# Geology of the Gold Belt Byway: Educational Outreach to Young Scientists in

# Southern Colorado



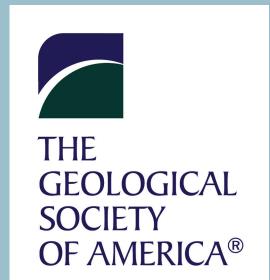
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#### Motivation

The Junior Explorer program of the Bureau of Land Management (BLM) focuses on educating children about the history, conservation, and preservation of BLM lands through interactive activity booklets.

These booklets provide a simple and fun method of learning for children, and are used to highlight the scientific and historic importance of specific areas.

The Gold Belt Byway in southern Colorado exhibits extensive historic and scientific significance, including many fossil quarries and localities as well as a rich mining history (Figure I). This scenic byway is a perfect tool for educating kids about basic geology and paleontology, as well as introducing practical economic geology.

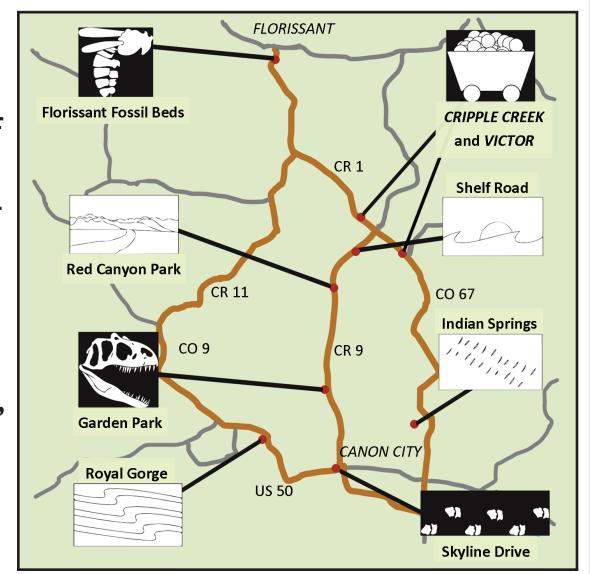


Figure 1. Map of the Gold Belt Byway. Each location has its own unique icon used throughout the book

# Objectives and Book Design

The Geology of the Gold Belt Byway Junior Explorer book uses a mix of instructional prose and activities to meet these educational goals and to cater to different learning styles. On-site activities are utilized to engage kinesthetic learners. Tables and illustrations engage visual learners, whereas puzzles and vocabulary boxes are in place

to assist intellectual learners. The large vocabulary associated with geoscience is introduced by providing definitions on the same page where new terms are used in context.

Geologic time is a recurring theme throughout the book. A time scale of all eras and periods of the Phanerozoic is presented with a description of how it is used. Each site in the book is discussed with a graphic representation of the geologic age of that site and a unique symbol to illustrate its geologic importance (Figure 1). The final activity in the book asks the reader to use that information to put the sites in stratigraphic order. In this way, readers begin to learn how geologists correlate widespread outcrops (Figure 2).

