, using proportional allocation, the sample sizes for different strata are 27, 68, 48, and 7, respectively, which are in proportion to the sizes of the strata, viz., 800:2000: 1400:200.

3.5. Data Collection Techniques

The unit of data collection in this study was the head of each household, and analysis was done at the respondent level. 150 respondents' responses were acquired using a variety of approaches. Primary data were gathered via self-administered questionnaires and semi-structured interviews. As a result, the researcher created the questionnaire under the guidance and approval of advisors. Five randomly chosen respondents were used for pre-testing the draft questionnaire. Both data collectors and the researcher themselves took part in this phase. As a result, changes were made to the actual questionnaire based on the pre-test, and it was then circulated to gather the necessary data.

3.6. Primary Data Collection Tools

Questionnaires from missionaries (mythology) such as deacons, mergata, priests, and shahs are among the main data collection tools. By using the questionnaire, researchers can collect data from a large group of individuals, and it is simple to administer certain subjects in one location at a time. The questionnaire is crucial because it can be used to gather significant, first-hand information from respondents.

Consequently, the researcher created questionnaires with 12 items (open and closed-ended). To make the questions easy for responders to grasp, the researcher first wrote them in English and then translated them into Amharic, the local language.

3.7. Secondary Data Collection

The researcher also employed secondary data reports from document reviews conducted for valuable websites, astronomical publications, and books as secondary data sources.

3.8. Methods of data processing and analysis

To ensure that the data received from the respondents using different technologies was consistent, the researcher processed the data by revising, coding, entering, and cleaning it.

4. Results and Discussion

The findings on how the Sirius star's omen (sign) affected people's beliefs about that star are presented in this section. A summary of the statistical analysis comes first.

4.1. Background of the Respondents

The following describes the respondent's age and education level: The respondent's status and his education level have a positive impact and make him better qualified to interpret the sign (omen) of the star Sirius and its understanding in their community, just like Merigeta, who was more educated than the priest and deacon. Respondents' ages were divided into four groups, as shown in Figure 1. Of the 150 respondents, 24.0% were classified as between the ages of 25 and 35, 28.0% as between the ages of 36 and 45, and 37.3% were aged 36 to 45. aged 46 to 55 and 10.7% over 55 gave a clear explanation of the sign (omen) of the star Sirius that they have been using for a long time.

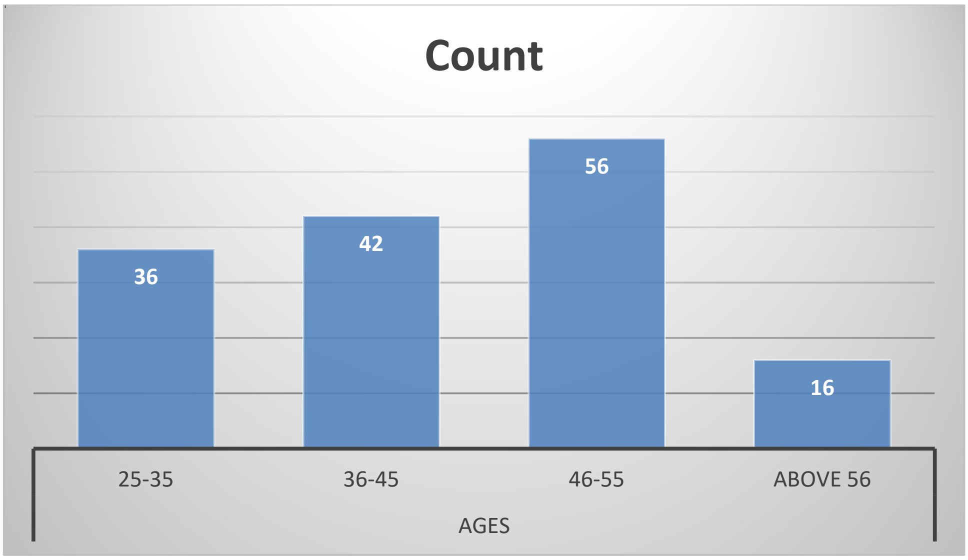


Figure 1. Respondent age distribution

Furthermore, Figure 2 shows the location of the respondents in their respective mosques and churches. Most respondents were from the local Christian community. Of the 150 responses, 38.0% identified themselves as deacons, 30.3% as priests, 26.7% as Marigeta, and 4.7% as Sheh participants.

