

THE MOON AND
THE ORIGIN OF FRANKENSTEIN

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THE MOON AND

THE ORIGIN OF FRANKENSTEIN

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ABSTRACT

The classic horror story, *Frankenstein; or, The Modern Prometheus*, has thrilled audiences for almost two centuries. Our Texas State group used astronomical methods to determine the precise date and time in June 1816 when Mary Shelley had the “waking dream” that inspired her story of the infamous monster. Mary Shelley described the origin of her tale in the introduction to the 1831 edition of *Frankenstein*. Astronomical dating of the events in the spring and summer of 1816 is important because some modern scholars have raised doubts regarding the chronology as given by Mary Shelley. Some current authors are even skeptical that Mary Shelley is truly the one who wrote *Frankenstein*. Our research group traveled to Cologny, Switzerland, in August 2010 to find the location where the idea of *Frankenstein* was originally created. We carried out astronomical calculations and topographical analyses, and we collected historical photographs and weather records. In this study we will use our evidence to support Mary Shelley’s chronology and by extension her authorship of her classic tale *Frankenstein* .

THE MOON AND THE ORIGIN OF *FRANKENSTEIN*

Much is known about the dark and stormy nights that prefaced the birth of the scary story, *Frankenstein, or, The Modern Prometheus*. On dark and stormy nights in June 1816, as jagged lightning bolts filled the sky and thunder echoed from the nearby mountains, a group gathered to tell ghost stories around the fireplace of a villa overlooking Lake Geneva, Switzerland. During one of those evenings, Mary Shelley first offered her tale of *Frankenstein* – an enduring and iconic creation that has inspired classic horror films and countless other popular culture references. The classic horror story, *Frankenstein; or, The Modern Prometheus*, has thrilled audiences for almost two centuries.

The group included two of England's most famous poets, Lord Byron and Percy Bysshe Shelley, Percy's future wife Mary Godwin, Mary's stepsister Claire Clairmont, and the physician and writer Dr. John Polidori. Although the first edition of the book was published anonymously in 1818, the 1831 edition of *Frankenstein* includes an introduction that establishes the origin of the tale as told by the revealed author, Mary Wollstonecraft Shelley.

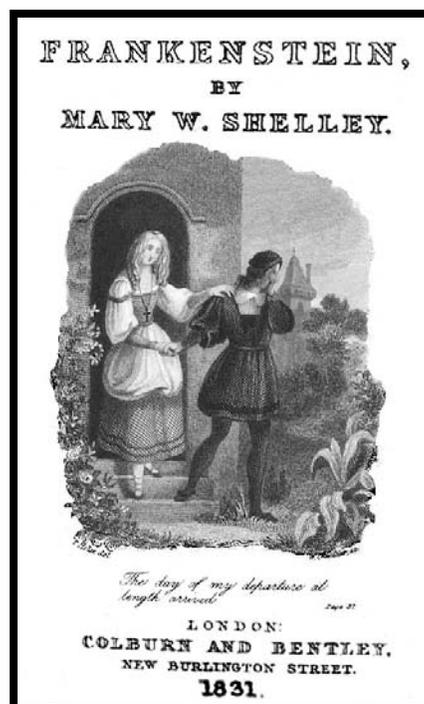


Figure 1: 1831 edition of *Frankenstein* title page (Courtesy of Donald Olson)

She tells of the rainy nights at the villa and how the group passed their time by reading scary stories from books and also creating horrific tales from their own imagination. The group that listened to Mary in Villa Diodati that night included Lord Byron and Percy Bysshe Shelley, along with Mary's stepsister Claire Clairmont and the physician John Polidori.



Figure 2: Theatrical depiction of the group at Villa Diodati (Courtesy of Robert Clayton for the Pioneer Theatre Company)

Byron and Polidori lived in Villa Diodati during the summer of 1816, while the Shelley party rented a nearby house known as Maison Chappuis.



Figure 3: Early photograph of Maison Chappuis (Courtesy of Donald Olson)



Figure 4: Map of Coligny (Courtesy of Bing Map images)

I first became interested in Mary Shelley's authorship as a member of a research team directed by Texas State University physics professor Dr. Olson. I worked with Donald W. Olson, Marilynn S. Olson, Russell L. Doescher, Roger Sinnott and Ava G. Pope to research the origin of this classic tale.



Figure 5: Photograph of Texas State research group (Courtesy of Russell Doescher)

Our Texas State group used astronomical methods to determine the precise date and time in June 1816 when Mary Shelley had the “waking dream” that inspired her story of the infamous monster. We also looked into the other events that are discussed by Mary and Dr. Polidori in their journals and letters from that summer. We traveled to Cologny, Switzerland, in August 2010 to find the location where the idea of *Frankenstein* was originally created. We carried out astronomical calculations and topographical analyses, and we collected historical photographs and weather records. The evidence we collected supports Mary Shelley’s account of the origin of the tale.

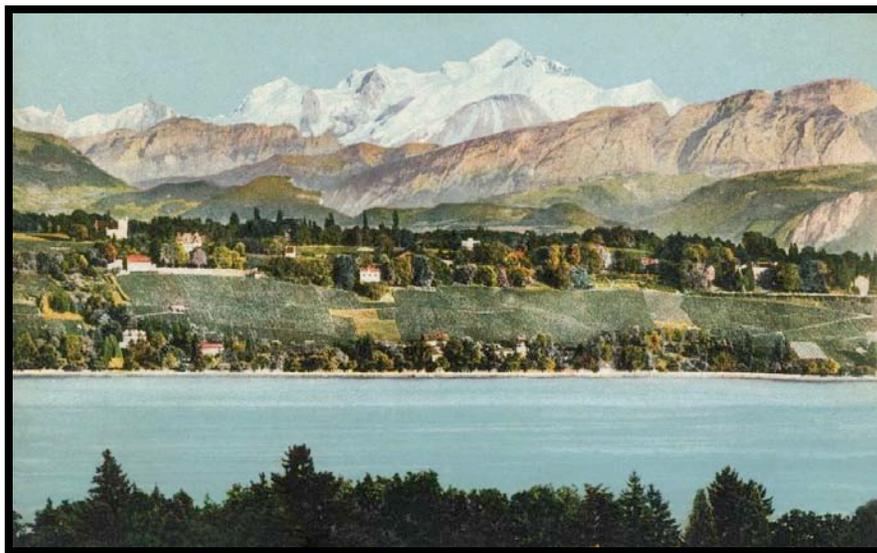


Figure 6: Post Card of Cologny on Lake Lemman (Courtesy of Donald Olson)

What does Percy say about the author of *Frankenstein*?



Figure 7: Theatrical depiction of Percy Shelley
(Publicity photograph, movie still from *Bride of Frankenstein*)

The original publishing of *Frankenstein, or, The Modern Prometheus*, was done anonymously in 1818. Mary did not reveal her authorship until after her marriage to the poetic writer she accompanied that summer in Geneva, Percy Bysshe Shelley. Percy, Mary and Claire had been traveling together for quite a while before their arrival to Switzerland. They came there to meet with Lord Byron because of a relationship Claire had developed with him.

Percy Shelley wrote a preface for the 1818 publication that begins to tell the story of the events on the shores of Lake Geneva that summer:

I passed the summer of 1816 in the environs of Geneva. The season was cold and rainy, and in the evenings we crowded around a blazing wood fire, and occasionally amused ourselves with some German stories of ghosts, which happened to fall into our hands. These tales excited in us a playful desire of imitation. Two other friends (a tale from the pen of whom would be far more acceptable to the public than anything I can ever hope to produce) and myself agreed to write each a story founded on some supernatural occurrence. The weather however, suddenly became serene; and my friends left me on a journey among the Alps, and lost, in the magnificent scenes which they present, all memory of their ghostly visions. The following tale is the only one which has been completed.



**Figure 8: Theatrical depiction of Percy and Mary Shelley
(Courtesy of Robert Clayton for the Pioneer Theatre Company)**

What does Mary say about her authorship?

The best way to find out the truth about what really happened in 1816 is to get as close to the primary sources of the occasion as possible. This is where our research begins. We began by looking through the introduction of the novel for any scientific links that could be made using modern technology and analysis.

Our most important clue came from Mary Shelley's description of how such "a young girl" could conceive "so very hideous an idea" Mary Shelley's Introduction to the 1831 edition of *Frankenstein* describes the events of 1816:

The Publishers of the Standard Novels, in selecting "Frankenstein" for one of their series, expressed a wish that I should furnish them with some account of the origin of the story. I am the more willing to comply, because I shall thus give a general answer to the question, so frequently asked me—"How I, then a young girl, came to think of, and to dilate upon, so very hideous an idea?" It is true that I am very averse to bringing myself forward in print; but as my account will only appear as an appendage to a former production, and as it will be confined to such topics as have connection with my authorship alone, I can scarcely accuse myself of a personal intrusion.

In the summer of 1816, we visited Switzerland, and became the neighbours of Lord Byron. At first we spent our pleasant hours on the lake, or wandering on its shores; and Lord Byron, who was writing the third canto of *Childe Harold*, was the only one among us who put his thoughts upon paper. These, as he brought them successively to us, clothed in all the light and harmony of poetry, seemed to stamp as divine the glories of heaven and earth, whose influences we partook with him.



**Figure 9: Theatrical depiction of Mary and Lord Byron
(Publicity photograph, movie still from *Bride of Frankenstein*)**

But it proved a wet, ungenial summer, and incessant rain often confined us for days to the house. Some volumes of ghost stories, translated from the German into French, fell into our

hands. There was the History of the Inconstant Lover, who, when he thought to clasp the bride to whom he had pledged his vows, found himself in the arms of the pale ghost of her whom he had deserted. There was the tale of the sinful founder of his race, whose miserable doom it was to bestow the kiss of death on all the younger sons of his fated house, just when they reached the age of promise. His gigantic, shadowy form, clothed like the ghost in Hamlet, in complete armour, but with the beaver up, was seen at midnight, by the moon's fitful beams, to advance slowly along the gloomy avenue. The shape was lost beneath the shadow of the castle walls; but soon a gate swung back, a step was heard, the door of the chamber opened, and he advanced to the couch of the blooming youths, cradled in healthy sleep. Eternal sorrow sat upon his face as he bent down and kissed the forehead of the boys, who from that hour withered like flowers snapt upon the stalk. I have not seen these stories since then; but their incidents are as fresh in my mind as if I had read them yesterday.

At first the group read the published stories aloud, but Mary recalled that Byron had an idea:



**Figure 10: Theatrical depiction of Mary, Lord Byron and Percy Shelley
(Publicity photograph, movie still from *Bride of Frankenstein*)**

"We will each write a ghost story," said Lord Byron; and his proposition was acceded to. There were four of us. The noble author began a tale, a fragment of which he printed at the end of his poem of Mazeppa. Shelley, more apt to embody ideas and sentiments in the radiance of brilliant imagery, commenced one founded on the experiences of his early life. Poor Polidori had some terrible idea about a skull-headed lady, who was so punished for peeping through a key-hole—what to see I forget—something very shocking and wrong of course; but when she was reduced to a worse condition than the renowned Tom of Coventry, he did not know what to do with her, and was obliged to despatch her to the tomb of the Capulets, the only place for which she was fitted. The illustrious poets also, annoyed by the platitude of prose, speedily relinquished the uncongenial task.

I busied myself *to think of a story*, —a story to rival those which had excited us to this task. One which would speak to the mysterious fears of our nature, and awaken thrilling horror—one to make the reader dread to look round, to curdle the blood, and quicken the beatings of the heart. If I did not accomplish these things, my ghost story would be unworthy of its name. I thought and pondered—vainly. I felt that blank incapability of invention which is the greatest misery of authorship, when dull Nothing replies to our anxious invocations. *Have you thought of a story?* I was asked each morning, and each morning I was forced to reply with a mortifying negative.

