

LOST LA

CURRICULUM PROJECT

HISTORICAL INQUIRY QUESTION

Why did Los Angeles become a center of astronomy?

LOST LA EPISODE

**Discovering the Universe: Exploring the Cosmos
Atop Mount Wilson**



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Why did Los Angeles become a center of astronomy?

Author of Lesson

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Content Standards

11.5.7 Discuss the rise of mass production techniques, the growth of cities, the impact of new technologies (e.g., the automobile, electricity), and the resulting prosperity and effect on the American landscape.

11.8.4 Analyze new federal government spending on defense, welfare, interest on the national debt, and federal and state spending on education, including the California Master Plan.

CCSS Standards

RH.11-12.1 Cite specific textual evidence to support analysis of primary and secondary sources, connecting insights gained from specific details to an understanding of the text as a whole.

WHSt.11-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

SL.11-12.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11-12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

Lost LA Episode

Los Angeles has long been known as the city of "stars". However, there is more to that statement than first meets the eye. While everyone might be familiar with Los Angeles' connection with the stars of Hollywood, not many are as familiar with the city's connection with the literal stars in our night sky. This lesson builds on the Lost LA episode "[Discovering the Universe: Exploring the Cosmos Atop Mount Wilson](#)" to illustrate how places such as Mount Wilson and the Jet Propulsion Laboratory have made Los Angeles a historic place in the annals of astronomy.

Overview of Lesson

In this lesson, students will explore the role of the city of Los Angeles in the history of astronomy, paying particular attention to different sites of astronomy including the Mt. Wilson Observatory, the Jet Propulsion Laboratory, and the Griffith Observatory. Additionally, students can engage in an analysis of an important discovery in astronomy through an included extension activity.

Sources

- A. *Publications of the Astronomical Society of the Pacific*. (1954) [The Founding of the Mt. Wilson Observatory](#).
- B. "Griffith's Transforming Vision" under A History of Griffith Observatory section. [Griffith Observatory](#).
- C. "JPL's beginnings" under the History section. [Jet Propulsion Laboratory](#).
- D. Chiotakis, Steve and Mesirov, Tod. (2019) *How Downey, California helped put Apollo 11 on the moon (and get the astronauts back safely)*. [KCRW](#).
- E. Masunaga, Samantha. (2018) *Why does SpaceX stay in the costly Los Angeles area? It's where the talent is*. [LA Times](#).
- F. [H335H \("Hooker plate 335 by Hubble"\)](#).

Procedures

1. Warm-Up: Have students answer the following question on a separate sheet of paper to engage prior knowledge:

"What is Los Angeles most famous for?"

Ask them to use their own personal experience as well as knowledge of the city to answer the question. After, have students share their responses with a partner and then ask for a few volunteers to share out with the class.
2. Inform students that another industry has been very important in the city's history: the field of astronomy. Provide students with the definition of astronomy below:

Astronomy: the study of stars and other celestial objects of the Universe
3. Introduce the inquiry question: *Why did Los Angeles become a center of astronomy?*
4. Watch part of the [Lost LA episode](#) video on Mt. Wilson. (*Play the first half of the episode up to 10:27*)
5. Next, model the close reading strategy with students using **Source A** on Mt. Wilson's establishment as an observatory. For this strategy, have students read the source individually first, then review together as a whole class, making sure to focus on information related to Mt. Wilson's establishment as an observatory. After reading the source, answer the corresponding questions on the said handout as a whole class.

6. Afterward, have students work in groups to analyze **Sources B-E**. Assign an individual source to each group and have them work on their source first, reading and answering corresponding questions. Ask students to chart their responses on chart paper to share with the class.
7. Finally, once all students are finished with their group work, have each group report back their learnings with the rest of the class. As each group presents, have the other groups take notes on the information being presented for use in their assessment.
8. **Extension Activity:** Have students answer corresponding questions on the Source F handout with an image of the Hooker plate to understand its significance in the history of astronomy. You can replay the Hooker plate portion of the episode toward the beginning to assist them with analysis.

Assessment

Students complete an **eleven-sentence paragraph describing** why Los Angeles became a center of astronomy. Students can also draw an accompanying picture to go with their paragraph, engaging multiple modalities in the process. A guide on how to write this paragraph is included at the end of this lesson.

