Friends of the Florissant Fossil Beds eNewsletter

#9—September 27, 2012

Florissant's Jeff Wolin wins Intermountain Region's Freeman Tilden Award

The Intermountain Region has awarded park ranger Jeff Wolin of Florissant Fossil Beds National Monument the region's 2012 Freeman Tilden Award for excellence in interpretation.

Wolin, with six other regional winners, is now under consideration for the National Park Service's national Freeman Tilden Award, which will be presented in November at the National Association for Interpretation's annual workshop.

The award, given annually, is one of the highest honors for an individual Park Service interpreter. Wolin was nominated for his vision and work in developing the Park Service's first Junior Ranger music compact disc, which is now in production and scheduled for release in October.

Wolin wrote and/or musically arranged, performed and coordinated the production of 19 original songs about a wide variety of national park themes, resources and geographical locales. He wrote them as interpretive learning tools to help diverse youth connect with the national parks.

"Music is a powerful instrument in sharing important stories and fostering understanding of the world around us," said Intermountain Region Director John Wessels. "The connections that Jeff's songs and the Junior Ranger album create are bound to enhance the experiences of young park visitors for years to come. Jeff's enthusiasm and hard work are making a tangible and positive contribution to Park Service interpretation and education."

Over the past year, Wolin, who accompanies himself on guitar, performed the songs across the country at a variety of Park Service and Department of the Interior special events. As the idea of producing a Junior Ranger music album

began to take shape, he started collaborative partnerships between his Colorado park and the Washington Office, the National Park Foundation, Eastern National Cooperating Association, and New Orleans Jazz National Historical Park.

Wolin sought and secured the participation of a variety of expert musicians — many of them young people themselves — to record his songs. Once available, the low-cost CD will enable families to add a musical component to their visits and trips to and from national parks, with positive messages of resource stewardship and protection for their children's future memories. Proceeds from CD sales are expected to provide long-term funding for the national Junior Ranger Program.

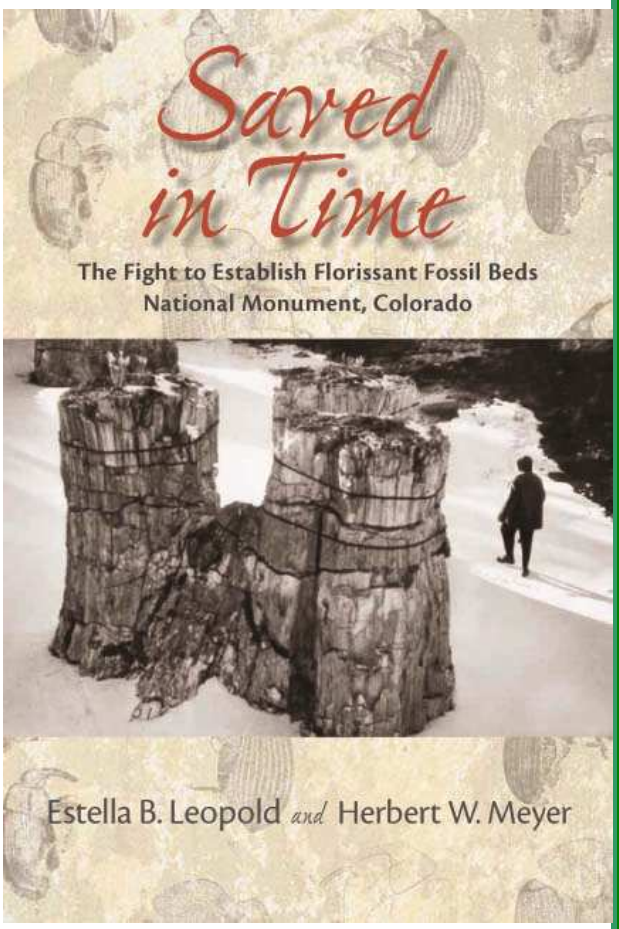
The award is named for Freeman Tilden (1883-1980), an American novelist and playwright who, tiring of fiction, turned to the national parks for inspiration. His works, including *The National Parks, What They Mean to You and Me* and *Interpreting Our Heritage*, have had a profound influence on interpretation and education programs in the National Park Service. The award was created in 1982 to stimulate and reward creative thinking and work that has positive effects on park visitors. Nominees are judged on creativity, originality, and contributions to enhanced public understanding of the National Park System and the resources it protects.

Contact Information
Name: Patrick O'Driscoll
Phone Number: 303-969-2839
Email: patrick_o'driscoll@nps.gov

New Book Tells the Story of the Monument's

By Herb Meyer
Paleontologist, Florissant Fossil Beds Nat. Mon.