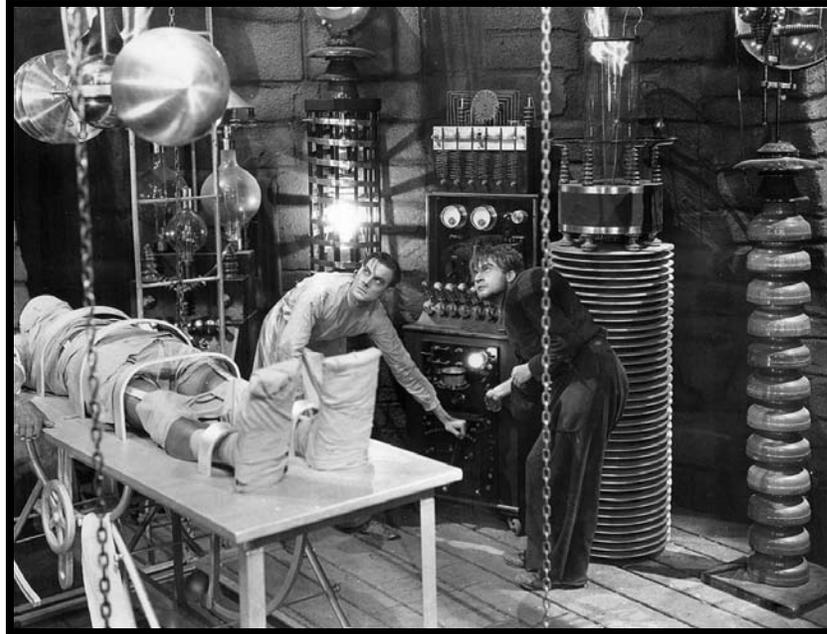


Figure 11: Photograph of Villa Diodati from side where Mary's bedroom would be located (Courtesy of Kelly Schnarr)

After several days of embarrassment at her lack of inspiration, the talk around the fireplace eventually gave Mary the spark of an idea:

Many and long were the conversations between Lord Byron and Shelley, to which I was a devout but nearly silent listener. During one of these, various philosophical doctrines were discussed, and among others the nature of the principle of life, and whether there was any probability of its ever being discovered and communicated. They talked of the experiments of Dr. Darwin, (I speak not of what the Doctor really did, or said that he did, but, as more to my purpose, of what was then spoken of as having been done by him,) who preserved a piece of vermicelli in a glass case, till by some extraordinary means it began to move with voluntary motion. Not thus, after all, would life be given. Perhaps a corpse would be re-animated; galvanism had given token of such things: perhaps the component parts of a creature might be manufactured, brought together, and endued with vital warmth.

Night waned upon this talk, and even the witching hour had gone by, before we retired to rest. When I placed my head on my pillow, I did not sleep, nor could I be said to think. My imagination, unbidden, possessed and guided me, gifting the successive images that arose in my mind with a vividness far beyond the usual bounds of reverie. I saw—with shut eyes, but acute mental vision, —I saw the pale student of unhallowed arts kneeling beside the thing he had put together. I saw the hideous phantasm of a man stretched out, and then, on the working of some powerful engine, show signs of life, and stir with an uneasy, half vital motion. Frightful must it be; for supremely frightful would be the effect of any human endeavour to mock the stupendous mechanism of the Creator of the world. His success would terrify the artist; he would rush away from his odious handywork, horror-stricken. He would hope that, left to itself, the slight spark of life which he had communicated would fade; that this thing, which had received such imperfect animation, would subside into dead matter; and he might sleep in the belief that the silence of the grave would quench for ever the transient existence of the hideous corpse which he had looked upon as the cradle of life. He sleeps; but he is awakened; he opens his eyes; behold the horrid thing stands at his bedside, opening his curtains, and looking on him with yellow, watery, but speculative eyes.



**Figure 12: Theatrical depiction of Dr. Frankenstein bringing the Monster to life
(Publicity photograph, movie still from *Frankenstein*)**

Mary frightened even herself as she imagined the now-famous scene when the monster comes to life! As she returned from her dream to reality, Mary became aware that the moon was shining outside her bedroom window.



**Figure 13: Photograph of Villa Diodati with moon shining into the bedroom windows
(Courtesy of Russell Doescher)**

I opened mine in terror. The idea so possessed my mind, that a thrill of fear ran through me, and I wished to exchange the ghastly image of my fancy for the realities around. I see them still; the very room, the dark *parquet*, the closed shutters, with the moonlight struggling through, and the sense I had that the glassy lake and white high Alps were beyond. I could not so easily get rid of my hideous phantom; still it haunted me. I must try to think of something else. I recurred to my ghost story, my tiresome unlucky ghost story! O! if I could only contrive one which would frighten my reader as I myself had been frightened that night!

Swift as light and as cheering was the idea that broke in upon me. "I have found it! What terrified me will terrify others; and I need only describe the spectre which had haunted my midnight pillow." On the morrow I announced that I had *thought of a story*. I began that day with the words, *It was on a dreary night of November*, making only a transcript of the grim terrors of my waking dream.

During the rest of 1816 and 1817 Mary Godwin (later to become Mary Shelley) developed her story into the novel, *Frankenstein*, published on January 1, 1818.

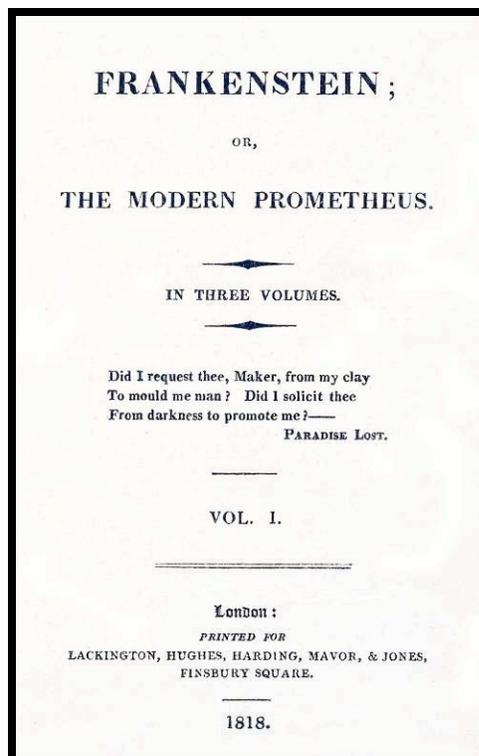


Figure 14: title page of the 1818 edition of *Frankenstein* (Courtesy of Donald Olson)

She goes on to describe how she transformed her dream into this story.

At first I thought but of a few pages of a short tale; but Shelley urged me to develop the idea at greater length. I certainly did not owe the suggestion of one incident, nor scarcely of one train of feeling, to my husband, and yet but for his incitement, it would never have taken the form in which it was presented. From this declaration I must except the preface. As far as I can recollect, it was entirely written by him.

And now, once again, I bid my hideous progeny go forth and prosper. I have an affection for it, for it was the offspring of happy days, when death and grief were but words, which found no true echo in my heart. Its several pages speak of many a walk, many a drive, and many a conversation, when I was not alone; and my companion was one who, in this world, I shall never see more. But this is for myself; my readers have nothing to do with these associations.

I will add but one word as to the alterations I have made. They are principally those of style. I have changed no portion of the story, nor introduced any new ideas or circumstances. I have mended the language where it was so bald as to interfere with the interest of the narrative; and these changes occur almost exclusively in the beginning of the first volume. Throughout they are entirely confined to such parts as are mere adjuncts to the story, leaving the core and substance of it untouched.

M.W.S.



**Figure 15: Theatrical depiction of Mary sharing her story at Villa Diodati
(Courtesy of Robert Clayton for the Pioneer Theatre Company)**

Lord Byron and Percy Shelley lost interest in the ghost-story project not long after it began, but a fragment by Byron was later completed by Polidori as a novel published in 1819 and titled *The Vampyre*. This book helped to inspire similar tales throughout the

rest of the 19th century, culminating in 1897 with Bram Stoker's story of an aristocratic vampire. It is hard to imagine that horror's two most famous characters – Frankenstein's monster and Count Dracula – both trace their original inspiration back to the story-telling evenings around the fireplace in Villa Diodati.

Given this significance to literature and popular culture, it is somewhat surprising that the precise dates for Byron's suggestion and for Mary's "waking dream" are still the subject of considerable controversy. We wondered whether the astronomical reference – Mary's mention to moonlight outside her bedroom window – might allow us to determine a precise date for the origin of *Frankenstein*.

When did Lord Byron suggest that the group write ghost stories?



Figure 16: Lord Byron making his ghost story proposition
(Courtesy of Robert Clayton for the Pioneer Theatre Company)

Most scholars conclude that Byron made his ghost-story proposition to the entire group on June 16. For example, James Rieger asserted that

16 June is the probable date of Byron's suggestion.

(James Rieger, "Dr. Polidori and the Genesis of *Frankenstein*," *Studies in English Literature*, 1963, page 467)

A Mary Shelley biography by Anne Mellor names the same date:

June 16 (this is presumably the evening in which they read and agreed to write ghost-stories) ...
(Anne Mellor, *Mary Shelley: Her Life, Her Fiction, Her Monsters*, 1988, pages 53-54)

In another biography, Emily Sunstein suggests that the Shelley/Wollstonecraft party was unable to return to Maison Chappuis because of the storms that night:

The excitement intensified during the week of June 16. On the sixteenth Chap[p]uis was caught at Diodati by a wild downpour and spent the night. They all gathered at the fireplace and read aloud a German book of ghost stories translated into French... this inspired Byron to propose that they each write a ghost story.
(Emily Sunstein, *Mary Shelley: Romance and Reality*, 1989, page 121)

Many other authors have adopted the same date for Byron's proposition. The evidence for this chronology comes from a diary kept by Polidori during the summer of 1816. His entry for June 16 mentions that the entire group gathered and spent the night at Villa Diodati:

June 16. -- ... Shelley came, and dined and slept here, with Mrs. S[helley] and Miss Clare Clairmont

Polidori's diary entry for the next night implies that Mary had begun her story with all the others (except Polidori himself) by June 17:

June 17 -- ... The ghost-stories are begun by all but me.

But this appears to conflict with Mary's definite and detailed description of how she agonized for several days – not just a few hours – while trying to come up with an idea for a story. This apparent inconsistency has long been considered a major problem with accepting her account.

Was Mary Shelley dishonest about her authorship?



**Figure 17: Theatrical depiction of Percy, Mary and Lord Byron
(Publicity photograph, movie still from *Bride of Frankenstein*)**

By astronomically dating the events in the spring and summer of 1816 we can support Mary's account by providing evidence of the bright moon she described in her introduction to the book. It is important because some modern scholars have raised doubts regarding the chronology as given by Mary Shelley. Some current authors are even skeptical that Mary Shelley is truly the one who wrote *Frankenstein*. They claim the dates she has given in regard to the waking dream and first telling of the tale is not in accordance with those given in the diary of John Polidori. Some scholars have entirely dismissed Mary Shelley's version of the origin of *Frankenstein* as a romantic invention. Harsh criticism of Mary Shelley's 1831 Introduction comes from James Rieger:

The received history of the contest in writing ghost-stories at Villa Diodati during the "wet, ungenial" June of 1816 is well known to every student of the Byron-Shelley circle. It is, as we shall see, an almost total fabrication. ... No statement in her account of the writing party at Diodati, or even of the inception of her own idea, can be trusted ... the entire chronology of conception is altered.

(James Rieger, "Dr. Polidori and the Genesis of *Frankenstein*," *Studies in English Literature*, 1963, pages 461, 465, 466, 469)

Anne Mellor likewise agrees that a “different chronology” was needed and that the 1831 Introduction made a “significant error” by

... lengthening the lapse of time between Byron’s proposal and her dream-invention of a plot for her ghost story from a few hours to several days ...

(Anne Mellor, *Mary Shelley: Her Life, Her Fiction, Her Monsters*, 1988, pages 53-54)

Another biography by Miranda Seymour makes especially strong statements about Mary Shelley’s veracity:

She wrote the 1831 Preface in order to help sell the book; telling the best possible story mattered more than the truth.

(Miranda Seymour, *Mary Shelley*, 2000, page 158)

Many historians discuss how it would not be proper for Mary Shelley to take part in a ghost story contest with a group of men. Claire Clairmont alludes to this when talking with Mary about her writing abilities:



**Figure 18: Theatrical depiction of Claire Claremont
(Courtesy of Robert Clayton for the Pioneer Theatre Company)**

You could write upon metaphysics, politics, jurisprudence, astronomy, mathematics –all those highest subjects which [the men] taunt us with being incapable of treating, and surpass them.(Martin Tropp, *Mary Shelley’s Monster*, 1977, page 3

I take this to mean Claire is proud of the accomplishments Mary made against the odds. Mary was not a formally educated woman. She was only a graduate of the school of hard knocks. Her mother died when she was eleven days old, and her father married a woman, Mary's step-mother, that did not support him keeping good relations with Mary. Mary's Cinderella story came when Percy began frequenting the Godwin home. Because of her father's disapproval of the couple, they met in secret at her mother, Mary Wollstonecraft's gravesite and fell in love. Of course Percy was a married man that only kept Mary as a mistress for several years. When Percy took Mary to Switzerland for the summer, he was married to another woman. Upon returning from their travels, Mary was pregnant with Percy's child. Because she was still an unmarried mistress, she faced ostracism and financial troubles with Percy. Percy did not agree to marry her until his wife committed suicide in 1816. She continued to travel with Percy and lost every child she got pregnant with but her fourth. In 1822, Percy was killed in a boating accident and Mary was left to pick up the pieces of her life once again on her own. The true story behind the author of *Frankenstein* is wilder and more exciting than any of these critics wish to believe. When you know the true story of Mary's life it is tempting to point out the inspiration Mary may have used for her writings. The proof behind Mary's authorship is genuine.

Was Mary Shelley truthful about her authorship?