Bibliography

- Adams, Walter S. 1954. *The Founding of the Mount Wilson Observatory*. Publications of the Astronomical Society of the Pacific.
<http://www.mtwilson.edu/old/articles/Founding.pdf>
- Chiotakis, Steve and Tod Mesirov. 2019. *How Downey, California helped put Apollo 11 on the moon (and get the astronauts back safely)*. KCRW.
<https://www.kcrw.com/news/shows/greater-la/apollo-11-how-southern-california-engineers-helped-change-history/how-downey-california-helped-put-apollo-11-on-the-moon-and-get-the-astronauts-back-safely>
- Griffith Observatory Foundation. A History of Griffith Observatory.
<https://griffithobservatory.org/about/observatory-history/history-1896-2002/>
- Jet Propulsion Laboratory. History. <https://www.jpl.nasa.gov/who-we-are/history>
- Masunaga, Samantha. 2018. *Why does SpaceX stay in the costly Los Angeles area? It's where the talent is*. <https://www.latimes.com/business/la-fi-spacex-los-angeles-20181017-story.html>

SOURCE A

The Founding of the Mount Wilson Observatory

Adams, Walter S. 1954. Publications of the Astronomical Society of the Pacific.

The idea of establishing an observatory on Mount Wilson, or Wilson's Peak as it was known in earlier years, although its shape is far from that of a peak in the usual sense, did not originate with Dr. Hale. As early as 1886 E. F. Spence, a Los Angeles banker with an interest in astronomy, had suggested to President Bovard of the University of Southern California the possibility of providing the University with a great telescope, larger than any other in the world, to be located at the best possible site...All of this occurred in June 1887. Since Mount Wilson seemed to be the most promising site available, Pickering agreed to send out an expedition from the Harvard College Observatory equipped with a 13-inch photographic telescope "to test the atmospheric qualities at that altitude for telescopic observations."

In January 1889 the Harvard expedition arrived in Pasadena, and soon afterward went up to Mount Wilson. The party consisted of President Bovard, W. H. Pickering of the Harvard staff, Alvan Clark, and Captain T. E. Fraser, the able superintendent of construction of the Lick Observatory. As a result of their trip the party returned full of enthusiasm over the site and the project. The Trustees of the Spence Observatory, a newly organized group, gave a preliminary order to Alvan Clark and Sons for a 40-inch telescope, and in addition a 24-inch double achromatic photographic telescope. The final contract was signed about a month later...

Source Questions

What did the expedition want to test at the site of Mt. Wilson?

What was the result of their trip to Mt. Wilson? How did they feel about it?

What role did geography play in the selection of this location?

SOURCE B

A History of Griffith Observatory

Griffith Observatory Foundation

<https://griffithobservatory.org/about/observatory-history/history-1896-2002/>

Griffith J. Griffith was introduced to astronomy through the Astronomical Section of the Southern California Academy of Sciences. He was also impressed by his visits to the new research observatory established at Mount Wilson in 1904. He believed that an individual gained an enlightened perspective when looking at the skies. His reaction after looking through the 60-inch telescope at Mount Wilson – then the largest in the world – was described by John Anson Ford: “The experience moved him profoundly – a distant, heavenly body suddenly being brought so close and made so real!” Ford quotes Griffith as saying “Man’s sense of values ought to be revised. If all mankind could look through that telescope, it would change the world!”

Griffith’s experience on Mount Wilson focused his desire to make science more accessible to the public. On December 12, 1912, he offered the City of Los Angeles \$100,000 for an observatory to be built on the top of Mount Hollywood to be fully owned and operated by the City of Los Angeles. Griffith’s plan for the observatory would include an astronomical telescope open to free viewing, a Hall of Science designed to bring the public into contact with exhibits about the physical sciences, and a motion picture theater which would show educational films about science and other subjects. This last aspect of the plan would eventually evolve into the planetarium, a technology not invented until the 1920s.

Source Questions

What was Griffith’s reaction when looking through the telescope at Mt. Wilson?

Why did Griffith want to build an observatory in the city of Los Angeles?

What role did geography play in the selection of this location?

SOURCE C

History

Jet Propulsion Laboratory.

<https://www.jpl.nasa.gov/who-we-are/history>

The origins of the Jet Propulsion Laboratory date back to the 1930s, when Caltech professor Theodore von Kármán oversaw pioneering work in rocket propulsion. After unsuccessful and sometimes hazardous experiments, several graduate students led by Frank Malina, along with rocket enthusiasts from the Pasadena area, moved their work off campus. They chose the Arroyo Seco, a dry canyon wash north of the Rose Bowl in Pasadena, California – and future home of JPL.

