Journal of the Jane Austen Society of North America – *Persuasions* #8, 1986
www.jasna.org ISSN 0821-0314

Star-gazing at Mansfield Park

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All of us are aware of Jane Austen's keen eye for the "follies and nonsense, whims and inconsistencies" of human beings. To the delight of those of us who work in the natural sciences, her observations of the natural world are equally discerning, if less frequent. As an example, I would like to examine the one explicitly astronomical reference in all of her novels, which occurs in *Mansfield Park*. Her reporting of the evening sky during this incident is sufficiently accurate and detailed that one may determine, to a fair degree of precision, the orientation of the drawing room at Mansfield Park in which this conversation takes place. Stoneleigh Abbey, in Warwickshire, is generally regarded as the prototype for Mansfield Park; if anyone should wish to identify the most likely candidate for the Mansfield Park drawing room, I should, of course, be delighted to come along as a technical consultant.

The conversation in question takes place after dinner, a few days after the trip to Sotherton during which Maria Bertram and Henry Crawford behave so equivocally, and Mary Crawford discovers to her dismay that Edmund Bertram is to become a clergyman. Fanny Price is conversing with Edmund, probably only because Mary Crawford has left the room. Here is the astronomical part of the conversation:

> "[Edmund] '... There's Arcturus looking very bright.' [Fanny] 'Yes, and the bear. I wish I could see Cassiopeia.' 'We must go out onto the lawn for that. Should you be afraid?' 'Not in the least. It is a great while since we have had any star-gazing.'" (*MP*, 113)

Immediately afterwards, unfortunately, a glee in which Mary Crawford is singing begins, and Edmund remains inside. "Fanny sighed alone at the window till scolded away by Mrs. Norris's threats of catching cold."

This doesn't sound like much information, does it? But Jane Austen has already told us the time of year and roughly the time in the evening when the conversation takes place. This information about the date and time, plus clues to the location of Mansfield Park given elsewhere in the novel, constrain the appearance of the night sky quite effectively—and Miss Austen gets it right, in striking contrast to some of her less careful colleagues, such as Charlotte Bronte. (The behavior of the moon in *Jane Eyre* is, well—"remarkable" is the polite word.)

To understand why the date, time, and location of the conversation are so important, we need to know something about the motions of astronomical objects relative to the earth. Let's start with the daily, or diurnal motion of the sun, moon, and stars with respect to the horizon, which is caused by the rotation of the earth. All of these objects rise in the east, move across the sky, and set in the west, taking 24 hours to do so. Hence their exact positions depend on the time of day (or night) that they are

observed. If, for example, we look for the sun around noon, we know that it should be high in the sky and, for observers in the North Temperate Zone, will be just about due south.

What about the time of year? That's a little more complicated. While the sun and stars all rise in the east and set in the west, they move across the sky at different rates—a result of the earth's orbital motion around the sun. If it were possible to stop the rotation of the earth, we would see the sun move slowly from west to east with respect to the background stars, taking one year to do so. This annual motion of the sun relative to the stars means that different stars are visible at different times of the year, since we can only see the stars when the sun is below the horizon (or during a total solar eclipse, but those don't happen very often at any given location). Veteran stargazers, like Fanny and Edmund, know that certain constellations are associated with certain seasons. Orion the Hunter, for example,