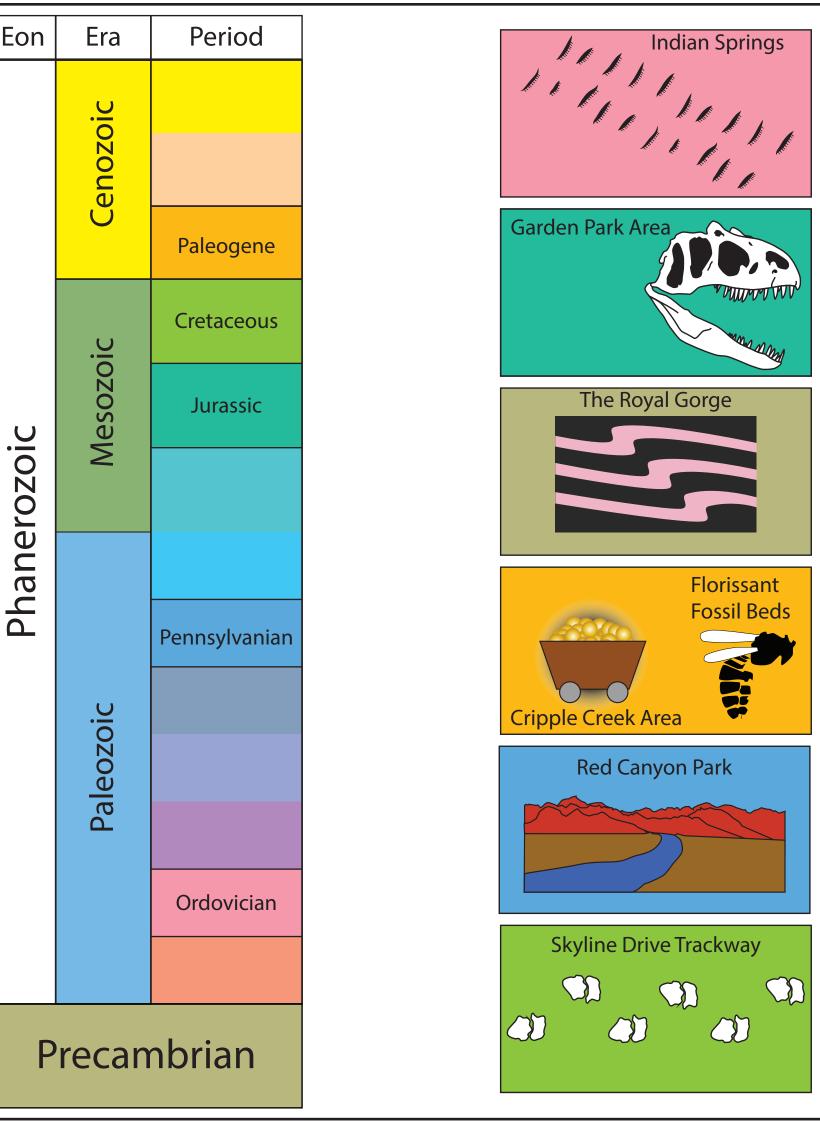


Figure 2. Geologic Time in the Gold Belt Byway. Readers discover the relative ages of each location by matching colors to the correct geologic age.

# 1) "These rocks tell me there was strong river here, carrying some pretty, big pebbles downstream." 2) "Ooh, I wish I could have been here in the past. I would have been floating in a nice warm ocean. And look at these neat corals!" 3) "I think I'm in the sea, too! But this rock has a lot of muddy layers in it." 4) "I'm on dry land here. See these cracks in the mud? Oh, there might have been a river nearby, too!" 5) "It's a good thing I packed sunscreen, because I'm on a nice sandy beach! I can tell because some of these other rocks are from deeper water." 6) "Even though this rock is on the surface now, it formed deep underground. I'm glad it isn't still melted. Ouch!"

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**ROCKS** 

Figure 3. The Story of Colorado. Readers understand how depositional environments are reflected in the rock record by matching descriptions to corresponding rock types.

Through the geology of each site, readers learn to recognize common types of rock and how to interpret them. Readers are presented with the definition and significance of several rock types both in the text and in an illustrated chart. This chart is used in two activities that ask readers to make an interpretation based on lithology, and to match depositional environments to their corresponding rock types (Figure 3).

Although the primary age group targeted in the book is 9-12, activities for all ages are included so younger children can participate.
Additionally, activities were designed to meet Colorado Academic Standards for Science, and fulfill standards specific to 1st, 3rd, 4th, 5th, 6th and 7th grades. Readers are encouraged to read this book with family, friends, or teachers who can help them to get the most out of the material.

# Objectives and Book Design (cont.)

An essential theme for this activity booklet is encouraging diversity in STEM fields. The illustrations used throughout depict a multicultural view of who can be a Junior Explorer. Readers are accompanied through the activities by characters from a variety of backgrounds to demonstrate that science is not the specialty of any one demographic (Figure 4).

The book is being disseminated in hardcopy from several locations along the Gold Belt Byway including the Visitor Center at Florissant Fossil Beds National Monument, museums in Cripple Creek and Victor, and the BLM Royal Gorge Field Office in Cañon City. Additionally, the book is available as a PDF file from the Gold Belt Byway Association website and the BLM Junior Explorer website.



Figure 4. The Junior Explorers represent a variety of backgrounds, and accompany readers through activities and text.

### Educational Goals

Children who read The Geology of the Gold Belt Byway Junior Explorer Book will:

- I) Know where to find several points of geologic and historic interest along the Gold Belt Byway.
- 2) Understand how geologists and paleontologists interpret the past based on rocks and fossils.
- 3) Be able to identify several common types of rock found in the Gold Belt area.
- 4) Understand the Geologic Time Scale and how it is used.
- 5) Be able to describe how Colorado's geologic past has shaped the present.
- 6) Be able to make good choices for the conservation and stewardship of public lands (Figure 5).