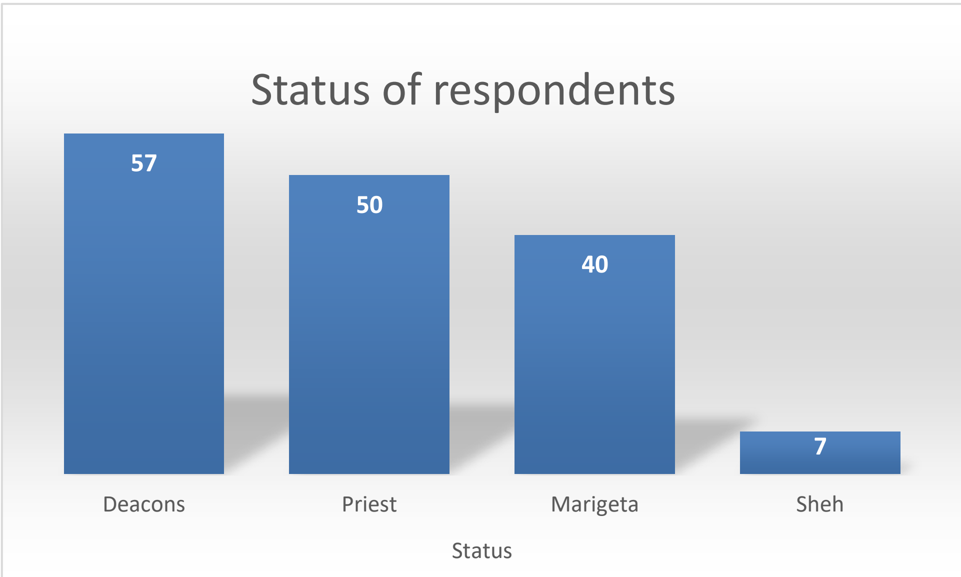


Figure 2. The status of the respondents in their churches and Mosque.

Descriptive data analysis

Q 1. Is the Sirius Star related to the birth of Christ or the birth of the Prophet Muhammad?
Q 2. If your answer is yes, explain

Of the 150 respondents, 146 (97.33%) chose "yes" in response to questions 1 and 2 above, citing the Sirius Star's connection to the births of the Prophet Muhammad or Christ, as indicated in Table 1. This demonstrates how society links various objectives to the Sirius stars and how people's views, cultures, and religions are predicted by the Sirius stars and people. The Creator, however, is at odds with them if the Sirius stars cannot be seen Monges, (2002).

Table 2. Sirius Star is related to the birth of Christ or the birth of Prophet Muhammad.

Q (1 and 2)	Frequency	Percent
0	4	2.67
1	146	97.33
Total	150	100.00

Q 3. The beginning of the new year, according to ancient Egyptian astronomers, occurs on August 25, when the Nile is full. What do people in Ethiopia think of this?

Q 4. Explain if your answer is yes to question 3.

Table 2 below shows that out of 150 respondents to questions 3 and 4, 68 (45.33%) said they had no direct connection with the Nile, and 82 (54.67%) said the Ethiopian calendar had nothing to do with the filling of the Nile. upward. According to the Ethiopian calendar, there are four distinct seasons of the year. These are

- The summer months of June, July, and August are called Kiremt or Meher.
- Tseday (Spring): Spring, sometimes called harvest season, lasts from September through October and November.
- Bega (winter): Dry months such as December, January, and February are marked by morning frosts, especially in January
- Belg (autumn): The autumn months of March, April, and May often have scattered rainfall. In Ethiopia, May is the hottest month.

Table 3.The Sirius star versus the Nile River

Q (3 and 4)	Frequency	Percent
0	68	45.33
1	82	54.67
Total	150	100.00

Q5. Do the Egyptians observe the stars and predict the season?
Q6. Based on question 5, if your answer is yes, explain the situation.

131 (87.33%) of the 150 respondents to Questions 5 and 6 in Table 4 stated that it would be a beautiful year and a sign that Christ would show mercy if the Sirius stars were occasionally visible. If the Sirius star had not been visible, they would have concluded that the year or the season would not be favorable. People watch the skies in order to comprehend the patterns of the cycles that the sky has experienced. They were fast to recognize and predict the seasons and broad-scale weather patterns that would most likely affect them. Since society depends on the production of the current year's crop. According to Mohamed and Shamsuddin (2022), since civilization depends on current crop yields, knowing when the rainy season will begin is essential information. Their individual survival and that of their group depend on it Hamacher, et al., (2019).

Table 4. Prediction of season and people’s thought

Q (5 and 6)	Frequency	Percent
0	19	12.67
1	131	87.33
Total	150	100.00

Q7. Do you believe that this star, Sirius, is a reliable sign for both people and animals?
Q 8. If your answer is yes to question 7, explain the situation.

As shown in Table 5, 131 (87.33%) of the 150 respondents to Questions 7 and 8 gave the affirmative. This is generally known in Ethiopia. It is, however, impossible to employ them in this way since humans have not studied nature very well, although it is quite predictable. The position and hue of this Sirius star can therefore be used to determine the current weather. The reappearance of the star Sirius in the sky was especially important to the Egyptians because it told them that the Nile would soon overflow, bringing water and fertile new soil to the arid lands where they would grow crops Khamis, (2018).

Table 5. Ancient astronomers used the omen (sign) of the Sirius star for a different mission.

Q (7 and 8)	Frequency	Percent
0	19	12.67
1	131	87.33
Total	150	100.00

Q 9. Does the star sign always appear?
Q 10. If your answer to question 9 is yes, then explain the time

As indicated in Table 6, 129 (86%) of the 150 answers to Questions 9 and10 agreed that the Look for two signs of seasonal change in the pre-dawn sky in late August and early September: Orion the Hunter and Sirius the Hound Star. Orion appears before dawn and is recognized by the short line formed by the three stars that make up its belt Khamis, (2018). The pre-dawn darkness gives way to dawn. Orion is followed in the sky by Sirius, the brightest star in the sky and also known as the Dog Star because it is a member of the constellation Canis Major, the Dog Big. Moreover, peoples believe that the birth and baptism of the Lord of the Rings occurred around this time, Sirius is celebrated from September 26 to December 25 and from December 26 to February 6.