Some other authors have tried to produce a chronology consistent with Mary's account by including a delay of several days between Byron's ghost-story suggestion and Mary's "waking dream" that gave her the idea for *Frankenstein*. These scholars still place Byron's proposition on June 16 and then assign Mary's "waking dream" to the night immediately preceding June 22, the date when the fireside group temporarily broke up as the weather improved and Byron and Percy departed to sail around Lake Geneva. Burton Pollin advanced this theory:

On June 16 the group read aloud a collection of ghost stories ... Byron then suggested that each one write a ghost story. ... it must be assumed that her tale first took the shape of her hideous dream, described in the preface, just before Shelley and Byron departed on their tour of Lake Lemman [Lake Geneva] ...

(Burton Pollin, article in *Comparative Literature*, 1965, pages 98-99)

Emily Sunstein likewise dated the origin of *Frankenstein* to the night before the poets' departure:

On June 22 Byron and Shelley were to leave to sail around the lake ... The night before their departure ... When Mary went to bed, still worrying about her ghost story, she had a 'waking' hypnagogic nightmare ... Next morning after the poets sailed off, she sat down at her work table and ... began a tale of a few pages narrating her dream. When Shelley returned on June 30, he was impressed and urged her to go on."

(Emily Sunstein, *Mary Shelley: Romance and Reality*, 1989, page 122)

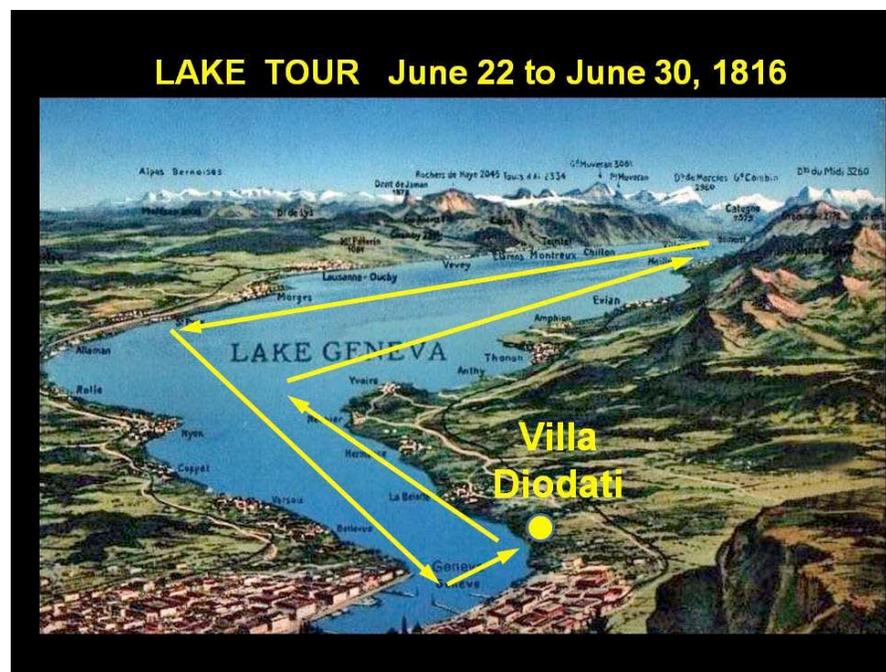


Figure 19: Route of the group's Lake Tour (Courtesy of Donald Olson)

Similar arguments, dating the origin of *Frankenstein* near June 22, appear in the biography by Richard Holmes (*Shelley: The Pursuit*, 1974, page 330) and the recent study by Dorothy & Thomas Hoobler (*The Monsters: Mary Shelley & the Curse of Frankenstein*, 2006, pages 148-149).

When did the ghost stories begin?

Some scholars have identified June 16 as a probable date for Byron's ghost-story proposition, and this gradually became adopted as the conventional wisdom by most later

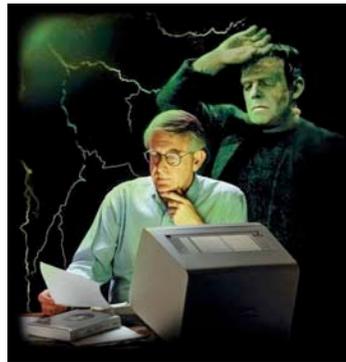
authors. But when we checked the diary entries, letters, notebooks, and authors' prefaces, we quickly realized that a specific date for Byron's proposal appears nowhere in the primary source material. Polidori's diary mentions that the entire group gathered at Diodati on June 16 and that the ghost stories were begun by all (except Polidori himself) by June 17, but Polidori has no description of Byron making his original suggestion in those (or any other) diary entries.

Paula Feldman and Diana Scott-Kilvert, the editors of Mary Shelley's journals, recognize this dating uncertainty and cautiously state that "Byron proposed that they should each produce a ghost-story" at "some time" after "10 June, when Byron and Polidori moved into the Villa Diodati" (*The Journals of Mary Shelley*, 1987, page 118).

Charles Robinson, in his facsimile edition of Mary Shelley's *Frankenstein* manuscripts, carefully surveyed the original sources and listed three possibilities:

... the ghost stories could have begun (1) before 15 June (as is suggested by M[ary] W[ollstonecraft] S[helley]'s recollection of her delay in conceiving a story); (2) on 15 June ... or (3) on 16 June (the date often given for the start of the stories).

(Charles Robinson, *Frankenstein* Chronology, in *The Frankenstein Notebooks*, 1996, page lxxvii)



**Figure 20: Photograph of Charles Robinson and friend (Courtesy of Charles Robinson)
How does the weather support Mary's authorship?**

A volcano played a role in the stormy weather that accompanied the origin of *Frankenstein*. Mount Tambora in Indonesia had exploded in April 1815, and the cloud of ash, dust, and aerosols from this event, one of the greatest eruptions in historic times, affected weather worldwide for several years. The year 1816 became known as the "year

without a summer,” with cold temperatures and nearly constant rain that drove the Byron-Shelley group inside.

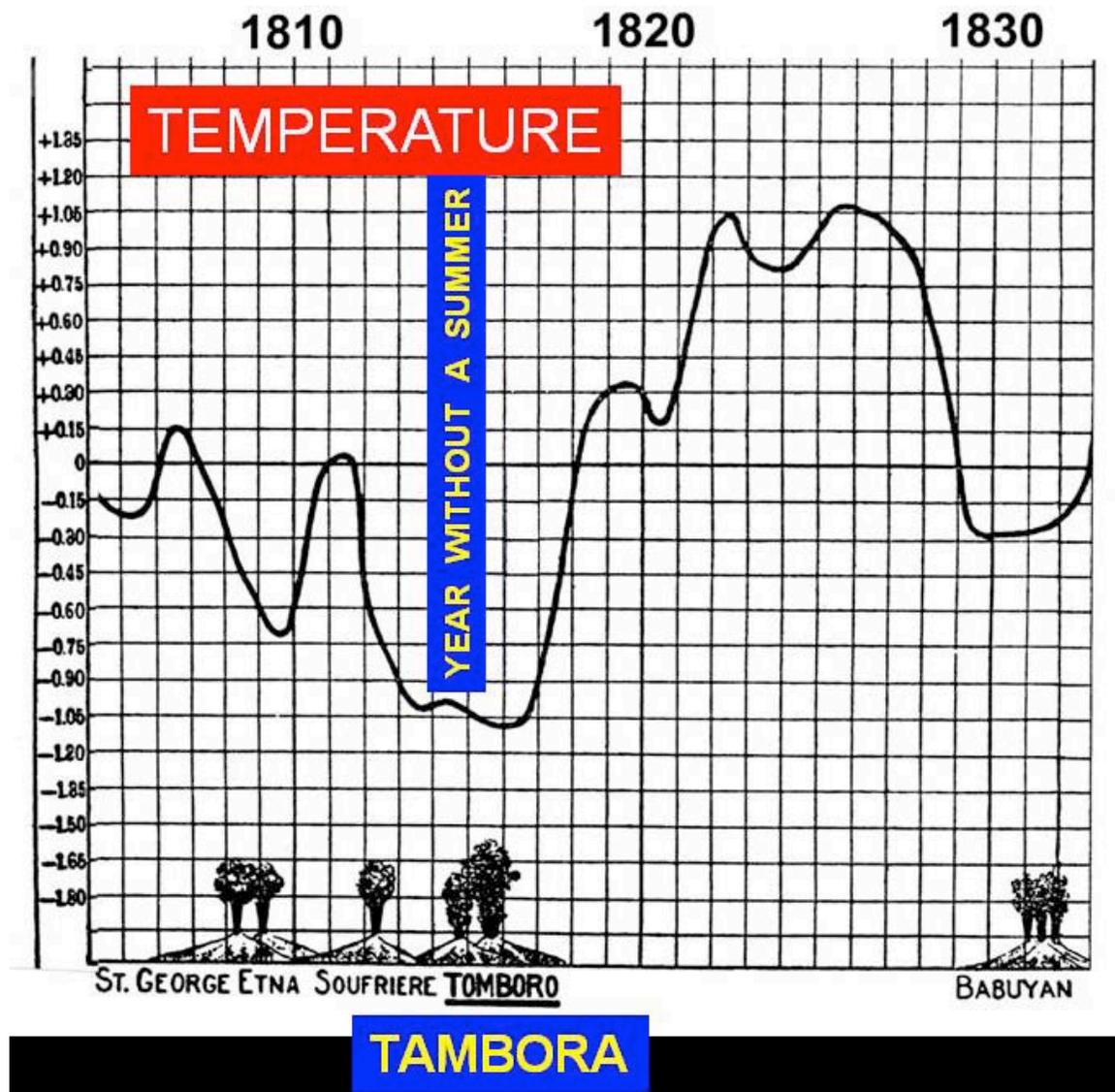


Figure 21: Graph of Mount Tambora's effects
(Courtesy of W. J. Humphreys *Physics of the Air*, 1920)

Is Mary Shelley's moon used in *Frankenstein*?

The astronomical reference in Mary Shelley's 1831 Introduction might help to resolve the dating controversy: she notices the moonlight outside her bedroom window at the point in her waking dream when Mary imagines the monster confronting his sleeping creator:

He sleeps; but he is awakened; he opens his eyes; behold the horrid thing stands at his bedside, opening his curtains, and looking on him with yellow, watery, but speculative eyes.

I opened mine in terror. The idea so possessed my mind, that a thrill of fear ran through me, and I wished to exchange the ghastly image of my fancy for the realities around. I see them still; the very room, the dark *parquet*, the closed shutters, with the moonlight struggling through ... (Introduction, *Frankenstein*, 1831 edition)

Mary tells us that on the next day she began writing out her story as “a transcript of the grim terrors of my waking dream.” Indeed, this description of moonlight and window shutters appears almost verbatim in the novel as Dr. Frankenstein recalls the night of the monster’s creation:

I started from my sleep with horror; a cold dew covered my forehead, my teeth chattered, and every limb became convulsed; when, by the dim and yellow light of the moon, as it forced its way through the window-shutters, I beheld the wretch—the miserable monster whom I had created. He held up the curtain of the bed; and his eyes, if eyes they may be called, were fixed on me.

(*Frankenstein*, 1818 edition, Volume I, Chapter 4; 1831 edition, Volume I, Chapter 5)

So far as we know, no previous scholars have used this astronomical clue to test the accuracy of Mary Shelley’s recollections. If we can prove that there was a bright moon shining through the windows at Villa Diodati on the night that Mary would have had her waking dream, we can support her story of the origin of *Frankenstein* with scientific evidence. Her use of a similar scene in chapter 4 of *Frankenstein* is an encouraging sign that she may have remembered the moon that night very well and that her story will hold up when tested.

Did Mary describe other natural phenomena of that summer?

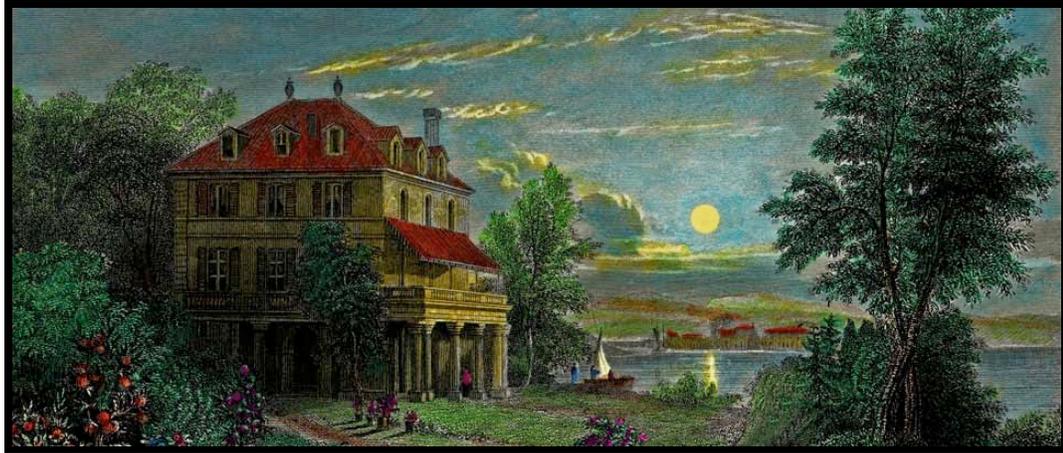


Figure 22: Engraving of Villa Diodati (Courtesy of Donald Olson)

Mary transcribed other natural phenomena from June 1816 directly into the novel. One of Mary Shelley's letters, begun on June 1 and continued at intervals over the next two weeks, includes a passage about the most spectacular thunderstorm that she witnessed over Lake Geneva:

The thunder storms that visit us are grander and more terrific than I have ever seen before. We watch them ... observing the lightning play ... in jagged figures ... One night we *enjoyed* a finer storm than I had ever before beheld. The lake was lit up ... and all the scene illuminated for an instant, when a pitchy blackness succeeded, and the thunder came in frightful bursts over our heads amid the darkness.