Adjunct Curator, University of Colorado at Boulder Research Associate, Denver Museum of Nature&Science



The new book about the Monument's history – Saved in Time: The Fight to Establish Florissant Fossil Beds National Monument, Colorado – will be available in October. The book was written by Estella Leopold, who spearheaded the lively effort to establish the Monument, and Herbert Meyer, the Monument's paleontologist, with contributions by John Stansfield. It is being published by the University of New Mexico Press and should be available for order from your favorite bookstore or Web site. The list price is $24.95.

Florissant was established as a national monument in 1969 from private lands in order to save the rare fossil beds from planned real estate development. Time was quickly running out as these 34-million-year-old fossils were on the threshold of destruction. Congress was acting slowly, and the only hope was to get the courts to listen before it was too late. The cry to battle against the developers came from Estella Leopold – the book's primary author – who tells her story about organizing a grassroots effort and finding the country's best attorney to lead the charge. The fiery attorney was Victor J. Yannacone, Jr., who became the founder of environmental law. Yannacone and Judge Alfred P. Murrah, along with Leopold and two other women activists and their friends who were willing to stand in the face of bulldozers, are among the many heroes in this story. Read this book and you will also meet the villains as the story unfolds with all of its many twists, turns, and insults. Needless to say, the story ends with a victorious happy ending. Herb Meyer recounts the deeper story of Florissant's history, unveiling the early paleontologists, homesteaders, and landowners, and also some of the revealing untold stories behind the national monument's management.

The back cover editorial review describes that the book "reads like a mystery thriller wherein a handful of committed environmentalists forestall the destruction of America's premier fossil beds. Brings to mind John Nichols's The Milagro Beanfield War and Edward Abbey's The Monkey Wrench Gang. It is a true story with a happy ending (unless you're a real estate developer)." (Jack Loeffler, author of Adventures with Ed: A Portrait of Abbey)

Partial funding for preparation of the book came from The Friends of the Florissant Fossil Beds. The authors are very grateful for this support. The Friends are exploring the possibility of obtaining a stock of autographed copies that will be sold as a means of fund-raising.

Friends Support Paleontologist's Travel to Japan

By Herb Meyer

Collecting at one of the fossil plant sites in Japan

Thanks to the support from the Friends, I was able to attend the International Organisation of Palaeobotany Conference in Japan from August 21 to September 4. This conference, held every four years, is the most important gathering of paleobotanists worldwide. The Friends also helped support my previous attendance at this conference when it was held in Germany and China. It helps to provide important exposure for our ongoing projects at the Florissant fossil beds.

The conference provides excellent opportunities to stimulate paleobotanical research at NPS sites and to interact with a broad spectrum of participants from many countries. The benefit of the conference is that we are able to draw the attention of professional paleobotanists to Florissant. Nothing surpasses the one-to-one personal contacts at conferences for stimulating this type of interaction, which is vital to the sustainability of encouraging new research at NPS units. The conference was attended by 514 participants representing 50 countries.

I was invited by the conference organizers to give two poster presentations about the monument's ongoing research. These presentations dealt with fossil plant evidence for significant climate change in the southern Rocky Mountains (including Florissant) during the Eocene-Oligocene transition about 33-34 million years ago. One of the posters was co-authored by other researchers who have worked at Florissant, including Estella Leopold (founder of the Monument), Melissa Barton (former Friends webmaster and museum tech), and Dena Smith (University of Colorado professor). The poster showed our research comparing Florissant to the slightly younger Antero Formation in nearby South Park. The second poster discussed the history of bristlecone pine in the southern Rocky Mountains during the Oligocene, about 30 million years ago.

The conference was sponsored by the Korakuen Campus of Chuo University, located in the center of Tokyo. I also attended two field trips in other parts of Japan to visit fossil sites and modern forests. Participation in these field trips helps to better understand Florissant's global setting. Some of the fossil plants at Florissant during the Eocene are now restricted to Asia, and comparison with Asian forests helps to interpret Florissant's paleoecology. The field trips enabled me to see the high elevation subalpine vegetation of Japan, including the rare conifer Sciadopitys that is endemic to small areas in Japan. This made for an interesting complement to my poster presentation on the development of subalpine vegetation during the Oligocene in the Rocky Mountains, in which I discussed the importance of the brislecone pine – a North American endemic.