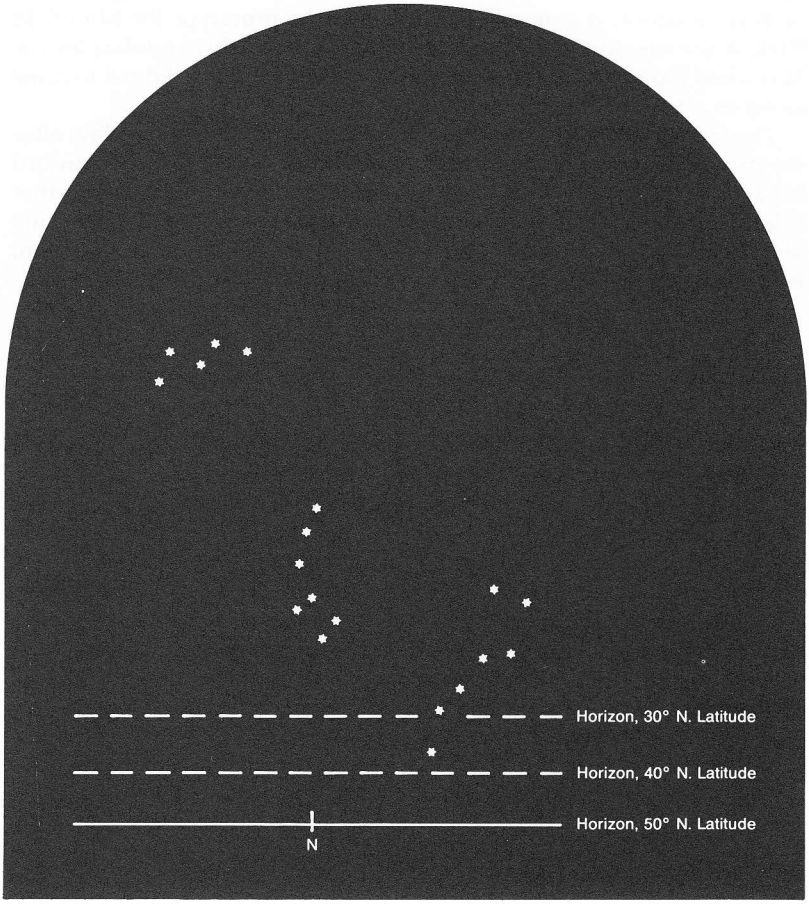

Figure 1. The night sky on January 15 at 8 p.m.

is a "winter" constellation; it is conveniently visible in the southeastern sky in the early evening during the winter, lingering to be visible in the southwest shortly after sunset by the spring. The star Arcturus, mentioned in the conversation between Fanny and Edmund, is in the constellation of Bootes the Herdsman, a "spring" (to summer) constellation.

In addition, the sun moves north and south of the celestial equator over the course of the year. Between late March and mid-September, the sun is north of the celestial equator, and we have summer in the Northern Hemisphere. Between late September and mid-March, the sun is south of the equator, and it's winter. This northerly and southerly motion has another effect besides giving us seasons; sunrise and sunset don't occur at the same time every day. Summer days are long, with early sunrises and late sunsets, while the reverse is true of winter days.

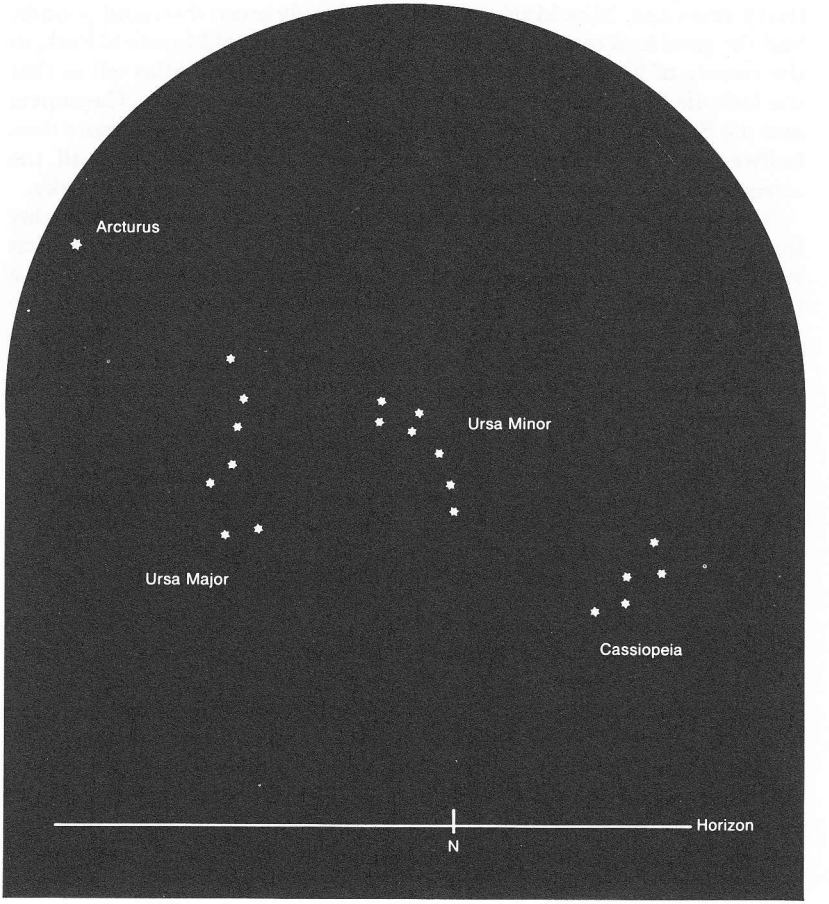

Figure 2. The night sky on August 15 at 8 p.m. at Mansfield Park.

Finally, what about the location of Mansfield Park? Why is that important to an interpretation of this passage? When this issue of *Persuasions* reaches you, one of the constellations mentioned in *Mansfield Park*—Cassiopeia, the Queen of Ethiopia—will be visible at night, almost due north. The bear—presumably the Great Bear, better known to us as the Big Dipper—is partially below the horizon at my latitude of 34°. Here in Claremont, near Los Angeles, Polaris is only about a third of the way up to the zenith from the horizon. Readers farther north than I will see Polaris higher in the sky, but will lose constellations to the south. (See Figure 1.) Readers farther south will see Polaris closer to the horizon, and will see constellations not visible to more northerly observers. Southern Hemisphere readers, alas, can't see Polaris at all; they get the Southern Cross instead.