(*History of a Six Weeks' Tour*, 1817, pages 99-100)

A scene based on this event appears in Mary's novel:

...I saw the lightnings playing ... in the most beautiful figures. ... the thunder burst with a terrific crash over my head ... vivid flashes of lightning dazzled my eyes, illuminating the lake, making it appear like a vast sheet of fire; then for an instant everything seemed of a pitchy darkness ...

(*Frankenstein*, 1818 edition, Volume I, Chapter 4; 1831 edition, Volume I, Chapter 7)

Byron must have watched the same storm with Mary, because he devoted forty-five lines of poetry written that summer to a nearly-identical account of the thunder and the intermittent illumination as "the lit lake shines, a phosphoric sea ... now again 'tis black ..." (*Childe Harold's Pilgrimage*, Canto III, stanzas XCII-XCVI). A footnote

written by Byron dates this specific storm (“none more beautiful”) to June 13, 1816. Polidori’s diary entry for June 13 likewise mentions exceptional “thunder and lightning.”

This example with the weather event on June 13 copied into *Frankenstein* supports the possibility that Mary’s description of moonlight in the Introduction and the novel may likewise have been derived from a real event.



Figure 23: Photograph of sailboat on Lake Geneva (Courtesy of Kelly Schnarr)

Why did we go to Switzerland?



Figure 24: Photograph of me (Kelly Schnarr) in front of Villa Diodati (Courtesy of Ava Pope)

In June 1816, which nights were moonless? On which nights could bright moonlight have shone on Mary Shelley’s bedroom window after midnight (after “the witching hour had gone by”)?



Figure 25: Photograph of Texas State research group in front of gate near Villa Diodati (Courtesy of Russell Doescher)

To help answer these questions, our Texas State group traveled in August 2010 to the town of Coligny, about two miles northeast of downtown Geneva. Villa Diodati still stands there on a steep slope overlooking the lake. The nearby Maison Chappuis no longer exists, but archival photographs show its exact location lower down on the slope.

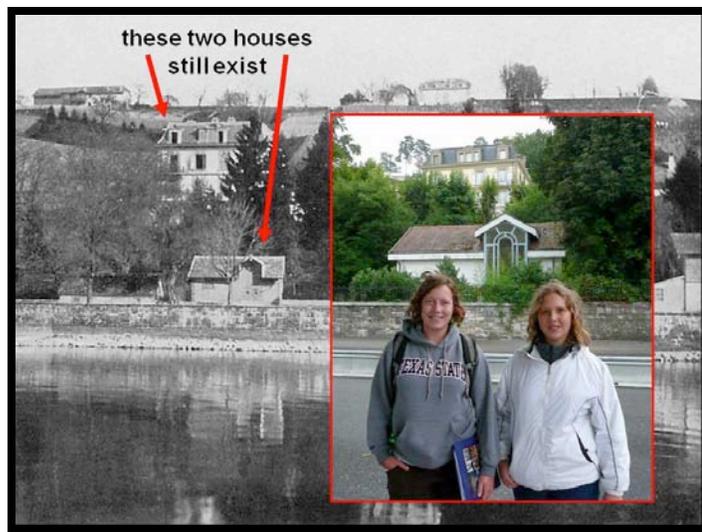


Figure 26: Ava Pope and I (Kelly Schnarr) in front of location of Maison Chappuis (Courtesy of Donald Olson)



Figure 27: Map showing slope of hill (Courtesy of Bing map images)



Figure 28: Photograph from park next to Villa Diodati (Courtesy of Madolan Greene)



Figure 29: Photograph of Ava Pope, Roger Sinnott, and me (Kelly Schnarr) calculating the slope (Courtesy of Donald Olson)

From the windows of both of these houses, relatively clear views prevailed to the west, but the view of the eastern sky would be blocked by the hill. From our GPS measurements of distances and elevations in Coligny, we determined that the average slope of the hill was 15 degrees.

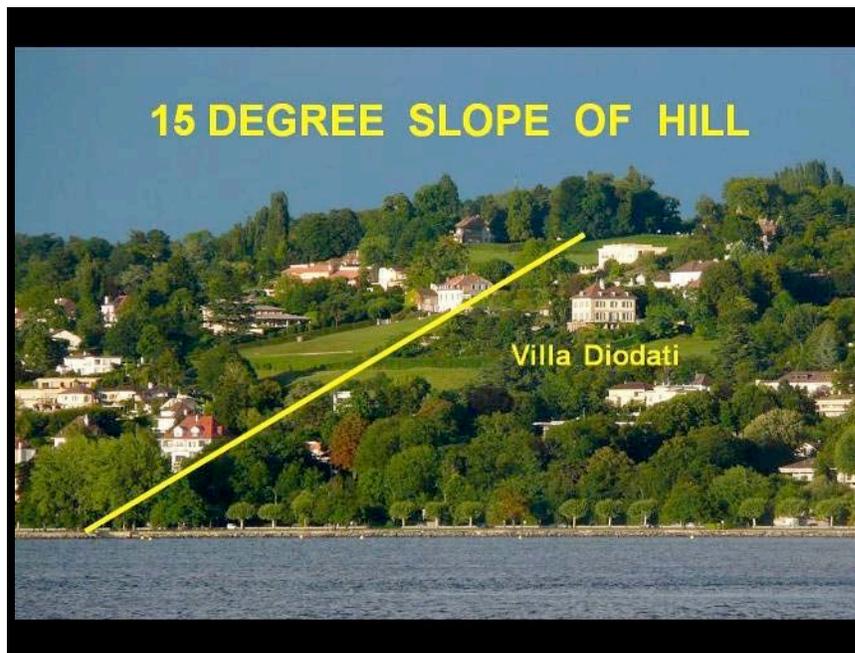


Figure 30: Photograph of Villa Diodati from the lake showing the slope (Courtesy of Donald Olson)

Combining this topographical result with calculations of the Moon’s phase and position allows us to rule out the chronology suggested by several authors who accepted Mary’s account of a delay of several days before she conceived her idea and therefore assigned her “waking dream” to June 22. During the hours before morning twilight on June 22, 1816, the Moon was a waning crescent, only 13% lit, and the view of the rising Moon would have been completely blocked by the hill to the east of Mary’s location. Moonlight could not have fallen on Mary’s bedroom window in the pre-dawn hours on June 22.



Figure 31: Photograph showing visibility on each side of Villa Diodati (Courtesy of Donald Olson)

But we can suggest another possibility, consistent with Mary Shelley’s account in her 1831 Introduction. In fact, we can explain three lunar references in the primary source material related to *Frankenstein*:

- (1) a waxing Moon near the end of May and early June 1816
- (2) a nearly-full Moon on June 9, 1816
- (3) bright moonlight shining on Mary Shelley’s window on the night of her “waking dream”

What does the moon look like over the lake?



Figure 32: Photograph of Lake Lemman with the moon shining (Courtesy of Daniel Shalloe)

In a letter started in the second half of May 1816 and continued at intervals over the next two weeks, Mary Shelley mentions boating on Lake Geneva in the moonlight:

... every evening at about six o'clock we sail on the lake ... Twilight here is of short duration, but we at present enjoy the benefit of an increasing moon, and seldom return until ten o'clock ...

Polidori's diary entries determine the precise dates for several of these evening excursions on the lake:

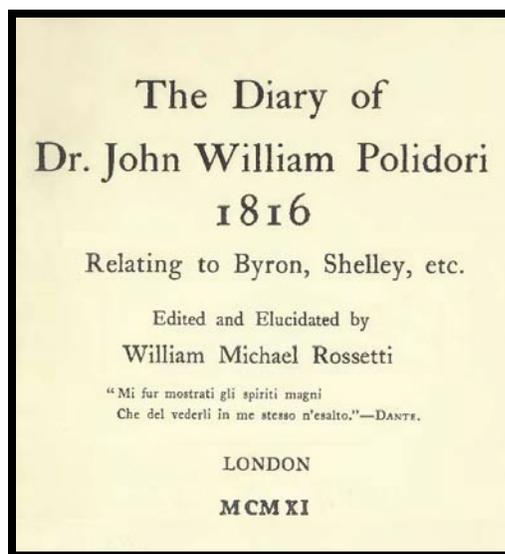


Figure 33: Title page of Dr. Polidori's Diary (Courtesy of Google books)

- May 30. -- ... I, Mrs. S[helley], and Miss G[odwin], on to the lake till nine....
- May 31. -- ... went into a boat with Mrs. S[helley], and rowed all night till 9 ...
- June 2. -- ... Dined with S[helley]; went to the lake with them and L[ord] B[yron]. Saw their house; fine. Coming back, the sunset, the mountains on one side, a dark mass of outline on the other, trees, houses hardly visible, just distinguishable; a white light mist, resting on the hills around, formed the blue into a circular dome bespangled with stars only and lighted by the moon which gilt the lake. The dome of heaven seemed oval. At 10 landed...

On May 30, May 31, and June 2, 1816, we calculate that the Moon was a waxing crescent, with illuminated fraction 15%, 24%, and 45%, consistent with Mary's mention of an "increasing moon." Sunset was at about 7:45 p.m., and moonset occurred after 11 p.m. on each of these days, in good agreement with the descriptions by both Mary Shelley and Polidori.

What does Dr. Polidori say about the moon?

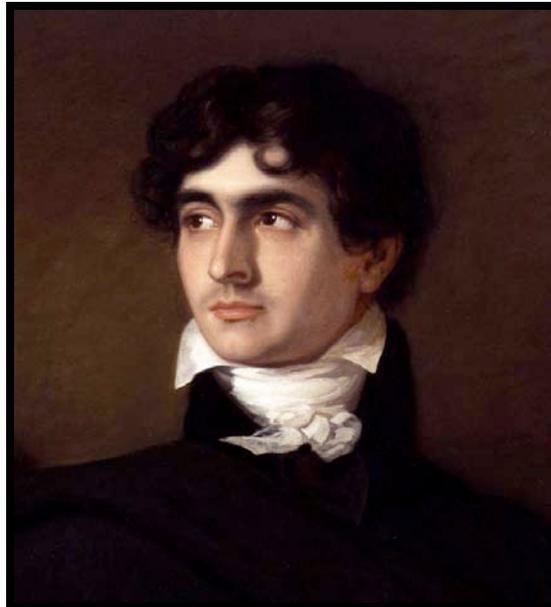


Figure 34: Painting of John Polidori (Courtesy of Wikimedia Commons)

Another Polidori diary entry makes a passing remark about the Moon:

June 9. -- ...came home. Looked at the moon, and ordered packing-up.

On June 9, 1816, the Moon was nearly full (99.9% illuminated) as it rose at about 7:29 p.m., explaining why it caught Polidori's eye. Polidori's reference here to "packing-up" refers to the impending move with Byron from their temporary hotel lodgings over to the Villa Diodati on June 10, as mentioned in that day's diary entry:

June 10. -- ... Got things ready for going to Diodati ... went to Diodati ... Shelley etc. ...came to tea, and we sat talking till 11. ...

Byron's suggestion to write ghost stories could therefore have occurred as early as June 10, an evening when the combined Byron-Shelley group gathered around the fireplace in Villa Diodati until 11 p.m. In the days following Byron's proposition, Mary struggled unsuccessfully to think of a story. Polidori's diary mentions that the combined Byron-Shelley group met at Diodati on June 15:

June 15. -- ... Shelley etc. came in the evening ... a conversation about principles, – whether man was to be thought merely an instrument.

This may be the discussion of the "principle of life" that Mary credited with giving her the spark of her idea.

How do we connect the moon to the origin of *Frankenstein*?



Figure 35: Photograph of a waning gibbous moon (Courtesy of Anthony Ayiomamitis)

Mary Shelley's "waking dream" and the origin of *Frankenstein* could therefore have occurred in the early morning hours of June 16, 1816.