Table 6.Seasonal variation of the Sirius star.

Q (9 and 10)	Frequency	Percent
0	21	14
1	129	86
Total	150	100.00

Q 11. Does the main character have a regular season?
Q 12. Based on question 11, if your answer is yes, explain the months

Out of 150 respondents, 127 (84.67%) indicated they agreed with this statement for Questions 11 and 12, and they believed that it was because the Lord's birth is symbolized by this star shown in Table 7. According to science, the point in the sky where the sun's path is furthest south is called the winter solstice, also known as the winter solstice. The day of the year with the least sunlight and therefore the longest night occurs on the winter solstice, when the sun reaches its shortest path across the sky. According to NASA sources, winter officially begins on the evening of the winter solstice, which falls on December 21 or 22 every year in the Northern Hemisphere. The days gradually get shorter before this event. After that, the days get longer and longer until the summer solstice, also known as the summer solstice, is the longest day of the year. Therefore, people's thoughts and scientific understanding are contrary.

Table 7. The star shows reputation season in December and January

Q (11 and 12)	Frequency	Percent
0	23	15.33
1	127	84.67
Total	150	100.00

Q 13. Is the community benefiting from the use of this star as a sign?
Q 14. Explain if the answer to question 13 is yes.

In response to Questions 13 and 14, 146 (97.33%) of the 150 respondents said they find the Sirius star omen (sign) to be quite helpful.

Table 8 shows that 146 (97.33%) out of 150 respondents knew that the appearance of the star in the Northern Hemisphere signals of the coming winter. We are experiencing a crisis that is preventing us from moving forward due to a lack of adequate attention. However, the Egyptians heeded the sign to protect their people from floods, cultivated the land, adopted the designs and symbols of the star Sirius, and built the Aswan Dam in 1970.

Table 8. The sign of the Sirius star for communities.

Q (13 and 14)	Frequency	Percent
0	4	2.67
1	146	97.33
Total	150	100.00

Q15. Does the neighborhood star, Sirius, depict the entire length of the Nile?
Q 16. If the answer to question 15 is "yes," could you please describe the date and state of the filling?

Of the 150 respondents, 84 (or 56%) chose "yes" in response to questions 15 and 16; Table 9 demonstrates the relationship between this Sirius star and the Nile Dobek, (2018). It is also referred to as the Nile Star. This implies that before the Nile fills up, the Sirius star is visible as a bright star. This illustrates the indissociably of the Sirius Star and the Nile. 66 respondents (44.8%) disagreed, claiming there is no connection between Sirius and the Nile.

Table 9. The Sirius Star is related to the Nile River.

Q (15 and 16)	Frequency	Percent
0	66	44
1	84	56
Total	150	100.00

Q 17. Does Sirius have contributed for their developments of Egypt or Ethiopia?
Q 18. Would you describe the civilization, if you said "yes" to inquiry 17?

From the 150 respondents, 136 (90.67%) chose to answer "yes" to Questions 17 and 18, stating that Sirius Star did not significantly contribute but that they were aware that intelligent Ethiopians were exploiting it for a variety of purposes shown in Table 10. They utilize it as a yardstick for measuring time, so it's critical to comprehend the local environment given that Sirius scintillation plays a part in forecasting weather and seasonal changes.

In addition, the Polynesians, mainly in the Southern Hemisphere, considered Sirius a sign of winter and an important navigational aid in their journey around the Pacific, the ancient Greeks and Egyptians associated associate this star with the “fang days” of summer and floods in the Pacific Ocean and Nile River Dobek, (2018). In particular, to accurately forecast, manage and exploit the Nile flood, it is necessary to have a method to accurately calculate the length of the year.

Accurate observation of the star Sirius at a particular time of the year is necessary to carry out one of the most effective techniques ever devised by the ancient Egyptians for this purpose. Due to its widespread use, Sirius represented regularity, order, and predictability in ancient Egypt. Knowledge of its position in the sky made it possible to keep temporal records and plan civic organizations around the Nile flood, which coincided with a critical time for crop growth and harvest. To say that knowing Sirius was essential to survival in ancient Egypt would not be an exaggeration Dobek, (2018). However, the contribution of Sirus star for Ethiopian development is insignificant relative to the neighboring Egypt.

Table 10. The Sirius Star did make a significant contribution

Q (17 and 18)	Frequency	Percent
0	14	9.33
1	136	90.67
Total	150	100.00

Q 19. Between June 26 and the end of August, Does the star can be seen in the early morning hours of the winter?

Q 20. According to query 19, if you can, please clarify what it means.

From the 150 households that responded to Questions 19 and 20, 145 (96.67%) indicated that they would rather look at the Sirius star's position and color than its star sign to protect themselves and their property from winter disasters like floods, and other similar events, as shown in Table 11. It is therefore advised to keep an eye out for this Sirius star sign (omen) before the incident.