Visiting the unique Sciadopitys forest, a rare conifer

Travel such as this would not be possible without outside support. This is one of the major contributions that the Friends of the Florissant Fossil Beds have made to the Monument in 2012. Thank you very much for helping to make this trip possible!

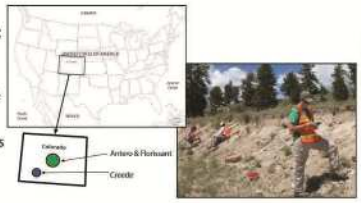
Poster Presentation

Paleobotanical and Pollen Evidence from the Antero Formation (Colorado, USA) for Climate and Floral Change During the Eocene-Oligocene Transition

Herbert W. Meyer[1], Estella B. Leopold[2], Dena M. Smith[3], and Melissa A. Barton[3]
[1]U. S. National Park Service, Florissant, Colorado, USA, Herb_Meyer@nps.gov
[2]University of Washington, Seattle, Washington, USA
[3]University of Colorado Museum of Natural History, Boulder, Colorado, USA

Introduction

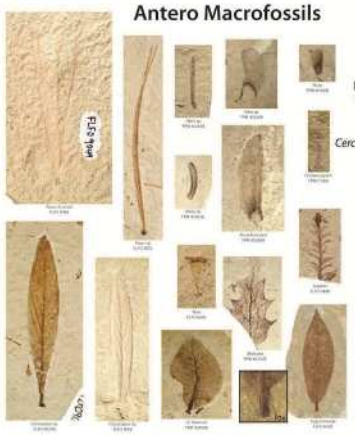
The Antero Formation was deposited in a lacustrine basin about 30 km west of the well-known Florissant Formation in central Colorado. Radiometric dates indicate that Antero is (in part) slightly younger than Florissant and may coincide with the Eocene-Oligocene boundary. A small leaf and seed assemblage shows similarities to both the warmer late Eocene Florissant flora and the cooler late Oligocene Creede flora of Colorado, indicating the onset of cooling in the southern Rocky Mountains during the Eocene-Oligocene transition. New pollen evidence from Antero is presented here to support this conclusion.



Geologic Area & Age

- Lacustrine tuffaceous shale associated with volcanic rocks
- Radiometric $^{40}Ar/^{39}Ar$ dates
  - Antero Formation tuffaceous sediments 33.76 ± 0.15 Ma
  - Antero Formation ignimbrite 33.76 ± 0.10 Ma
- Coincident with Eocene-Oligocene boundary (33.7-33.9 Ma)
- Dates indicate Antero is ~0.31 m.y. younger than Florissant ($^{40}Ar/^{39}Ar$ dated as 34.07 Ma)

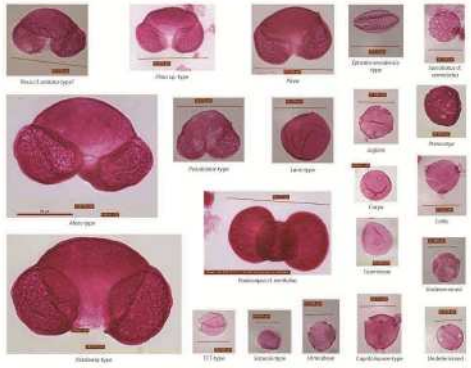
Antero Macrofossils



Conifers
Abies
Picea?
Pinus spp.
(incl. *P. cf. crossii*
Chamaecyparis
Sequoia

Angiosperms
Cercocarpus (dominant)
Mahonia
cf. *Quercus*
Rosa (thorn)
Leguminosae

Antero Pollen



Conifers Dominant
Pinus spp.
Picea spp. (2)
Abies-type

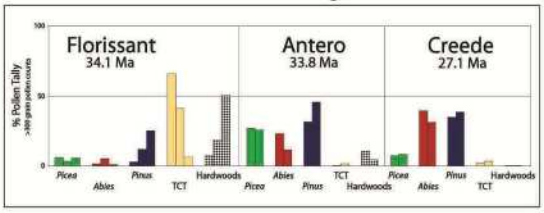
Minor Conifers
Pinus cf. *aristata*-type
Abies cf. *bracteata*-type
Keteleeria-type
cf. *Pseudolarix*
Podocarpus
Ephedra spp.
Larix-type
TCT- Cupressaceae
(incl. *Sequoia*-type)

Angiosperm Hardwoods Rare
Betulaceae types
Carya
Juglans
Pterocarya
Celtis
Ulmoideae