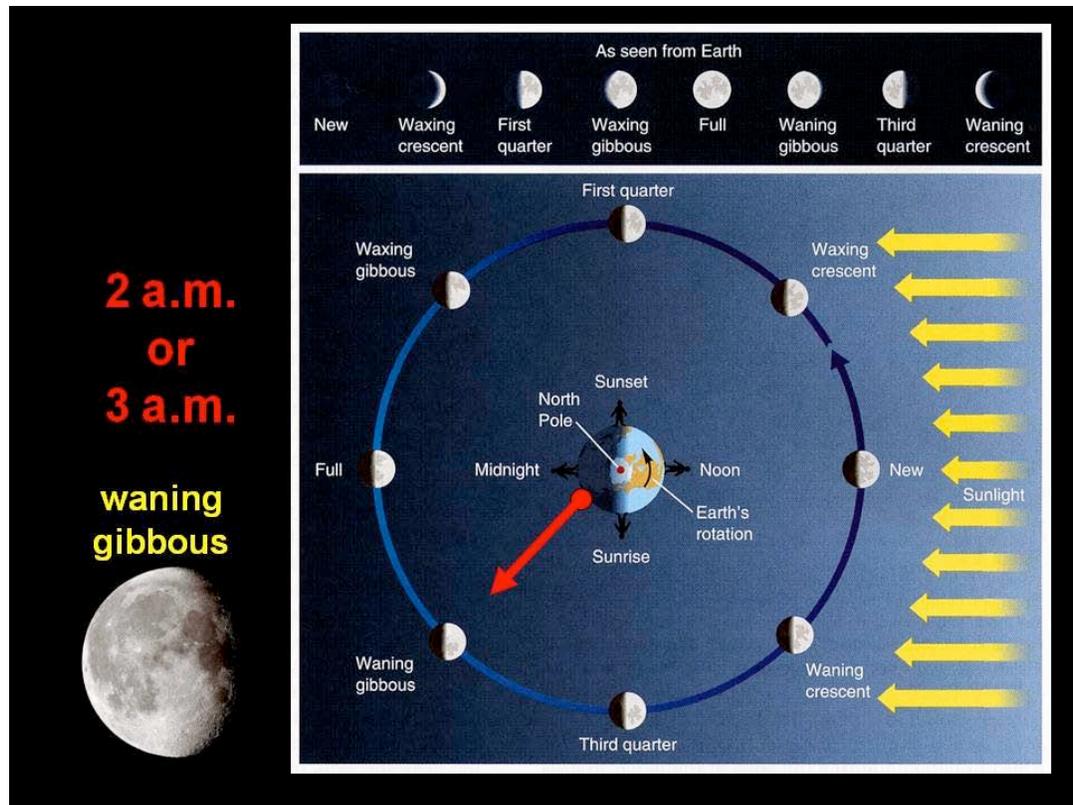


Figure 36: Chart showing what the moon would look like (Courtesy of Donald Olson)

A bright waning gibbous Moon, 67% lit, rose into the southeastern sky that night. Planetarium programs for Coligny (6 degrees 11 minutes east longitude, 46 degrees 13 minutes north latitude) give the time of moonrise as 12:01 a.m. on June 16, but this calculation assumes a flat horizon. The Moon actually would not have cleared the hill until just before 2 a.m. and then would have illuminated the windows of the houses on the slope overlooking the lake. This calculated time is in good agreement with Mary Shelley's description that "the witching hour had gone by, before we retired to rest ... I see them still; the very room ... the closed shutters, with the moonlight struggling through"



Figure 37: Photograph of the moon shining on Villa Diodati (Courtesy of Russell Doescher)

Because June 16 was only five days before the summer solstice, morning twilight came early, with nautical twilight beginning at 2:36 a.m., civil twilight beginning at 3:28 a.m., and sunrise at 4:07 a.m. The brightening sky would have overpowered the moonlight by roughly 3 a.m.

Our astronomical calculations therefore suggest that Mary Shelley’s “waking dream” and the origin of *Frankenstein* occurred between 2 a.m. and 3 a.m. on June 16, 1816.

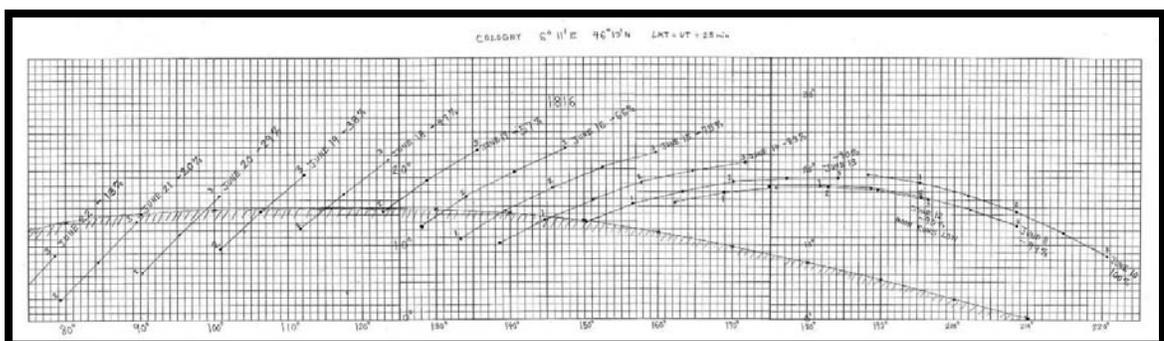
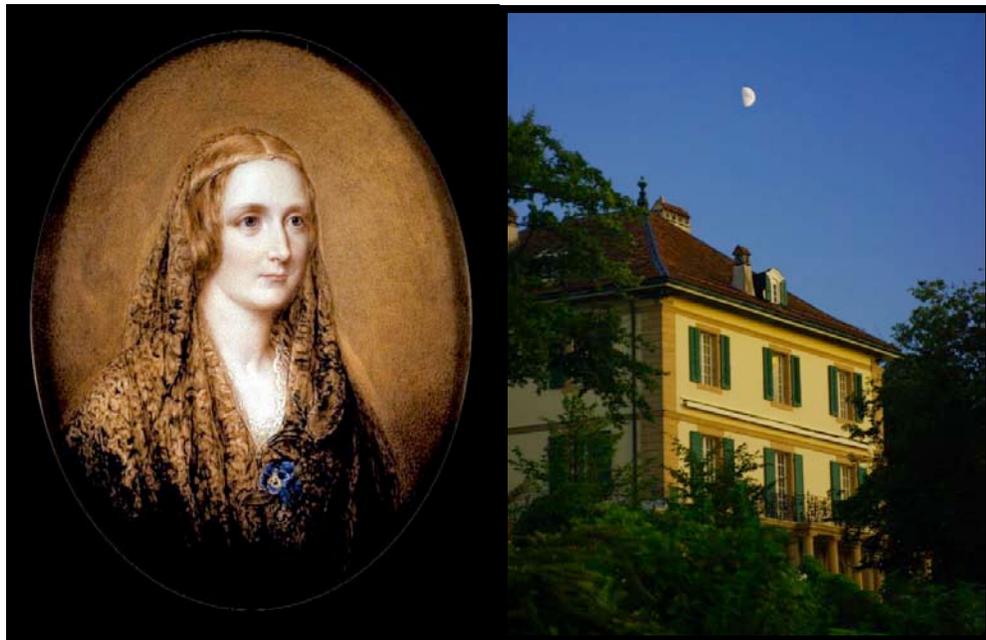


Figure 38: Graph showing what the moon would look like on possible dates (Courtesy of Donald Olson)

What can we conclude?

Some scholars have argued that Mary Shelley's 1831 Introduction is a fabrication and that nothing in it can be trusted. On the contrary, our astronomical analysis suggests the following chronology, consistent with the idea that Mary Shelley gave a generally accurate account of the origin of *Frankenstein*. It is important that we honor a woman who wrote such an influential story at a time when few female writers were brave enough to publish their writings. It is my belief that the original copy of the book was not published under her name for this reason. Her honesty and talent do not deserve to be tarnished, and I believe the facts and science are on her side.



**Figure 39: Painting of Mary Shelley and Photograph of Villa Diodati
(Courtesy of Wikipedia and Russell Doescher)**

CHRONOLOGY CONSISTENT WITH MARY SHELLEY'S 1831 INTRODUCTION,
POLIDORI'S DIARY, AND OUR ASTRONOMICAL ANALYSIS

Events of 1816:

May 27	new Moon
May 30 to June 2	boating on the lake in the evenings by the light of an “increasing moon”
June 3	1 st quarter Moon
June 9	Polidori observes the nearly-full Moon
June 10	full Moon; Byron moves into Villa Diodati
June 10 to 13	Byron proposes ghost stories on one of these evenings; Mary is initially unable to think of a story
June 13	spectacular lightning and thunder storm over Lake Geneva
June 15	evening conversation at Villa Diodati about principles of life
June 16	the origin of <i>Frankenstein</i> : Mary's “waking dream” (2 a.m.–3 a.m.)
	with light from a waning gibbous Moon struggling through the closed shutters; that evening Mary begins to tell her story to the others at Villa Diodati
June 17	3 rd quarter Moon; all of the group (except Polidori) have begun their stories
June 22	Byron and Percy Shelley depart to tour Lake Geneva
June 25	new Moon

TIME SYSTEM IN 1816

All the clock times in this article are expressed in local mean time, which at Cologny (6 degrees 11 minutes east longitude) is 25 minutes ahead of UT. Modern time zones were not employed until the late 19th century.

ACKNOWLEDGEMENTS

The author is grateful for research assistance from Charles Robinson of the University of Delaware, and Margaret Vaverek at Texas State University's Alkek Library.

APPENDIX

The Moon and The Origin of Frankenstein article in Sky and Telescope.....Pages 40-46

The Guardian article.....Page 47

BBC Radio show on Frankenstein’s Moon.....Page 48

San Marcos Daily Record news article.....Pages 49-50

Wired magazine cartoon article.....Page 51

Weekly Reader Current Science articlePages 52-54

Time magazine article.....Page 55



GHOST STORIES ON STORMY NIGHTS Left to right: Percy Bysshe Shelley (1792–1822), Claire Clairmont (1798–1879), John Polidori (1795–1821), Mary Shelley (1797–1851), and Lord Byron (1788–1824) gathered at Villa Diodati on the shores of Lake Geneva, Switzerland, in June 1816. Their evening ghost stories would provide the creative spark that led Mary Shelley to conceive the idea for *Frankenstein*, a landmark novel that has gained in popularity and stature since its publication in 1818. Byron and Percy Shelley are widely regarded as two of the greatest poets in the English language. Polidori was a physician and writer who authored the 1819 short story *The Vampyre*. Clairmont was Mary's stepsister and Byron's mistress.

 Astronomy Detective Story

The Moon & the Origin of Frankenstein

DONALD W. OLSON • MARILYNN S. OLSON • RUSSELL L. DOESCHER • AVA G. POPE • KELLY D. SCHNARR

An astronomical investigation may have solved a lingering mystery surrounding the origin of the classic horror novel.

On dark and stormy nights in June 1816, as jagged lightning bolts filled the sky and thunder echoed from nearby mountains, a group that included famous (and soon-to-be-famous) writers gathered to tell ghost stories around the fireplace of Villa Diodati, overlooking Switzerland's Lake Geneva. Present were two of England's greatest poets, Lord Byron and Percy Bysshe Shelley, along with Mary Shelley (then 18 years old), Mary's stepsister Claire Clairmont, and the physician John Polidori. Byron and Polidori lived in Villa Diodati, while the Shelley party rented a nearby house called Maison Chappuis.

During one of the evenings in Diodati, Mary Shelley (1797–1851) first offered her tale of *Frankenstein* — an iconic creation that has inspired classic horror films and countless pop-culture references. In Shelley's novel, scientist Victor Frankenstein brings to life a monster made of cadaverous remains, who goes on a murderous rampage when his creator refuses to ease his loneliness by producing a mate.

Surprisingly, the question of when Mary Shelley conceived this idea has been a long-standing matter of controversy, with some scholars even calling Mary's honesty into question. Because Mary's published recollections include her memory of moonlight outside her bedroom window, we wondered whether this astronomical reference might

allow us to test the accuracy of her account and determine a precise date for the origin of *Frankenstein*.

Mary Shelley's Account

Our most important clue came from Mary Shelley's Introduction to the 1831 edition of *Frankenstein*, which describes how such "a young girl" could conceive, in her words, "so very hideous an idea:"

In the summer of 1816, we visited Switzerland, and became the neighbours of Lord Byron ... it proved a wet, ungenial summer, and incessant rain often confined us for days to the house. Some volumes of ghost stories ... fell into our hands.