Table 11. The communities use the Sirius star location and color to escape an accident.

Q (19 and 20)	Frequency	Percent
0	5	3.33
1	145	96.67
Total	150	100.00

Q 21. A relationship to the Nile is implied by the fact that Sister Sirius Star appeared just before the second construction of the Nile Dam.

Q 22. If the answer is yes to question 21, define their relationship.

Out of the 150 responders, 140 (93.33%) said that the Sirius Star can anticipate natural disasters like the flooding and other disasters that were mentioned in the previous questions 19 and 20. As demonstrated in Table 12, it often provides signs of the amount of time that elapses before a flood or a disaster resembling one occurs, and it reacts by formulating a plan for mitigation to prevent any material or humanitarian issues.

Table 12. The Sirius Star serves as an indicator of catastrophic

Q (21 and 22)	Frequency	Percent
0	10	6.67
1	140	93.33
Total	150	100.00

Q23 Is the star Sirius used by the community to indicate the time and whether dawn has already broken?
Q 24. Explain if your answer is yes to question 23.

Of the 150 respondents surveyed, 142 (94.67%) gave affirmative answers to Questions 23 and 24, stating that their forefathers used to wake up at night and visit the temple to watch the local star. So, according to the interviewer, the Sirius star was utilized to determine the time shown in Table 13.

Table 13. Sirius star used to estimate time.

Q (23 and 24)	Frequency	Percent
0	8	5.33
1	142	94.67
Total	150	100.00

4.2. The Physics of the Sirius Star

Located in the constellation Canis Major, the star Sirius, commonly known as Alpha Canis Majoris, is the brightest star visible from Earth. Sirius A, a main sequence star, and Sirius B, a white dwarf partner, make up this binary system. Ancient civilizations have observed and studied the star over the ages and offered many different symbolic explanations for its appearance. Its characteristics, especially its distance from Earth, its spectral characteristics and its evolutionary history, are now better understood thanks to advances in astronomical research. In this section, the physics of the Sirius star are presented.

The major characteristics of the sun, Sirius, and the other eight members of the star family is shown in Table 14. As a result, Sirius was found to be 8.6 light years from the sun, Alpha Centauri was 4.4 light years away, and Canopus and Arcturus were far from the sun. Sirius' relative mass is 2.1 times that of the sun's mass, and its radius is larger than that of the Alpha Centaur. Sirius is brighter than the sun and Alpha Centauri.

Sirius is twice as bright as Canopus the next brightest star, according to the results listed in Table 1. Alpha Centauri is a first magnitude star that is fainter than Sirius and Canopus. Arcturus is one of the brightest stars in the northern constellation Chapman-Rietschi, (1995).

Table 14.
The physical parameters of the first ten nearest stars

Star Name	Distance [AU] [km]	Mass $[M_{\odot}]$ [kg]	Radius $[R_{\odot}]$[km]	Luminosity $[L_o][watt/m^2]$	Absolute magnitude
Sun	0.00001583	1.0	1.0	1	-26.7
Sirius	8.6	2.1	1.71	25.4	1.43
Canopus	310	15.0	7.1	13.500	-0.74
Alpha Centauri	4.4	1.1	1.2	2	-0.27
Arcturus	37	1.1	26	170	-0.04
Vega	25	2.2	2.7	50	0.58
Capella	43	2.6	12	150	0.48
Rigel	860	23.0	78.9	120,000	4.34
Procyon	11.4	1.5	1.9	7.7	2.68
Betelgeuse	640	20.0	950	60,000	0.45

In general, more massive stars also tend to be brighter. Figure 1 shows a graphical representation of this relationship, also known as the mass-luminosity relationship. The luminosity of the star is given by

$$L \propto M^{3.9} \qquad (1)$$

Each point designates a star of known mass and luminosity. The star's mass is displayed horizontally on the chart in units of solar mass, while its luminosity is displayed vertically in units of solar luminosity.