Angiosperm Shrubs & Herbs
Cardiospermum
Sarcobatus
Gramineae
Caprifoliaceae

Uncertain
Cathaya-type?
Tsuga sp.?
T. cf. mertensiana

Pollen Percentages



Comparisons of Late Eocene through Late Oligocene floras of Colorado

	Florissant	Antero	Creede
Age	34.07 Ma (latest Eocene)	33.76 Ma (Eocene-Oligocene boundary)	27.1 Ma (late Oligocene)
Macroflora	Diverse broadleaved hardwoods and angiosperm shrubs (>100 spp.); abundant *Chamaecyparis* and *Sequoia*; uncommon *Pinus* and *Picea*.	*Pinus* (cf. *P. crassii*), *Abies*, *Picea*?, *Cercocarpus*, *Mahonia*, Leguminosae. Shares most taxa with Florissant and some with Creede.	Dominated by *Abies*, *Pinus* (~5 spp., incl. *P. crassii*), *Picea*, *Juniperus*, *Mahonia*, *Ribes*, and *Cercocarpus* (20 genera of angiosperms, esp. Rosaceae shrubs).
Palynoflora	Dominated by TCT (*Sequoia* and *Chamaecyparis*). Pinaceae (*Pinus-Abies-Picea*) moderately common. Hardwood trees common.	Dominated by *Pinus-Abies-Picea*. Hardwood trees sparse in pollen counts. More similar to Creede than Florissant.	Dominated by *Abies* and *Pinus* with lesser *Picea*. Hardwood trees rare (absent from pollen counts); some shrubs present.
Vegetation summary	Warm temperate broadleaved hardwood forest mixed with conifers (primarily *Chamaecyparis* and *Sequoia*). Many genera no longer live in the region today.	Temperate coniferous forest dominated by conifers (pine-fir-spruce and some Cupressaceae) and mixed with broadleaved hardwoods and angiosperm shrubs.	Cool temperate montane mixed coniferous forest (dominated by Pinaceae) mixed with dryland angiosperm shrubs. Many generic similarities to the modern flora of this region.

Responses of Floras to the Eocene-Oligocene Transition

Comparison of the Antero macrofossil and pollen assemblages to the latest Eocene Florissant flora shows the initiation of cooling near the Eocene-Oligocene boundary. Florissant and Antero were deposited under identical taphonomic conditions at similar elevations. The Antero macrofloral assemblage shares most of its taxa with Florissant at the generic level, although this comparison is limited due to the small size of the Antero collection. Antero lacks the high diversity of hardwoods present at Florissant. The Antero pollen assemblage provides more robust data to document abundances of taxa. In comparison to Florissant, it shows a decrease in Cupressaceae ("TCT"), an increase in Pinaceae, and a decline in hardwoods over a period of about 0.3 million years. This difference in floral composition, and particularly the abundance of Pinaceae at Antero, supports evidence that the climatic cooling of the Eocene-Oligocene transition began between the deposition of the Florissant Formation and the Antero Formation.

Comparison of the Antero macrofossil and pollen assemblages to the late Oligocene Creede flora shows continued cooling and the modernization of the flora and climate of the southern Rocky Mountains. Creede and Antero both represent lacustrine sedimentation, although Creede differs because it represents a caldera and may have been at a different elevation. The Antero pollen assemblage is dominated by Pinaceae and more closely resembles Creede than Florissant, and indicates a cool climate. Foliage of the cold-adapted bristlecone pine group (*Pinus crosii*) at Creede and possibly Antero (supported by pollen evidence of *Pinus* cf. *aristata*-type at Antero) supports the interpretation of a cool climate.

Conclusions

New evidence from fossil pollen shows a marked increase in the abundance of cool-adapted montane conifers (*Abies*, *Pinus*, and *Picea*), which increase from about 20% to about 80% during the period from the latest Eocene to the late Oligocene in the southern Rocky Mountains. This cooling is also indicated in the pollen counts by the decline in hardwoods (i.e., angiosperm trees), which are common at Florissant, rare at Antero, and nearly absent at Creede. These changes mark the climate shift from warm temperate conditions indicated at Florissant to cool temperate conditions indicated at Creede. The new pollen assemblage from Antero, combined with previous evidence from macrofossils, shows that a climate shift began near the Eocene-Oligocene boundary in interior North America, and is comparable to other global evidence for climate change during this time. Various estimates indicate that mean annual temperature decreased about 7-8°C from the late Eocene to the late Oligocene in this area.