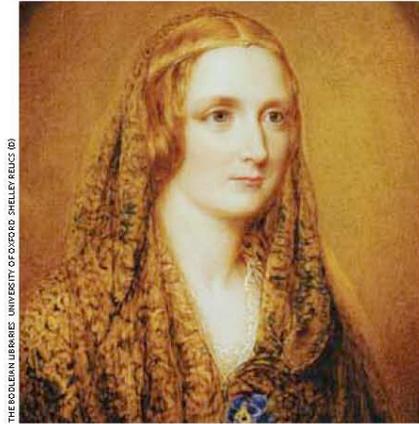
At first the group read the published tales aloud, but Mary recalled that Byron suggested that they should each try to write their own ghost story:

I busied myself to think of a story ... one to make the reader dread to look round, to curdle the blood, and quicken the beatings of the heart ... I thought and pondered — vainly ... Have you thought of a story? I was asked each morning, and each morning I was forced to reply with a mortifying negative.

After several days of embarrassment, a talk around the fireplace gave Mary the spark of an idea:

... various philosophical doctrines were discussed, and among others the nature of the principle of life ... Night waned upon this talk, and even the witching hour had gone by, before we retired to rest. When I placed my head on my pillow, I did not sleep ... My imagination, unbidden, possessed and guided me

Astronomy Detective Story



THE BODLEIAN LIBRARY; UNIVERSITY OF OXFORD; SHELLEY (ARLUCS 80)

THE AUTHOR This posthumous portrait of Mary Shelley depicts the author of *Frankenstein* sometime after her husband, Percy Bysshe Shelley, died in 1822 (he passed away just six years after the summer at Lake Geneva). Mary Shelley was only 18 years old when she conceived the idea for her most famous work. The artist Reginald Easton is said to have created this portrait from Mary Shelley's death mask, so this is probably a reasonably accurate portrayal.

... I saw the pale student of unhallowed arts kneeling beside the thing he had put together. I saw the hideous phantasm of a man stretched out, and then, on the working of some powerful engine, show signs of life ...

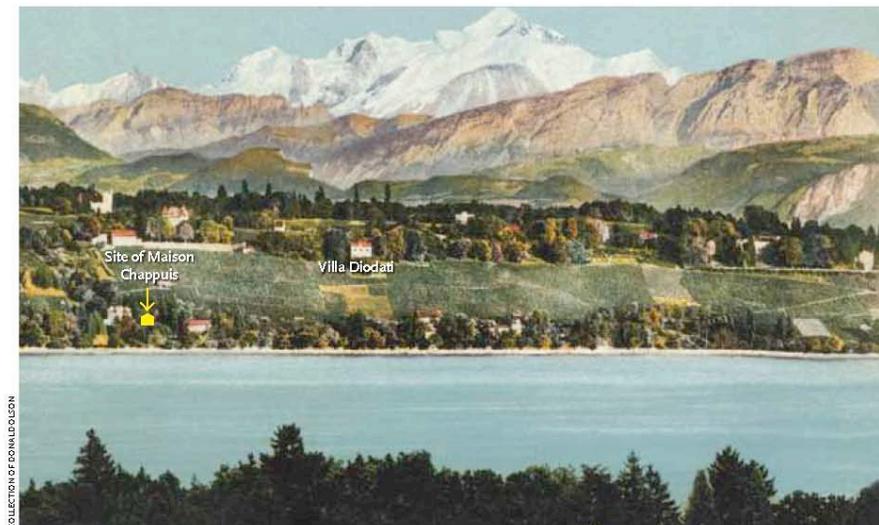
As she returned to reality, Mary noticed that moonlight was shining through her bedroom window:

I wished to exchange the ghastly image of my fancy for the realities around. I see them still; the very room, the dark parquet, the closed shutters, with the moonlight struggling through, and the sense I had that the glassy lake and white high Alps were beyond ... On the morrow I announced that I had thought of a story ... a transcript of the grim terrors of my waking dream.

Mary Shelley began to develop her story into the novel *Frankenstein*. Lord Byron and Percy Shelley soon lost interest in the ghost-story project, but Polidori later developed a fragment from Byron into a novel titled *The Vampyre*. This book helped to inspire similar tales throughout the 19th century, culminating with Bram Stoker's famous story. Thus horror's two most enduring characters — Frankenstein's monster and Count Dracula — both trace their origins back to the storytelling evenings in Villa Diodati.

Was Mary Shelley Dishonest?

The precise dates for Byron's suggestion and for Mary's "waking dream" remain controversial. The chronology is



COLLECTION OF DONALD OLSON

SUMMER RESIDENCES This postcard from around 1900 shows Villa Diodati overlooking Lake Geneva. Maison Chappuis no longer exists, but its location is marked. Both buildings are located on a steep slope that afforded relatively clear views to the west, but the hill obstructs the eastern horizon. This basic topography was an important clue in the authors' investigation.

based primarily on the journals and letters written by the party during their stay in Switzerland. Despite the lack of compelling evidence, the overwhelming majority of scholars conclude that Byron made his ghost-story proposition on June 16th. The meager evidence comes from the June 16th entry from Polidori's diary, which mentions that the entire group spent the night at Villa Diodati:

June 16 • Shelley came, and dined and slept here, with Mrs. S[helley] and Miss Cla[ire] Clairmont ...

Polidori's diary entry for the following night implies that Mary had begun her story with all the others (except Polidori himself):

June 17 • The ghost-stories are begun by all but me.

Therefore, identifying June 16th as the night of Byron's proposal, and with the ghost stories beginning the following evening, conflicts with Mary Shelley's detailed description of how she agonized for several days — not just a few hours — while trying to come up with a story. Scholars have long considered this apparent inconsistency a stumbling block to accepting her account.

Some scholars dismiss Shelley's version of the origin of *Frankenstein* as a romantic invention. One of the harshest criticisms of her 1831 Introduction comes from an article by James Rieger (*Studies in English Literature*, 1963):

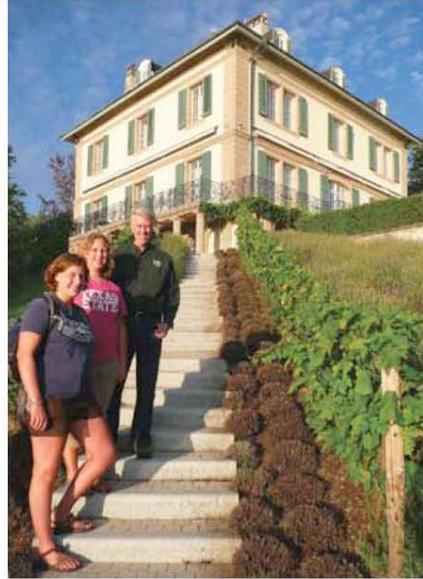
The received history of the contest in writing ghost-stories at Villa Diodati during the "wet, ungenial" June of 1816 is well known to every student of the Byron-Shelley circle. It is, as we shall see, an almost total fabrication ... No statement in her account of the writing party at Diodati, or even of the inception of her own idea, can be trusted ... the entire chronology of conception is altered.

A biography by Miranda Seymour (*Mary Shelley*, 2000) concludes that Mary's account is simply a lie:

She wrote the 1831 Preface in order to help sell the book; telling the best possible story mattered more than the truth.

Other authors have tried to produce a chronology consistent with Mary's account by including a delay of several days between Byron's ghost-story suggestion and Mary's "waking dream" that gave her the idea for *Frankenstein*. These scholars still place Byron's proposition on June 16th and then assign Mary's "waking dream" to the early morning of June 22nd, hours before the fireside group temporarily broke up as the weather improved and Byron and Shelley left to sail around the lake. An article by Burton Pollin (*Comparative Literature*, 1965) advances this theory:

On June 16 the group read aloud a collection of ghost stories ... Byron then suggested that each one write a ghost story ... it must be assumed that her tale first took the shape of her hideous dream, described in the preface, just before Shelley and Byron departed on their tour of Lake Lemán [Lake Geneva] ...



ROBERT SHROTT



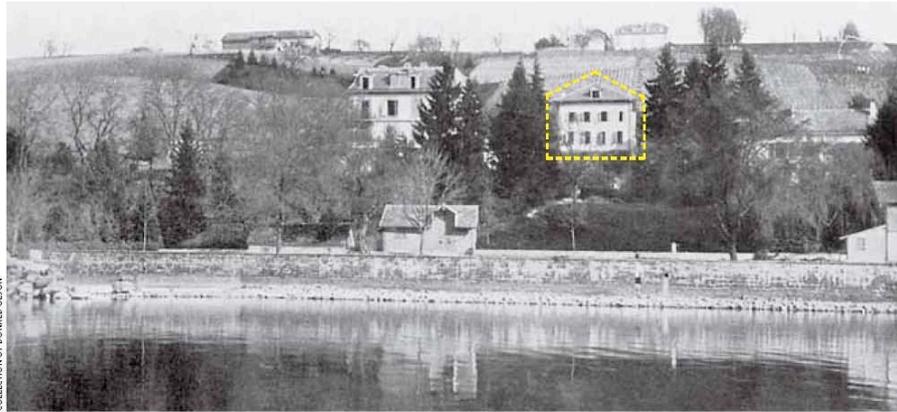
MARSHALL OLSON

THE AUTHORS AT VILLA DIODATI Top: Coauthors Ava Pope, Kelly Schnarr, and Don Olson stand in front of the building where the Byron-Shelley party exchanged ghost stories. Above: Russell Doescher and Ava Pope examine a topographical map in the garden of Villa Diodati.

Volcanic Skies

A volcano played a role in the stormy weather that accompanied the origin of *Frankenstein*. Mount Tambora in the Dutch East Indies (now Indonesia) had exploded in April 1815, and the cloud of ash, dust, and aerosols from this catastrophe, one of the largest volcanic eruptions in historic times, affected weather worldwide for several years. The year 1816 became known as the "year without a summer," with cold temperatures and nearly constant rain that drove the Byron-Shelley group indoors.

Astronomy Detective Story



COLLECTION OF DONALD OLSON

SHELLEY RESIDENCE Mary Shelley had her “waking dream” while sleeping at Maison Chappuis (outlined), just a short walk downhill from Villa Diodati. Maison Chappuis no longer exists, but the two nearby buildings on its left in this 1880s photo are still there.

When Did the Ghost Stories Begin?

Although most modern authors adopted June 16th as the probable date for Byron’s ghost-story proposition, we realized that Polidori’s diary has no description of Byron making his original suggestion, and a specific date appears nowhere in the primary sources.

Paula Feldman and Diana Scott-Kilvert, the editors of Mary Shelley’s journals, recognize this dating uncertainty and cautiously state that “Byron proposed that they should each produce a ghost-story” at “some time” after “10 June, when Byron and Polidori moved into Villa Diodati” (*The Journals of Mary Shelley*, 1987).

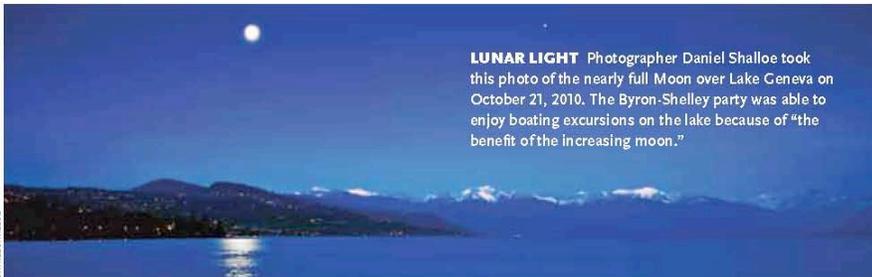
Based on the surviving letters, journals, and memoirs, Byron’s proposal appears to fall between June 10th and June 16th. Mary Shelley’s astronomical reference in her 1831 Introduction might help to resolve the dating contro-

versy. Mary noticed the moonlight outside her bedroom window at the point in her waking dream when she imagined the monster confronting his sleeping creator:

He sleeps; but he is awakened; he opens his eyes; behold the horrid thing stands at his bedside, opening his curtains, and looking on him with yellow, watery, but speculative eyes.

I opened mine in terror ... I wished to exchange the ghastly image of my fancy for the realities around. I see them still; the very room, the dark parquet, the closed shutters, with the moonlight struggling through ... (Frankenstein, 1831 edition)

This waking dream became a moonlit scene in her novel. So far as we know, no previous scholars have used this astronomical clue, yet Mary’s use of other natural phenomena suggests that her lunar reference should be taken seriously. For example, she witnessed a spectacular thunderstorm over Lake Geneva on June 13th, vividly described the storm in a letter, and later copied this passage almost verbatim in *Frankenstein*. Mary’s “moonlight” may likewise have been derived from a real event.



DANIEL SHALLOE

LUNAR LIGHT Photographer Daniel Shalloe took this photo of the nearly full Moon over Lake Geneva on October 21, 2010. The Byron-Shelley party was able to enjoy boating excursions on the lake because of “the benefit of the increasing moon.”

Trip to Switzerland

On which nights in June 1816 could bright moonlight have shone on Mary Shelley's bedroom window after midnight (after "the witching hour had gone by")

To answer this question, our Texas State University group traveled in August 2010 to the town of Cologny, about two miles northeast of downtown Geneva. Villa Diodati still stands on a steep slope overlooking the lake, facing west. Maison Chappuis no longer exists, but archival photographs show its exact location lower down on the slope. Windows of both houses afforded relatively clear views to the west, but the hill on which the houses stood partially blocked the view of the eastern sky. From our GPS measurements of distances and elevations, we determined that the hill's average slope is 15°.