Source Questions

Where was the initial work being done to research how to launch rockets?

Why do you think the Jet Propulsion Laboratory eventually decided to remain in the Los Angeles area?

What role did geography play in the selection of this location?

SOURCE D

How Downey, California helped put Apollo 11 on the moon (and get the astronauts back safely)

Steve Chiotakis and Tod Mesirow. 2019. KCRW.

Before the space race of the 1960s, aeronautics workers built aircraft in Downey. The small city played a key role in equipping Allied forces with planes and parts during World War II.

After the war, North American Aviation (NAA) started operating in Downey, and employed thousands.

In 1960, the company won the bid from NASA to design and construct the command and service module (CSM) for the Apollo program. Functioning as a mothership, the CSM carried a crew of astronauts and the second Apollo spacecraft, the “lunar module,” to lunar orbit, and brought the astronauts back to Earth.

Once NAA won the bid, its workforce ballooned and 35,000 workers descended on the small city.

“A huge majority were just blue collar technicians who could build stuff with their hands,” said Dickow. “This facility was bigger than Disneyland. 24/7, three shifts a day, tons of people and activity.”

Source Questions

What role did Downey workers have during World War II? How did this work help them transition to the space race?

Why do you think NASA decided to give government contracts to this company in Downey?

What role did geography play in the selection of this location?

SOURCE E

Why does SpaceX stay in the costly Los Angeles area? It's where the talent is

Samantha Masunaga. 2018. Los Angeles Times.

Although SpaceX has facilities outside California — launch and rocket refurbishment in Florida, test sites in Texas — and it recently accepted an incentive agreement to expand in Coryell County near Waco, Texas, the Elon Musk-led venture is staking its expansion plans on Southern California for a reason. It wants to take advantage of the region's vast aerospace talent pool.

The majority of SpaceX's more than 6,000 employees are based locally.

"More important than anything is [the] quality of people," especially in engineering, said Greg Autry, director of the Southern California Commercial Spaceflight Initiative at the USC Marshall School of Business.

Since moving into a former Northrop Corp. facility off Crenshaw Boulevard in 2007, SpaceX now occupies 10 buildings in Hawthorne, said Steve Basham, senior market analyst at CoStar Group, a commercial real estate data firm. Most of the company's expansion occurred from 2014 to 2016. That's when the company began to notch a number of milestones, such as a \$2.6-billion NASA contract to build an astronaut transport capsule and the earliest landings on Earth of its first-stage rocket booster. The first of those boosters stands sentry outside the main Hawthorne facility.

Source Questions

Why does SpaceX choose to continue to expand in Southern California?

How is this reason similar to or different from some of the articles (e.g. JPL, Downey)?

SOURCE F

H335H ("Hooker plate 335 by Hubble")

Carnegie Institution for Science

<https://obs.carnegiescience.edu/PAST/m31var>



On the night of October 5-6, 1923, Carnegie astronomer Edwin P. Hubble took a plate of the Andromeda Galaxy (Messier 31) with the Hooker 100-inch telescope of the Mount Wilson Observatory. This plate, with identification number H335H ("Hooker plate 335 by Hubble"), is famous for having led to his discovery of the first Cepheid variable star in M31, which established beyond any doubt that M31 was a separate galaxy from our own.

SEE What do you see on the plate?	MEAN What does the "VAR" notation mean in the plate?	MATTER What was the significance of this plate to astronomy?

HANDOUT 1: THE 11-SENTENCE PARAGRAPH FORMAT

This writing strategy can be used to support students in the writing of the “Assessment” portion of this Lesson.

There must be thorough “commentary” (explanation/analysis) of your “concrete detail” (textual support/evidence) that relates back to the main points or topic sentence of the whole paragraph.

1. Thesis: state the topic of your paragraph and the main point you want to make about the topic.
2. Introduce the first reason or example that supports your main point (concrete detail).
3. Provide a quote or specific example as **evidence** or support.
4. Explain how the quote or example supports your main point (**commentary**).
5. Transition to another reason or example that supports your main point (concrete detail).
6. Provide a quote or specific example as **evidence** or support.
7. Explain how the quote or example supports your main point (**commentary**).
8. Transition to a third reason or example to support your main point (concrete detail).
9. Provide a quote or specific example as **evidence** or support.
10. Explain how the quote or example supports your main point (**commentary**).
11. Write a concluding sentence that explains how all three of the examples above support your thesis.