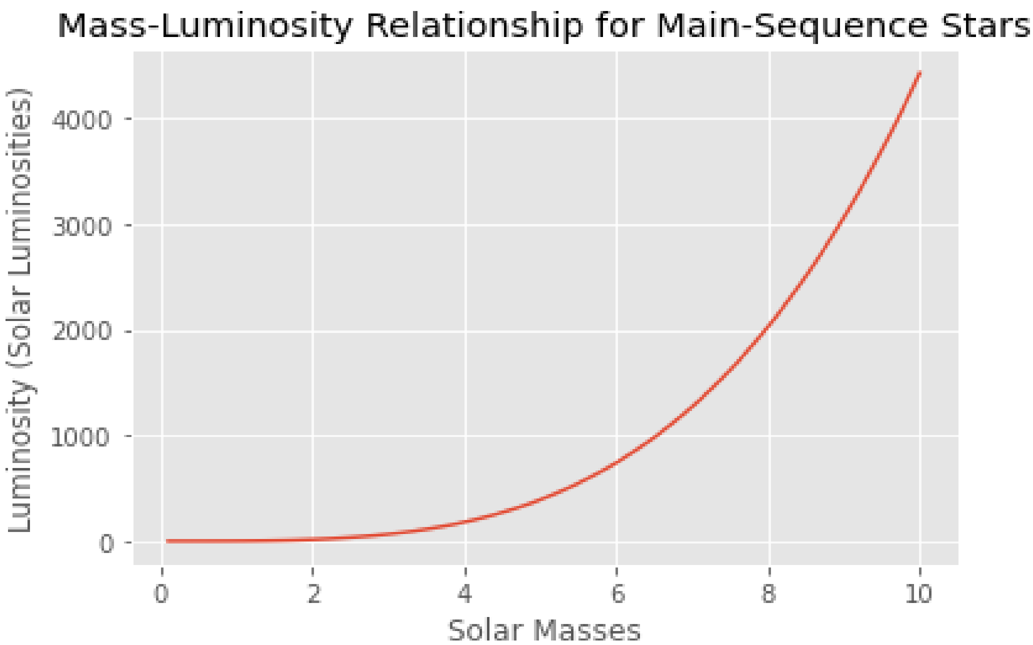


Figure 1. Luminous intensity of stars versus with the solar mass

Additionally, Figure 2 illustrates the relationship between light intensity and stars. The apparent magnitude of the star and the distance between the observer and the star. The results indicate that there is an inverse relationship between Sirius luminosity and distance.

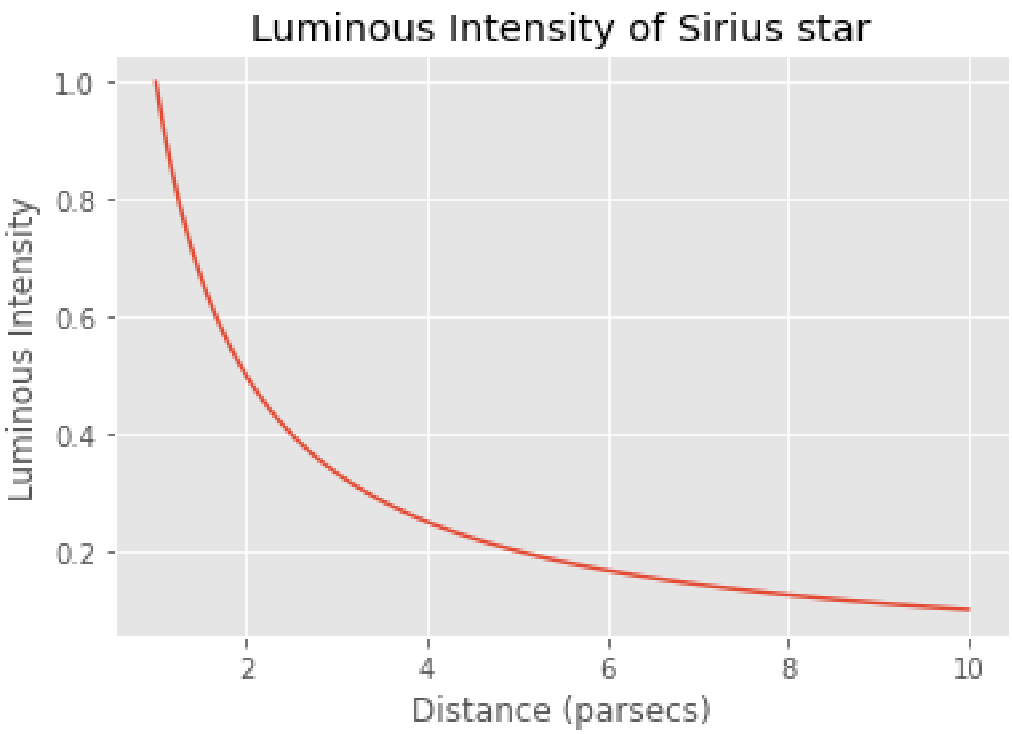


Figure 3. The luminous intensity of Sirius star versus the distance from its center

Wien’s disType equation here.placement law describes the relationship between the

wavelength at which the blackbody radiates most intensely and its temperature. The law can be expressed mathematically as

$$\boldsymbol{\lambda_{max}} = \frac{\boldsymbol{b}}{\boldsymbol{T}} \qquad (2)$$

Where $\boldsymbol{\lambda_{max}}$ is the peak wavelength, T is the temperature of the black body, and b is the Wien’s displacement constant, which is approximately equal to 2.898$\mathbf{2.898} \times \mathbf{10^{-3}}$ meter per kelvin.

This is an inverse relationship between wavelength and temperature. So, the higher the temperature, the shorter or smaller the wavelength of the thermal radiation. The lower the temperature, the longer or larger the wavelength of the thermal radiation. For visible radiation, hot objects emit bluer light than cool objects. The Wien’s temperature of the Sirius star is shown in Figure4. The results show that, the temperature of the sun is inversely proportional to the temperature as it was described in Eq. 2.