Combining this topographical information with calculations of the Moon's phase and position allows us to rule out the chronology suggested by authors who assign her "waking dream" to June 22nd. During the hours before morning twilight on June 22, 1816, the Moon was a waning crescent, only 13% lit, and the hill on which both houses stood would have blocked her view to the east of the rising Moon. Moonlight could not have fallen on Mary's bedroom window in the pre-dawn hours on June 22nd.

But we can suggest an earlier date, consistent with Mary's 1831 account. Three lunar references in the primary source material show us that the group members were interested sky observers, which helps to strengthen our argument.

1. In a letter started in the second half of May 1816 and continued at intervals over the next two weeks, Mary mentions boating on Lake Geneva in the moonlight:

... every evening at about six o'clock we sail on the lake ... Twilight here is of short duration, but we at present enjoy the benefit of an increasing moon, and seldom return until ten o'clock ...

Polidori's diary entries on May 30th and 31st, and June 2nd, give us precise dates for several of these evening excursions, with the June 2nd entry specifically stating "a circular dome bespangled with stars only and lighted by the moon which gilt the lake."

At 9 p.m. on the evenings of May 30, May 31, and June 2, 1816, the Moon was a waxing crescent, with an illuminated fraction of 15%, 24%, and 46%. This is consistent with Mary's mention of an "increasing moon." Sunset was at about 7:45 p.m., and moonset occurred after 11 p.m. on each of these dates, in good agreement with the descriptions by both Mary Shelley and Polidori.

2. Another Polidori diary entry from a week later makes a passing remark about the Moon:

June 9 ... came home. Looked at the moon, and ordered packing-up.

On June 9, 1816, the Moon was more than 99.9% illuminated as it rose over Mont Blanc at about 8 p.m., explaining

why it caught Polidori's eye. Polidori's mention of "packing-up" refers to the impending move with Byron from their temporary hotel lodgings, as mentioned in the next day's diary entry:

June 10 ... Got things ready for going to Diodati ... went to Diodati ... Shelley etc. came to tea, and we sat talking till 11 ...

Byron's suggestion to write ghost stories could have occurred between June

The Time System in 1816

The clock times in this article are expressed in local mean time, which at Cologny (6° 11' east longitude, 46° 13' north latitude) is 25 minutes ahead of UT. Modern time zones were not employed until the late 19th century.

Proposed 1816 Chronology

- May 27** New Moon
- May 30** Boating on the lake in the evenings by the light of an "increasing moon"
- to June 2**
- June 3** First-quarter Moon
- June 9** Polidori observes the nearly full Moon.
- June 10** Full Moon; Byron and Polidori move into Villa Diodati.
- June 10** Byron proposes ghost stories on one of these evenings; Mary Shelley is initially unable to think of a story.
- to 13**
- June 13** Spectacular thunderstorm over Lake Geneva
- June 15** Evening conversation at Villa Diodati about the principle of life
- June 16** The origin of *Frankenstein*: Mary Shelley's "waking dream" (between 2:00 and 3:00 a.m.) with light from a waning gibbous Moon struggling through the closed shutters. That evening Mary Shelley begins to tell her story at Villa Diodati.
- June 17** Third-quarter Moon; all group members except Polidori have begun their stories.
- June 22** Byron and Percy Shelley depart to tour Lake Geneva.
- June 25** New Moon





THE MONSTER One of fiction's most enduring characters is the monster in Mary Shelley's novel *Frankenstein*. People often erroneously assume that the monster's name is Frankenstein; in fact, that's the name of the scientist who created the monster. Shelley did not give the monster a name.

10th (the first evening in Villa Diodati when the group gathered around the fireplace) and about June 13th (the night of the spectacular storm). This allows several days for Mary's struggle to think of a story. Polidori's diary mentions that the combined Byron-Shelley group met at Diodati on June 15th:

June 15 • Shelley etc. came in the evening ... a conversation about principles, — whether man was to be thought merely an instrument.

This conversation may have included the discussion of the "principle of life" that sparked Mary's idea.

Mystery Solved?

3. Mary Shelley's "waking dream" that inspired *Frankenstein* could therefore have occurred in the early morning hours of June 16, 1816. A bright waning gibbous Moon, 67% lit, rose into the southeastern sky that night. Planetary programs for Cologne give the time of moonrise as 12:01 a.m. on June 16th, but this calculation assumes a flat horizon. The Moon actually would not have cleared the 15° slope until just before 2 a.m. and then could have illuminated her bedroom window in Maison Chappuis. This calculated time is in good agreement with Mary Shelley's description that "the witching hour had gone by ... the closed shutters, with the moonlight struggling through ..."

Because June 16th was only five days before the summer solstice, with civil twilight beginning at 3:29 a.m. and sunrise at 4:07 a.m., the brightening sky would have overpowered the moonlight by roughly 3 a.m. Our calculations thus suggest that Mary Shelley's "waking dream" occurred between 2 a.m. and 3 a.m. on June 16, 1816.

If moonlight had not been shining on her window that morning, the astronomical analysis would point to a fabrication on her part. Instead, the bright waning gibbous Moon, together with the chronology we suggest, supports the idea that Mary Shelley's 1831 Introduction provided a generally accurate account of *Frankenstein's* origin.

Mary Shelley gave us an icon that resonates today even more than it did before science and invention so radically changed our world. As Halloween approaches, it's appropriate to look back at the most famous monster of them all — created in the terrifying dream of an 18-year-old woman on a moonlit night on the shores of Lake Geneva. ♦



To view more images related to this article, visit SkyandTelescope.com/Frankenstein.

Don Olson and Russell Doescher teach in the Department of Physics, and Marilyn Olson in the Department of English, at Texas State University, where Kelly Schnarr is an undergraduate in the Department of Education and the Honors Program. Ava Pope recently received her B.S. from Texas State and is now a physics graduate student at the University of North Carolina. The authors are grateful for research assistance from Charles Robinson (University of Delaware) and Margaret Vaverek (Texas State University).

The Guardian | Monday 26 September 2011

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National

Astronomers shed light on Frankenstein's hour of creation

Tim Radford

Texas astronomers have used the light of the moon to highlight the hour of creation for Victor Frankenstein and his notorious monster - and defend the memory of their teenage creator, Mary Shelley.

The inspiration came in a waking dream between 2am and 3am on the morning of 16 June, 1816, they explain in the November issue of *Sky and Telescope*.

In the preface to the third edition of Frankenstein Shelley described a villa party: Lord Byron, Percy Shelley, herself and Byron's physician Polidori, and the famous challenge by Byron that each of

them should begin a ghost story. She also described her repeated inability to come up with an idea until a moment of inspiration during a sleepless night in her dark room, behind closed shutters "with the moonlight struggling to get through".

And then, she continued: "I saw with shut eyes, but acute mental vision... I saw the hideous phantasm of a man stretched out, and then, on the working of some powerful engine, show signs of life..."

The two poets soon lost interest. Polidori kept a diary of his days with Byron and some enigmatic entries have prompted scholars to suggest that to enhance sales Mary Shelley might have composed yet another fiction about the

chronology of literary creation. Did Byron make his challenge on 16 June? Was Mary Shelley writing the next day?

Or did she spend several days agonising and think of her tale on 22 June?

"Our calculations show that can't be right, because there wouldn't be any moonlight," says Donald Olson, from Texas State University in San Marcos. Just as astronomers can predict lunar cycles decades ahead, they can say when they happened centuries in the past.

In August 2010, Professor Olson, two colleagues and two students went to Lake Geneva to discover when moonlight would have hit the windows, and penetrated the shutters, of Mary Shelley's bedroom.



Boris Karloff as Frankenstein's monster

Shelley reports that she stayed up beyond the "witching hour" of midnight. By 22 June, the moon would then have been a waning crescent, masked by a hillside. But a bright, gibbous moon would have cleared the hillside to shine into Mary Shelley's bedroom window just before 2am on 16 June.

So Shelley's version of events is supported by evidence. Byron probably made his challenge somewhere between 10 and 13 June, 1816. On 15 June, according to both Polidori and Mary Shelley, the party talked about the "principle" of life. The monster and the tormented scientist were dreamed up in the small hours of that night.

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Frankenstein's Moon

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Did the Moon shining into Mary Shelley's bedroom in June 1816 play a part in the genesis of her Frankenstein story? Two forensic astronomers in the United States believe there is evidence from moon charts and old weather reports to give this tale credence.



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September 27, 2011
Frankenstein's moon: Texas State astronomers vindicate account of masterwork

— Victor Frankenstein's infamous monster led a brief, tragic existence, blazing a trail of death and destruction that prompted mobs of angry villagers to take up torches and pitchforks against him on the silver screen.

Never once during his rampage, however, did the monster question the honesty of his ultimate creator, author Mary Wollstonecraft Shelley.

That bit of horror was left to the scholars.

Now, a team of astronomers from Texas State University-San Marcos has applied its unique brand of celestial sleuthing to a long-simmering controversy surrounding the events that inspired Shelley to write her legendary novel "Frankenstein."

Their results shed new light on the question of whether or not Shelley's account of the episode is merely a romantic fiction.

Texas State physics faculty members Donald Olson and Russell Doescher, English professor Marilyn S. Olson and Honors Program students Ava G. Pope and Kelly D. Schnarr publish their findings in the November 2011 edition of Sky & Telescope magazine, on newsstands now.

"Shelley gave a very detailed account of that summer in the introduction to an early edition of Frankenstein, but was she telling the truth?" Olson said. "Was she honest when she told her story of that summer and how she came up with the idea, and the sequence of events?"

A Dark and Stormy Night

The story begins, literally, in June 1816 at Villa Diodati overlooking Switzerland's Lake Geneva. Here, on a dark and stormy night, Shelley – merely 19 at the time – attended a gathering with her future husband, Percy Bysshe Shelley, her stepsister Claire Clairmont, Lord Byron and John Polidori.

To pass the time, the group read a volume of ghost stories aloud, at which point Byron posed a challenge in which each member of the group would attempt to write such a tale.

Related Photos



Mary Shelley

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"The chronology that's in most books says Byron suggested they come up with ghost stories on June 16, and by June 17 she's writing a scary story," Olson said. "But Shelley has a very definite memory of several days passing where she couldn't come up with an idea. If this chronology is correct, then she embellished and maybe fabricated her account of how it all happened.

"There's another, different version of the chronology in which Byron makes his suggestion on June 16, and Shelley didn't come up with her idea until June 22, which gives a gap of five or six days for conceiving a story," he said. "But our calculations show that can't be right, because there wouldn't be any moonlight on the night that she says the moon was shining."

Moonlight is the key. In Shelley's account, she was unable to come up with a suitable idea until another late-night conversation—a philosophical discussion of the nature of life—that continued past the witching hour (midnight). When she finally went to bed, she experienced a terrifying waking dream in which a man attempted to bring life to a cadaverous figure via the engines of science.

Shelley awoke from the horrific vision to find moonlight streaming in through her window, and by the next day was hard at work on her story.

Doubting Shelley

Although the original gathering and ghost story challenge issued by Byron is well-documented, academic scholars and researchers have questioned the accuracy of Mary Shelley's version of events to the extent of labeling them outright fabrications.

The traditionally accepted date for the ghost story challenge is June 16, based on an entry from Polidori's diary, which indicates the entire party had gathered at Villa Diodati that night. In Polidori's entry for June 17, however, he reports "The ghost-stories are begun by all but me."

Critics have used those diary entries to argue Shelley didn't agonize over her story for days before beginning it, but rather started within a span of hours.

Others have suggested Shelley fabricated a romanticized version for the preface of the 1831 edition of "Frankenstein" solely to sell more books. Key, however, is the fact that none of Polidori's entries make reference to Byron's ghost story proposal.

"There is no explicit mention of a date for the ghost story suggestion in any of the primary sources—the letters, the documents, the diaries, things like that," Olson said. "Nobody knows that date, despite the assumption that it happened on the 16th."

Frankenstein's moon

Surviving letters and journals establish that Byron and Polidori arrived at Villa Diodati on June 10, narrowing the possible dates for the evening of Byron's ghost story proposition to a June 10-16 window. To further refine the dates, Shelley's reference of moonlight on the night of her inspirational dream provided an astronomical clue for the Texas State researchers.

To determine which nights in June 1816 bright moonlight could've shone through Shelley's window after midnight, the team of Texas State researchers traveled in Aug. 2010 to Switzerland, where Villa Diodati still stands above Lake Geneva.

The research team made extensive topographic measurements of the terrain and Villa Diodati, then combed through weather records from June of 1816.

The Texas State researchers then calculated that a bright, gibbous moon would have cleared the hillside to shine into Shelley's bedroom window just before 2 a.m. on June 16. This calculated time is in agreement with Shelley's witching hour reference.