Now we know why the latitude of Mansfield Park is important. But where is it? Jane Austen tells us, at the very opening of the novel: "About thirty years ago, Miss Maria Ward... with only seven thousand pounds, had the good luck to captivate Sir Thomas Bertram, of Mansfield Park, in the county of Northhampton..." This passage and an atlas tell us that the latitude of Mansfield Park is about 52°N. At this latitude, Cassiopeia and the Big Dipper are both easily visible, and the Pole Star is more than halfway up to the zenith from the horizon. Now we have all the astronomical information we need to look at the Mansfield Park sky.

So when does this conversation take place? We may set the time of day from the opening of the scene, "... after tea, as Miss Crawford was standing at an open window with Edmund and Fanny looking out on a twilight scene..." About half an hour's conversation ensues before the all-important astronomical conversation; we may therefore assume that it takes place about an hour after sundown. The time of sundown, however, depends on the time of year. But we know the time of year from Maria Bertram's wedding plans:

> "November was the black month fixed for his [Sir Thomas Bertram's] return... It would hardly be *early* in November, there were generally delays, a bad passage, or *something*... It would probably be the middle of November, at least; the middle of November was three months off. Three months comprised thirteen weeks. Much might happen in thirteen weeks." (*MP*, 107)

We may safely conclude, then, that the date of the conversation is around August 15. On August 15, sunset occurs at about 7 p.m. at the latitude of Mansfield Park, twilight ends about half an hour later, and the conversation takes place at about 8 p.m. In the mid-August Mansfield Park sky, the Big Dipper is slightly south of west, and Cassiopeia is slightly north of east. Arcturus, which isn't visible in the winter, is a bright star over in the west. (See Figure 2.) According to their conversation, Fanny and Edmund can see Ursa Major and Arcturus from the drawing room, but they must go out on the lawn for Cassiopeia. If this is the case, the drawing-room window has to face just about due west, plus or minus 20°.

Now, how did Jane Austen manage to get this right? There are three

possible explanations. First, she may have "made exact calculations," like Lady Russell in *Persuasion* and myself. This seems somewhat unlikely. Although Miss Austen was unquestionably an accomplished woman, I find no suggestion that spherical trigonometry was regarded as one of the important abilities of such a lady. In *Pride and Prejudice*, Caroline Bingley, Mr. Darcy, and Elizabeth Bennett are discussing the "accomplished woman," and Miss Bingley remarks,

> "... 'A woman must have a thorough knowledge of music, singing, drawing, dancing, all the modern languages, to deserve the word; and besides all this, she must possess a certain something in her air and manner of walking, the tone of her voice, her address and expressions, or the word will be but half deserved.' 'All this she must possess,' added Darcy, 'and to all this she must add yet something more substantial, in the improvement of her mind by extensive reading.'" (*PP*, 39)

Mr. Darcy's "extensive reading" probably did not include Laplace's 1799 *Mécanique Céleste*, in spite of his and Caroline Bingley's insistence on "all the modern languages." If Mr. Darcy, with his high standards for the accomplished woman, does not insist on spherical trigonometry, probably no one else in England at the time did either, even Jane Austen. (Although she *did* have those two sailor brothers, who would have needed it for navigation.)

A second possible explanation for Jane Austen's accuracy with the heavens in *Mansfield Park* is one frequently invoked by persons who assume that anyone who did not have the good fortune to live in the Twentieth Century cannot possibly have known anything about the natural world. The chief exponent of this point of view is the well-known Erich von Däniken, author of *Chariots of the Gods* and other scholarly works. His working hypothesis (actually used to explain the astronomical sophistication of Stonehenge) is that all such accuracy is the work of intelligent extra-terrestrials. But we know from a variety of sources such as *Analog Science Fiction* that intelligent extra-terrestrials generally have green skin, or antennae, or three eyes, and it seems unlikely that so alert an observer as Jane Austen could have overlooked these features.

So the most reasonable explanation for this conversation in *Mansfield Park* is that Jane Austen was acquainted with a room from which the August sky would have just the appearance she has described. It is probably no coincidence that Stoneleigh Abbey, near Leamington Spa, is located at a latitude of 52°15′. I would like to close with another passage from *Mansfield Park*, suggesting that Jane Austen herself may very well have looked at the sky from this room, and with great pleasure:

> "'Here's harmony!' said she, 'Here's repose! Here's what may leave all painting and all music behind, and what poetry can only attempt to describe. Here's what may tranquillize every care, and lift the heart to rapture! When I look out on a night like this, I feel as if there could be neither wickedness nor sorrow in the world: and there certainly would be less of both if the sublimity of Nature were more attended to, and if people were more carried out of themselves by contemplating such a scene.'" (*MP*, p. 113)