

Sirius Matters by Noah Brosch, Springer, 2008, pp. xvii + 216. Scope: monograph. Level: undergraduates, graduate students, amateur astronomers, educated public.

Sirius is the brightest star in the night sky. It is able to cast shadows and can even be visible during daylight. So it is hardly surprising that it has been an object of great human fascination over the millennia, and that it has accrued an extensive terrestrial history in the writings and art of many civilisations and peoples including Egypt and the ancient Middle East, Greece, Rome, Africa, Arabia, India, China, Judah, the Americas and Australia. It also has an important history in modern science and still retains some teasing mysteries.

Noah Brosch's intriguing title seems deliberately ambiguous: is it an affirmative statement that the Sirius is important, or does it just indicate that the book covers matters pertaining to Sirius? On dipping into the book, it quickly becomes apparent that title carries both of these meanings. Brosch addresses Sirius at all levels including the cultural, the historical, and the scientific. He starts with the cultural and historical aspects and we learn, for example, that Sirius was regarded as a predictor of the Nile flood. In many civilisations it was the dog (or jackal, of wolf) star, though not in ancient Egypt. Recently, the public has been interested in Sirius mainly on account of its supposed mystical properties.

One of the long-standing puzzles about Sirius is its colour. In many ancient writings it is described as being red, but nobody would call it red now. Brosch considers the evidence in some detail, and weighs a number of different possible explanations. Perhaps the change in colour was real? But this seems unlikely given the rate of evolution of a standard star of mass twice that of the sun. Or perhaps atmospheric scattering reddened Sirius's light, especially when the star was being observed from the northern hemisphere, low in the southern sky? This too seems improbable, as the scattering would simultaneously have dimmed Sirius to the point where it would have seemed uninteresting. Yet another possibility arises from the fact that Sirius is a double star: Sirius A has a companion white dwarf star Sirius B. Suppose Sirius B's passage via the red giant stage, before collapsing to its present white dwarf state, had happened in historical times? At first sight this seems an attractive explanation, but it turns out that the white dwarf is too old. Brosch finally leans towards the idea that Sirius's light was reddened by the interstellar medium (low-density atoms, molecules, dust) and it is this that has changed in properties during recorded history, an idea that is not as fantastic as it might seem given known inhomogeneities in the inter-stellar medium and Sirius's movements.

Relative to our solar system, Sirius is a close and swiftly-moving star. Its proper motion is among the largest in the sky, and it is currently travelling towards us. In fact, it has been our brightest star only for $\sim 90,000$ years, and it will continue to brighten over the next $\sim 60,000$ years when it reaches its closest distance of ~ 8 light years. Then

it will fade until, in $\sim 210,000$ years time, it will relinquish its title as our brightest star. Sirius would have passed right across the Milky Way during the stone age. One of the Arabic names for Sirius is *al-schira al-abur*, or “Sirius which has passed across”, raising the fascinating speculation that there could somehow be a human memory of this ancient astronomical event. Sirius also wiggles on account of Sirius A and Sirius B rotating about their common centre of mass – originally noticed by Bessel when the existence of Sirius B was unknown, but leading him to infer correctly the presence of an invisible companion.

Another Sirius puzzle addressed by Brosch is how the West African Dogon tribe (near Timbuktu, in Mali) acquired such an extraordinarily detailed knowledge of Sirius. They are even aware of its companion, which they say is made of a metal so dense that all earthly beings combined could not lift it, and they are aware of the orbital period of the Sirius components being ~ 50 years. Curiously, they also believe that there is a third star in the Sirius system. Where does all this astronomical knowledge come from? Brosch considers and rejects a number of possibilities, including the suggested major transfer of cultural and technical knowledge by extra-terrestrial beings several thousand years ago: some believe it was this that triggered the advances of the Mediterranean civilisations. Brosch reaches no definite conclusion, but wonders whether the knowledge transfer could have been far more recent, perhaps passed to the Dogon by scientists who were members of the 1893 eclipse expedition, and then quickly transmogrified into the Dogon’s oral tradition. It seems both a mundane and an improbable explanation, but it is a good deal easier to accept than the alternatives.

The author seems to have summarised almost everything that is known about Sirius. After covering the cultural and historical aspects, he moves on to consider whether Sirius might also involve a third component, but concludes that there cannot be any body of significant size or mass. He goes on to describe modern astronomical observations, intra-galactic motion, and the present understanding of stellar evolution – all in particular relation to Sirius.

Although Brosch stresses in the Introduction that it “is not intended to be a popular-level book”, most of the text will be understandable to anyone with a basic knowledge of physics – not necessarily to degree level. There is a diversity of interesting pictures, graphs, and diagrams, including satellite data and dramatic images in which Sirius B is clearly resolved. Brosch writes for the educated reader, and even non-scientists will be able to enjoy large parts of his opus, especially the historical and ethnographical sections. It is a delightful book that can be recommended warmly to all those who read *Contemporary Physics*, as well as to many who do not.

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