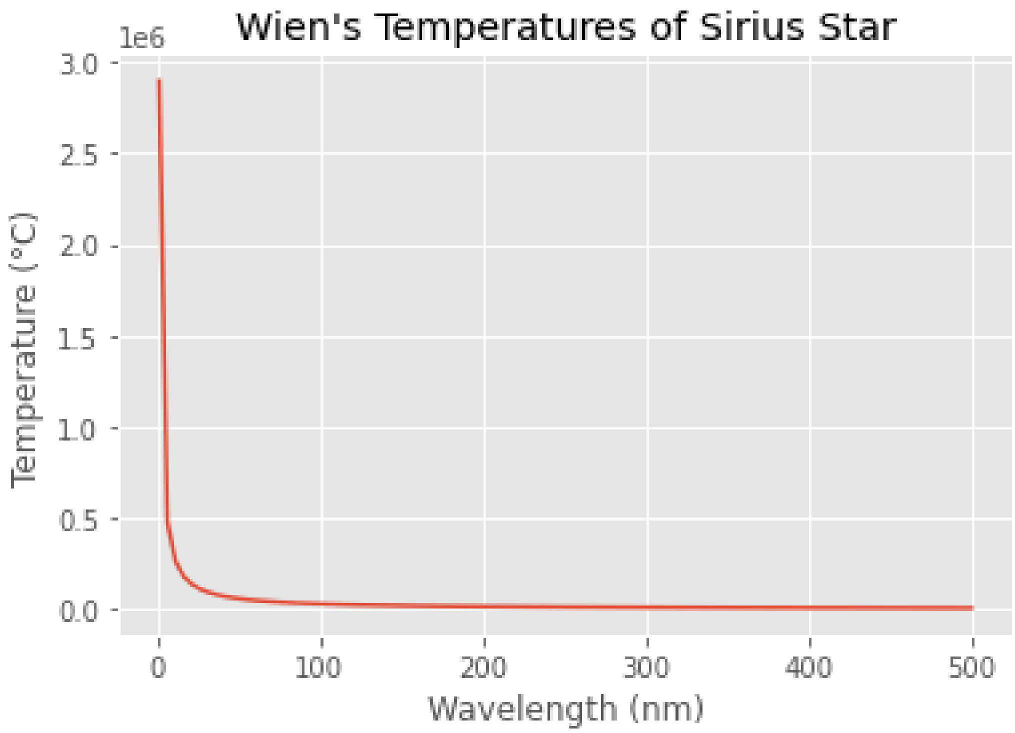


Figure 3. The Wien's temperature of Sirius star versus with its wavelength

Cold stars, on the other hand, emit the majority of their visible light energy at red wavelengths. As a result, the color of a star can be used to calculate its real or intrinsic surface temperature. Color is unaffected by proximity to an object. If we could observe a star, transport it far away, and then observe it again, its apparent brilliance would change. However, because the brightness variation is the same across all wavelengths, the color would not vary. The temperature of the coolest star is around 2,000 kelvins, whereas the temperature of the hottest star is around 40,000 kelvins. Our sun's surface temperature is at 6000 K, and its peak wavelength hue is a pale greenish-yellow.

Sirius (CMa), the brightest star in the sky, is also the sixth closest star to the sun, at a distance of 2.6 pc from the sun. Sirius has a very ineffective friend. Sirius B and Sirius A appear to be fairly close neighbors. Sirius B has the same mass as our sun but has one millionth the volume Chapman-Rietschi, (1995). This is because Sirius B is a white dwarf. Sirius is difficult to observe since it never rises higher than 13° above the horizon. Because of the low height, the viewing conditions were highly chaotic, making it difficult to exactly judge the brightness and position. The ideal time to watch the star in Pulkovo is soon after midnight in February and March. Despite these obstacles, strive had begun meticulously observing Sirius and its new companion in early 1863.

Normally, astronomers use filters to determine the apparent brightness of a star since each one radiates light from a specific spectrum of wavelengths (colors). One popular set of astronomical filters measures the brightness of stars at three different wavelengths: ultraviolet (U), blue (B), and visible yellow light (V) Pope, and Fry, (1997). Each of these filters transmits light with a wavelength of 360 nm, 420 nm, or 540 nm. Magnitudes are commonly used to indicate the brightness measured via each filter Aerts, et al., (2010).

The color index measures the difference between any two of these magnitudes, such as the blue and visual magnitudes (B-V). A color index is assigned to a star with a surface temperature of 0 by altering the UV blue and visual magnitudes of the UBV system, as agreed upon by astronomers. The bluest stars have a B-V color index of -0.4 at temperatures around 40,000 K, whereas the reddest stars have a B-V color index of +2 at temperatures around 2000 K Pope, and Fry, (1997).

Apparent magnitude (m) is a measure of the brightness of a star or other celestial body as seen from Earth. An object's apparent size is governed by its inherent brightness, distance from Earth, and the dimming of the object's light by interstellar dust along the observer's line of sight. The apparent magnitude of brightness is given by Eq. 3.

$$m_1 - m_2 = 2.5\log\left(\frac{b_2}{b_1}\right) \quad (3)$$

where m_1 and m_2 are the magnitude and b_1 and b_2 are the brightness of the stars. Then, the results shown in Table 14 can be determined using Eq. 3.