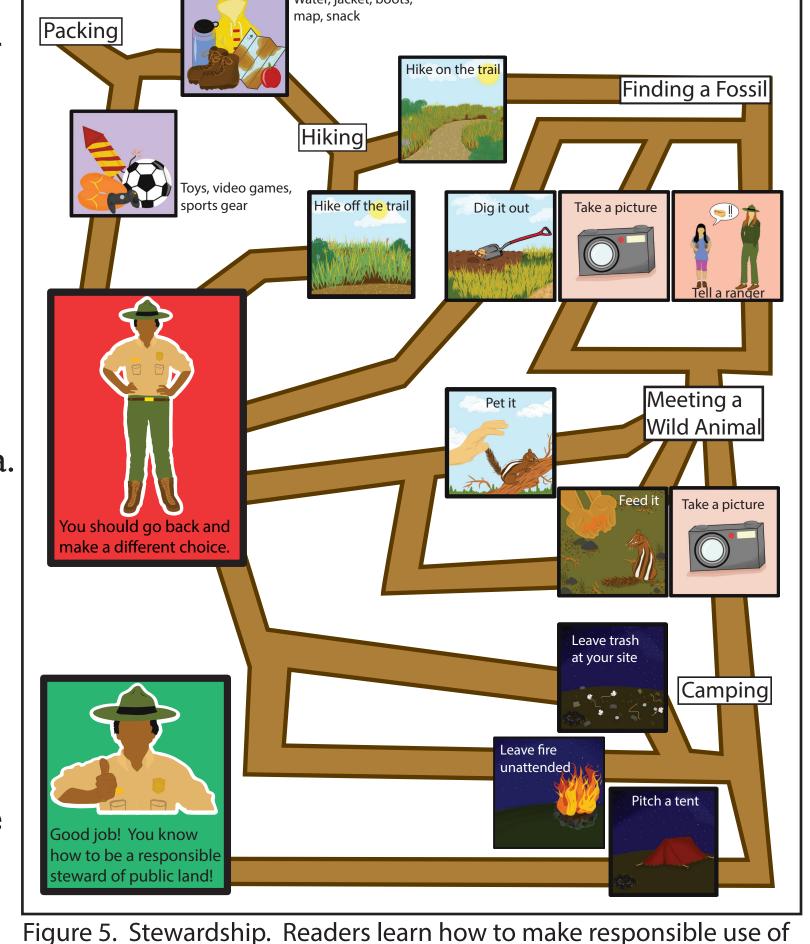


Figure 5. Stewardship. Readers learn how to make responsible use of public lands by navigating this maze of choices. Good decisions allow the reader to progress, whereas poor choices require the reader to rethink their behavior before proceeding.

## Acknolwedgements

We thank GeoCorps America and the Geological Society of America for sponsoring this project through internships at the Bureau of Land Mangement Royal Gorge Field Office and at Florissant Fossil Beds National Monument. We thank Herb Meyer and the staff at Florissant, the staff at the Royal Gorge Field Office, Renee Garfias, and our fellow GeoCorps interns.

# The Gold Belt Tour National Scenic Byway connects many more points of interest than could be included in a single Junior Explorer book. Consequently, focus was placed on seven sites of particular scientific and historic value. I) Florissant Fossil Beds National Monument is famous for its

Gold Belt Tour National Scenic Byway

- I) Florissant Fossil Beds National Monument is famous for its diverse and very well-preserved Late Eocene flora and fauna. Including Florissant also facilitates cooperation between the BLM and the National Parks Service for this and future projects.
- 2) Cripple Creek and Victor were established during the Colorado Gold Rush in the late 19th Century. These historic mining towns give the Gold Belt Byway its name, and continue to produce gold today.
- 3) Red Canyon and Shelf Road are home to a city park set in the hoodoos of the Fountain Formation, and a BLM-managed climbing area on the cliffs of the Fremont Formation. These settings allow visitors to get a closer look at local geology without needing to go off-trail.
- 4) The Garden Park area was a famous battlefield during the Bone Wars, and produced some of the most well-known and recognizable Jurassic dinosaurs. Today the BLM maintains interpretive sites near the Marsh-Felch Quarry and the Cleveland-Delfs Quarry.
- 5) The Indian Springs Trace Fossil Site is a National Natural Landmark featuring a remarkable array of trackways, feeding traces, burrows, and other trace fossils in the Ordovician Harding Formation. The site is protected on private land, but the landowners offer tours for interested visitors.
- 6) The Royal Gorge of the Arkansas River offers a spectacular view of Precambrian gneiss, granite, and schist carved by the Arkansas River within the last five million years. The human history of Royal Gorge involves stymied explorers, heated railroad disputes, and a bet leading to the construction of one of the highest suspension bridges in the world.
- 7) Skyline Drive was built in 1909 by prison labor along the hogback of the Dakota Group, and offers a wonderful view of local stratigraphy and the Cañon City Basin. More recently, an extensive dinosaur trackway was discovered at the top of the hogback preserving the prints of at least two different species.