Furthermore, a Polidori diary entry backs up Shelley's claim of a late-night philosophical "conversation about principles" of life taking place June 15.

Had there been no moonlight visible that night, the astronomical analysis would indicate fabrication on her part. Instead, evidence supports Byron's ghost story suggestion taking place June 10-13 and Shelley's waking dream occurring between 2 a.m. and 3 a.m. on June 16, 1816.

"Mary Shelley wrote about moonlight shining through her window, and for 15 years I wondered if we could recreate that night," Olson said. "We did recreate it. We see no reason to doubt her account, based on what we see in the primary sources and using the astronomical clue."



A monster is born

Texas State University astrophysicist Donald Olson uses celestial references in art and literature to solve puzzles. His latest enquiry: the date of Frankenstein's conception. WIRED tells the story...

By Charlie Burton. Illustration by Luke Pearson



In June 1816, Mary Shelley was holidaying with her husband Percy Bysshe Shelley, Lord Byron and others at Villa Proserpina by Lake Geneva.

PLAY PRINT

The group spent their evenings reading aloud ghost stories. One night, Byron suggested that they each write one of their own...



She awoke to see the Moon shining brightly outside her bedroom window. The next morning, Shelley announced that she had a tale.



...but Shelley was unable to think up a plot.



A few nights later, following a discussion about the nature of being alive, she went to bed at four midnight and hit upon the Frankenstein idea in a dream.



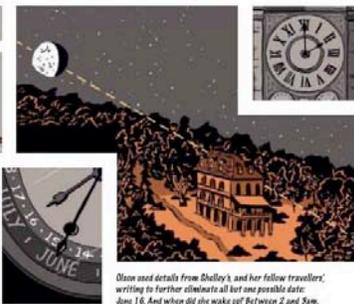
However, the exact date of her inspiration remained a mystery. Until now.



Donald Olson says he has solved the puzzle. Using software that maps the sky, his team noticed when a bright Moon would have been visible in June 1816.



He then went to Lake Geneva where he found the view from Shelley's window observed by a hill. He measured its gradient with GPS: 15 degrees. This narrowed down the nights on which she could have seen the Moon.



Olson used details from Shelley's, and her fellow travellers, writing to further eliminate all but one possible date: June 16. And when did she wake up? Between 2 and 3am.

Olson's Frankenstein paper is published this month in Sky & Telescope (skyandtelescope.com)

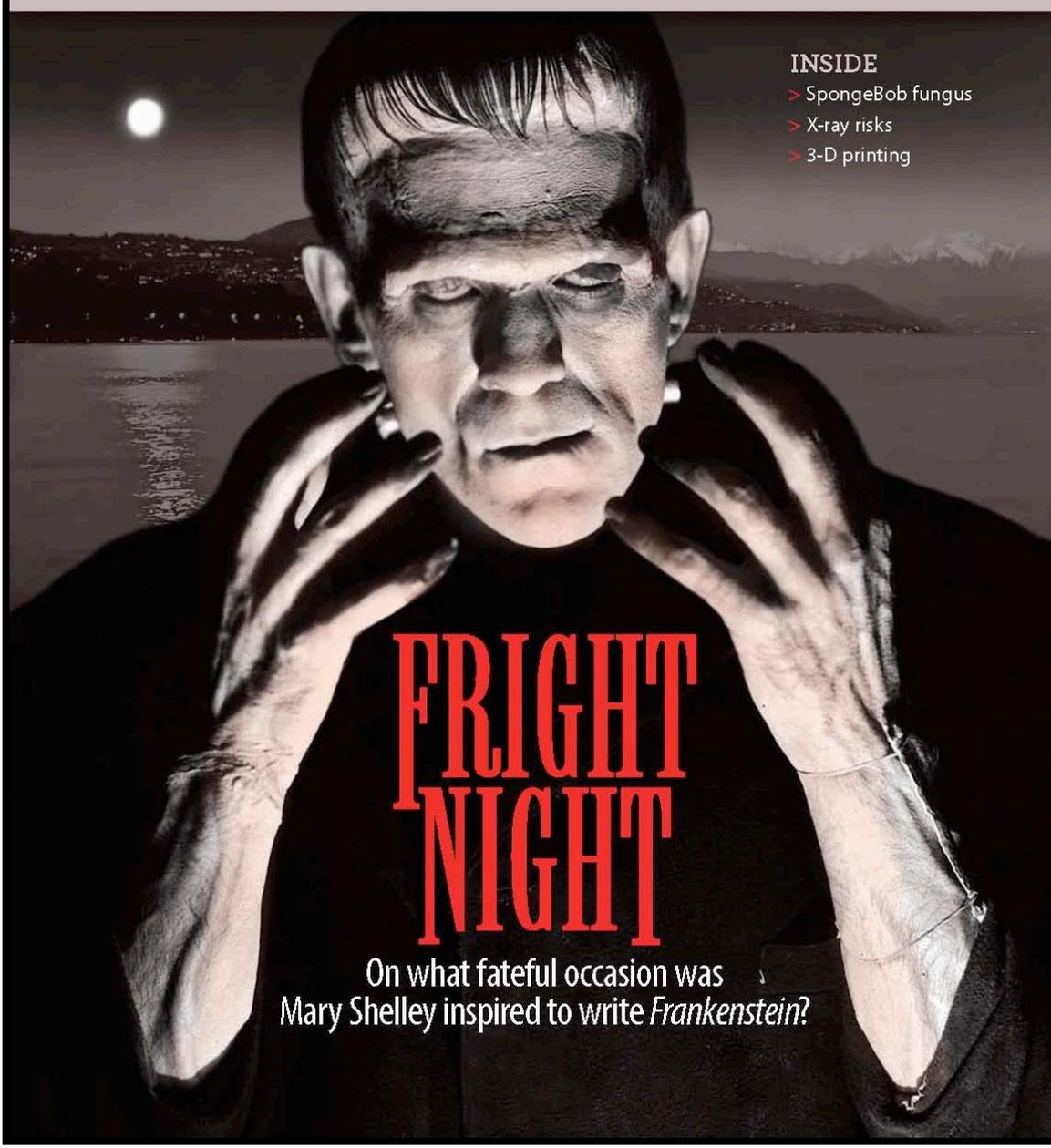
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FRIGHT NIGHT

On what fateful occasion was
Mary Shelley inspired to write *Frankenstein*?

▶ EARTH



It is a stormy night in the mountains of Germany. In a dreary, candlelit laboratory, a scientist kneels beside a long bench. On it lies his handiwork: a beast assembled from human body parts robbed from nearby graves. Suddenly, the beast's eyelids open. The monster has come to life.

So proceeds the famous tale *Frankenstein*, written by 21-year-old Mary Shelley. Later, Shelley revealed that the "ghastly image" of the scientist and the beast that inspired her grim masterpiece came to her in a "waking dream" one terrifying night.

Exactly which night has always puzzled historians. Don Olson now thinks he knows. Olson is a physics professor at Texas State University who has made a career of using astronomy to solve literary and artistic mysteries.

GHOST STORIES

The story of *Frankenstein's* origin began on an actual dark and stormy night in June 1816. Shelley, her husband, and three friends were summering at Lake Geneva in Switzerland. As the rain pounded and lightning flashed, they entertained one another with old ghost stories. Then one friend, the poet Lord Byron, had an idea: "We will each write a ghost story."

Shelley struggled to come up with one. "I busied myself to think of a story . . ." she wrote later, ". . . one to make the reader dread to look round, to curdle the blood."

Several days later, she said, the group had a conversation about the nature of life. They wondered whether a corpse could be brought back from the dead. The discussion, Shelley recalled, went on until after the "witching hour" of midnight.

That night, as she fell asleep, Shelley had the waking dream. In it, the terrified scientist flees, only to

By Beth Geiger

FRIGHT NIGHT

On what fateful occasion was Mary Shelley inspired to write *Frankenstein*?

940L

be awakened by "the horrid thing ... at his bedside ... looking at him."

"I opened [my eyes] in terror," Shelley recalled. She looked frantically around her bedroom. Among other details, she noted moonlight "struggling" through the shutters.

The next evening, Shelley frightened her friends with the story we now know as *Frankenstein*. Her dark tale has raised the hair on readers' necks ever since. For Olson, Shelley's reference to moonlight raised his eyebrows.

OLD HAUNTS

For years, scholars have puzzled over the exact details of *Frankenstein's* creation. When did Lord Byron issue the challenge? When did Shelley have her waking dream? "Just like today, we want to re-create the day-by-day activities of famous people," says Charles Robinson, a *Frankenstein* expert at the University of Delaware. Some scholars have even suggested that Shelley made up the waking dream story, perhaps to sell books.

To get at the details, Olson and fellow physics professor Russell Doescher flew with several students to Shelley's old haunts in Switzerland. The ghost stories were told at Lord Byron's home, Villa Diodati, which still exists, on the side of a steep hill overlooking Lake Geneva. Olson's mission was to determine whether there were any nights in June 1816 when the sky matched up with Shelley's account.

Many scholars believe that Shelley's waking dream haunted her on June 22, 1816. Using a computer program, Olson checked the phases of the moon for June 1816. On June 22 the moon was a *waning crescent*, only 13 percent illuminated. A *waning crescent* moon is a phase of the moon that appears a few days before the moon is *new*, or completely dark. (See diagram.)



A gibbous moon shines above Villa Diodati, the manor on Lake Geneva in Switzerland where Mary Shelley conceived *Frankenstein*.

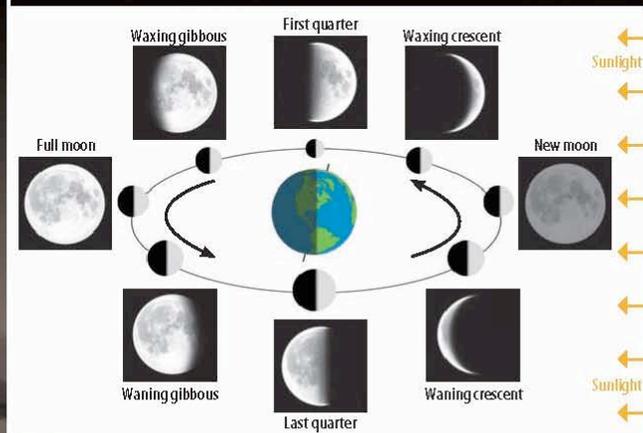
Then the team factored in the steep hill. It blocks the eastern sky, where the moon rises. The team concluded that June 22 was a no-go. The moon did not rise high enough that night to clear the hill before dawn, Olson explains in the November issue of *Sky & Telescope*.

June 16 was a much better match, however. In the early hours of that morning, Lake Geneva was lit by a *gibbous* moon—a moon more than half illuminated. The moon also rose earlier that morning than it did on the 22nd, clearing the hill just before 2 a.m.

Those circumstances fit Shelley's account of going to bed sometime after midnight, having her vision, and seeing moonlight. "We calculated that Shelley's waking dream occurred between 2 a.m. and 3 a.m. on June 16, 1816," Olson told *Current Science*.

In a letter, Shelley also described a lightning storm over the lake on the evening of June 13. If Lord Byron issued his challenge on that evening, the "life" discussion could have happened on the 15th and Shelley's dream early on the 16th. Says Olson: "It fits her story perfectly." **CS**

Phase Change Moonlight is simply reflected sunlight. As you can see from the center of this diagram, half of the moon always faces the sun, just as half of Earth always faces the sun. But during the course of every month, the moon goes through phases. Its appearance to people on Earth goes from a fully lit sphere to a darkened sphere and then back to a fully lit sphere. That happens because, as the moon revolves around the planet, its position changes relative to Earth and the sun, so what we see of the moon changes too.



Mary Shelley: Bettmann/Corbis; Frankenstein: The Granger Collection; Background: Dan El Shalabi; Manor: Don Olson/Texas State; Moon: John W. Bova/Photo Researchers, Inc.; Graphic: Photo Researchers, Inc.; Moon phases: Igor Kofronov/Alamy

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Scientists Back Up Mary Shelley's 'Frankenstein Moon' Claim

By: MEGAN GIBSON (1 day ago)

Topics: ARTS, BOOKS, FRANKENSTEIN, LITERARY THEORY, LITERATURE, LORD BYRON, MARY SHELLEY, MOON, SCIENCE



Patricia Hamilton/ Getty Images

Even back in the 19th century, people wanted to know how authors got their ideas. Except, back then, not everyone believed the answers.

Case in point: Mary Shelley's account of where she got the idea for *Frankenstein* has long been disputed by literary scholars. In the preface to the 1831 edition of the novel, Shelley wrote that she had the idea for the monster tale in the summer of 1816, when she stayed in a manor on Lake Geneva with Percy Bysshe Shelley (her future husband) and the writers Lord Byron and John Polidori. After Byron had suggested that they each write a ghost story, Shelly claimed she struggled with writer's block.

4

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