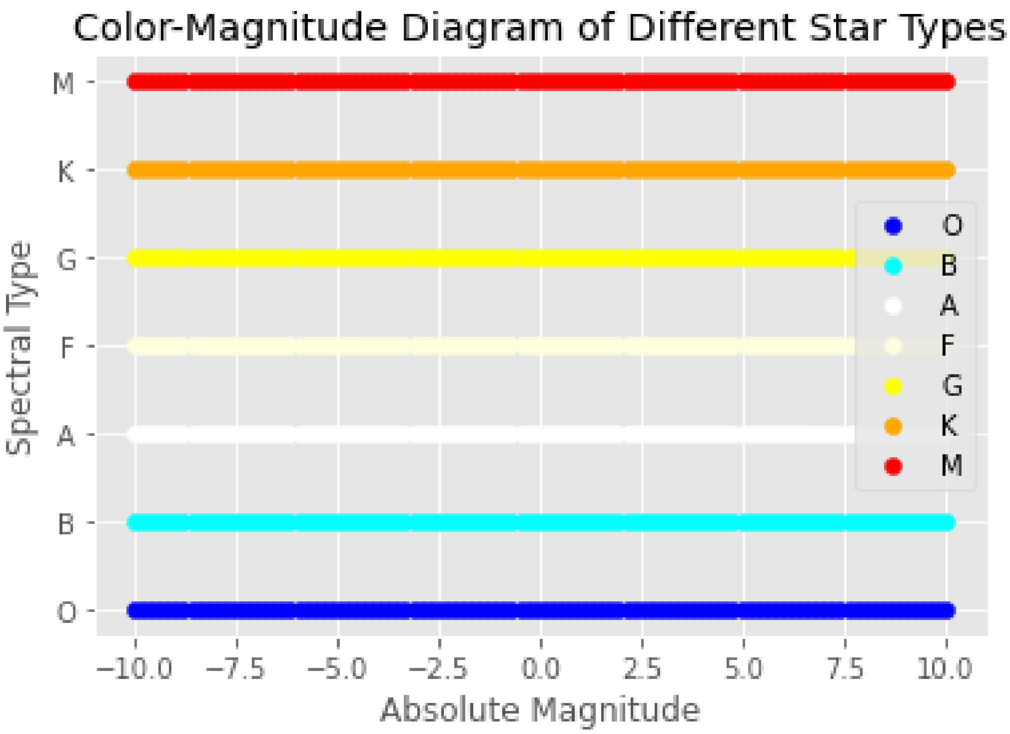
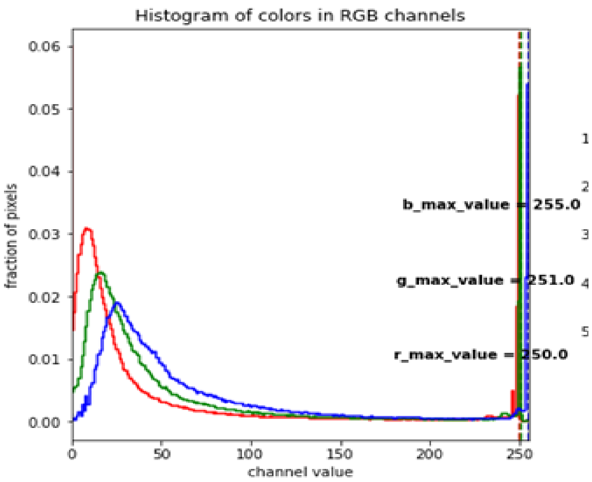


Figure 4. The absolute magnitude of stars with spectral type of stars.

Image segmentation can be performed using separate color channels (red, green, and blue) as part of the RGB model. Through analysis of an image's RGB data, individual objects can be distinguished from each other based on their color characteristics shown in Figure 3. The strategies and techniques implemented by Python can be used to accomplish this. Using RGB data for image segmentation provides important information about the color distribution in the image, facilitating inspection and better understanding of image content. The evolutionary timelines along the RGB spectrum (and thus the proportionate some stars of different luminosities). The results shows that the maximum value for each of the colors were 255.0 for of them. The fraction of the pixels is peak for the red is slightly greater than 0.003. This was due the classification of the Sirius star as red Sterken and Manfroid, (2012). In addition, the analysis provides insights into the overall color composition and intensity variations within the image. By calculating measures such as mean, median, mode, and standard deviation for each RGB channel, we can understand the dominant colors, identify color imbalances or biases, and detect outliers in the image data.



A set of methods used to enhance images is called image enhancement. This makes images more aesthetically appealing to people, which will facilitate future image processing analysis. White balance, histogram manipulation, and Fourier transform are some image enhancement processing techniques. Ensuring that white objects in a scene appear white in the photo is how white balance is performed in this job. The technique of removing noise from an image to make elements in the image white is called white balance. The updated image of the Sirius star, which have all noise colors removed, are shown in Figure 6. The results show the brightness of the star Aerts, et al., (2010).

Figure 5. The histogram of colors in the RGB channel of the Sirius star.