THE GEOLOGICAL SOCIETY OF AMERICA® Poster designed by Lindsay J. Walker (GeoCorps America, Geological Society of America)

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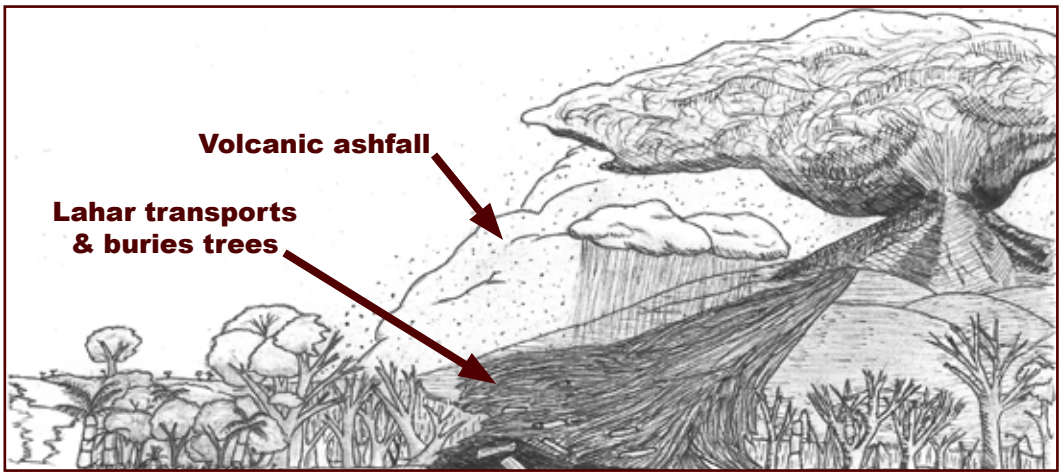
Macrofossil photography by Ashley Ferguson, Kelly Hatton, & Lindsay J. Walker (GeoCorps America)
Pollen specimens photographed by Stephanie Zaborac-Reed (U. Washington)

Note: 3x scale for macrofossils unless indicated otherwise

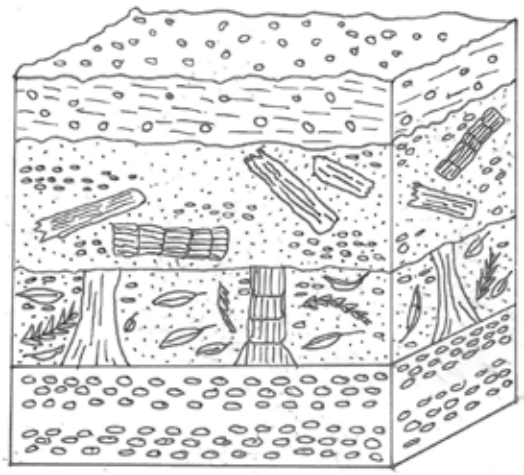
Sexi Through Time

Preservation of the Fossil Forest



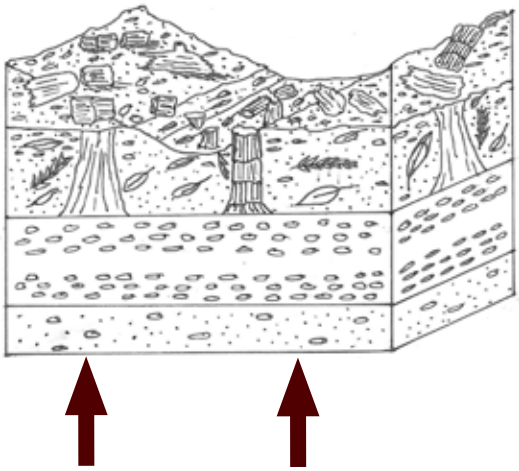
A volcanic eruption occurred near Sexi during the Eocene epoch 39 million years ago. As ash was erupted from the volcano and fell over the tropical forest, it stripped leaves from the trees below. Some ash formed small round rocks, or ”lapilli,” during a rainstorm. Soon after the ash and lapilli first reached the forest floor, a slurry of volcanic debris, a “lahar,” moved downslope and buried the forest.

Burial & Fossilization



The fossil forest at Sexi first became known to science during the 1990s. Once scientists examined the fossil woods and leaves, it became apparent that the ancient low-lying tropical forest buried by the volcano was very different from the evergreen trees and shrubs that cover the hills near Sexi today.

Erosion & Uplift



Sexi Today

Wood and leaves remained encased in the layers of volcanic rocks for millions of years, slowly fossilizing over time. Movement of Earth’s plates later uplifted the buried forest to its present elevation as the Andes Mountains formed. Rain and wind eroded the rocks encasing the forest, exposing the fossil woods and leaves at the Earth’s surface.