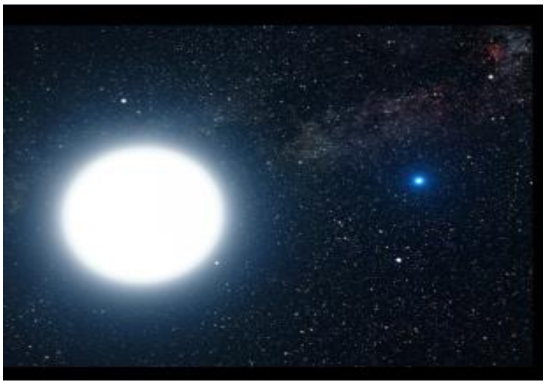


Figure 6. The white balanced image of Sirius stars after some correction

Sirius A and Sirius B constitute a unique duo. The 2.1 $M_{\odot}$ primary, seen in Figure 4, is one of the earliest. Sirius B is the one on the far side with the smaller size and blue color, whereas Sirius A is the one with the largest size and white hue. There are no known main sequence stars in a binary system with a white dwarf; therefore, the 1.0M secondary's main sequence progenitor must have been an even earlier spectral type Holberg et al., (1998); Whittet, (1999).

The binary star system Sirius has two white stars that orbit each other every 50.1 years at a distance of about 20 AU. The brighter component, known as Sirius A, is a main-sequence star of the early A spectral type with an estimated surface temperature of 9,940 K. Sirius B, its companion, is a white dwarf star that has already deviated from the main sequence. Early in its life, it was thought to have had two bluish-white stars orbiting each other in an elliptical orbit every 9.1 years.

Sirius A

Sirius A has a 1.7 $R_{\odot}$ radius and a mass of 2 $M_{\odot}$ shown in Table 15. The predicted rotational velocity is 16 km/s. All of its internal energy was generated by nuclear processes. The core generated convection and energy via the CNO cycle De Marco and Izzard (2017). The strong metallic absorption lines in Sirius A's spectra, which imply a rise in heavier elements than helium, such as iron, are what distinguish it as an AM star Landstreet, (2011); Chapman-Rietschi, (1995). According to the reported spectral type, A0m1, it would be categorized as A1 from hydrogen and helium lines but as A0 from metallic lines, putting it in the same classification as Am stars. The ratio of iron in Sirius A's atmosphere to hydrogen ($\frac{Fe}{H} = 0.5$, which is equivalent to $(10)^{0.5}$), which is as abundant as in the sun's atmosphere, is similar to that of the sun given by Aerts, et al., (2010); Landstreet, (2011); De Marco and Izzard (2017).

Sirius B

Sirius B is one of the biggest known white dwarfs. Its mass of 1.02 $M_{\odot}$ is roughly twice as large as the average figure of 0.5-0.6 $M_{\odot}$ shown in Table 15. This mass is squeezed into a space roughly the size of the Earth. The majority of Sirius B is made up of a carbon-oxygen combination created by helium fusion in the progenitor star Nagakura, et al., (2021). Because of the high surface gravity, the components are separated by mass, which is covered by an envelope of lighter materials. The outer atmosphere of Sirius B is now almost entirely made of hydrogen, the element with the lowest mass Aerts, et al., (2010); Chapman-Rietschi, (1995); Nagakura, et al., (2021).

Table 15. The Physical Parameters of the Sirius A and B Binary Systems.

Property	Sirius A	Sirius B
Evolutionary stage	Main sequence	White dwarf
Spectral type	A0MA1	DA2
U-B colour index	-0.05	-1.04
B-V colour index	+0.00	-0.03
Absolute magnitude (M v)	1.42	11.18
Mass	$2.063 \pm 0.023 M_{\odot}$	$1.018 \pm 0.011 M_{\odot}$
Radius	$1.711 R_{\odot}$	$0.0084 \pm 3\% R_{\odot}$
Luminosity	$25.4 L_{\odot}$	$0.056 L_{\odot}$
Surface gravity (log g)	4.33 c g s	8.57 c g s
Temperature	9940K	25200K
Age	237-247 M yr	22 M yr

5. Conclusion and Recommendation

This study demonstrates Ethiopian religious leaders' views on the cultural and symbolic significance of celestial entities, such as the Sirius star system, that can shed light on human mythology and beliefs as well as the historical context from which they originate. A critical perspective supported by meticulous research and empirical evidence is needed to examine the connection between human cognition and the physical world. This article serves as an overview for future research on the direct impact of human perception on astronomical objects.

Its main sequence star (spectral type A1V) indicates that Sirius A's energy comes directly from the fusion of hydrogen atoms deep in its core. For this reason, Sirius A has a surface temperature of about 10,000 degrees Celsius, or 18,000 degrees Fahrenheit, and a luminosity easily 25 times that of our Sun.

The white dwarf Sirius B has important ramifications for stellar evolution. The physical properties of white dwarfs, including size, mass, temperature, composition, luminosity, and energy production, provide important insights into their nature. The different masses and sizes of the two stars have a significant effect on their luminosity, composition, and temperature, among other properties. Understanding stellar evolution depends on these changes in physical properties.

6. Acknowledgments

We would like to express our gratitude to everyone we have had the pleasure of working with on this and other related initiatives. The members of my dissertation committee have all taught me a lot about scientific research and life in general and have all been very helpful to me personally and professionally. We also appreciate the leaders of the Quarite Weda and Western Gojjam religions leaders for their help in making this a reality.

Conflict of interest

There is no any conflict of interest

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