

Email correspondence between Connie Barlow and Prof. Estella Leopold

On Aug 12, 2008, at 9:52 AM, Connie Barlow wrote:

Hello Estella!

This is Connie Barlow, founder of TorreyaGuardians.org and a friend of Celia Hunter's. A colleague who knows us both (George Mustoe) suggested I let you know about a conservation biology action my group has just undertaken, in which we named 2 of the 31 endangered seedlings we planted, "Aldo Leopold" and "Celia Hunter" (Celia was a dear friend of mine, and I put a few pinches of her ashes beneath the tree so named; I know that you know her because she and I once camped out at your house while we were in the Seattle area, though you were not there at the time). I have attached jpgs that show the signs we held up for context photo archiving the location of each seedling (we decided to name each, rather than number them; that is me in the photos, holding the signs).

Our action was documented by a writer and a photographer commissioned by Audubon magazine, and will likely appear in the March 2009 issue.

Meanwhile, I have published a photo-essay of this first "assisted migration" for an endangered plant (from the Apalachicola peak-glacial reserve in Florida to the mountains of North Carolina) in light of global warming. A purely upstart citizen undertaking, not having anything to do with the official mgmt plan for this endangered species. ESA had a pre-annual meeting meeting on "assisted migration" last week. You can access it at: <http://www.torreyaguardians.org/waynesville-rewilding.html>

On another thread of connection, I lived part-time during the 90s near where the West Fork meets the East Fork in the Gila Wilderness north of Silver City. I was there during the 75th anniversary of the Gila as a wilderness and the 50th of Sand County Almanac. Aldo is a hero of mine, and I wrote a tribute to his "fierce green fire" story when the Mexican Gray Wolves were first brought in. It was never published, but I put it on audio in 2000 while sitting on a log in the West Fork of the Gila. You can access that if you wish at: <http://www.thegreatstory.org/songs/aldo.mp3>

By the way, a colleague of yours, Hazel Delcourt, was in conversation with a number of us and the conversation led to establishment of Torreya Guardians, aimed at moving this endangered conifer north. Hazel's book, "Forests in Peril" which chronicles her paleobotanical work at pocket Ice Age Refuges was the inspiration for me to begin the conversations.

I am also the author of several books on evolution, most recently, "The Ghosts of Evolution" (Basic Books).

Best wishes,
Connie Barlow

From: "Estella B. Leopold" <eleopold@u.washington.edu>

Date: Thu, 11 Mar 2010 18:14:16 -0800

To: Connie Barlow <cbtanager@bigplanet.com>

Cc: George Mustoe <mustoeg@cc.wvu.edu>, Nina BRADLEY <ninalbradley@gmail.com>

Subject: Re: Aldo Leopold and Celia Hunter trees named for

Dear Connie and George!

I ran across this message about the 2 trees you had planted, naming them Aldo and Celia. Very nice! thanks for your nice thought. I am sending this to my sister, Nina!

I impressed with all your writings and out put! How wonderful. So glad George put me on to your name! Thank you George! Yes I am impressed about the 2 trees, and Celia Hunter etc. Esp. I am charmed by all the book titles you have written!Marvelous! And George and I are publishing a story about a fossil Torreya that grew in Washington State about 11 million years ago! Exciting! Lets talk further!
in admiration- Estella L

Estella B. Leopold
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University of Washington
Seattle WA 98105
ph 206/685-1151

From: Connie Barlow <cbtanager@bigplanet.com>

Date: Wed, 07 Apr 2010 10:30:01 -0700

To: Estella Leopold <eleopold@u.washington.edu>

Cc: Bron Taylor <bronaway@gmail.com>

Subject: Author of Dark Green Religion wants to send Estella a comp copy

Estella -

This is Connie Barlow of Torreya Guardians. A colleague, Bron Taylor, is Professor of Religion and Nature at the University of Florida, and a great appreciator of your father's work. He told me he would love to send you a copy of his new book, "Dark Green Religion: Nature Spirituality and the Planetary Future"

<http://www.brontaylor.com/environmental_books/dgr/dark_green_religion.html>

You can email him a "Yes" if you wish directly at:

Bron Taylor <bronaway@gmail.com>

A quick way to see what his book is about is via this article he published in the St. Petersburg Times:

Toward a Natural Religion, St. Petersburg Times, 3 December 2009,
commemorating the sesquicentennial of Darwin's "Origin of the Species."
www.tampabay.com/news/perspective/toward-a-natural-religion/1056081 <<http://www.tampabay.com/news/perspective/toward-a-natural-religion/1056081>>

Bron is also Editor, Journal for the Study of Religion, Nature, and Culture & the Encyclopedia of Religion & Nature, Founder & President (2005-2009), International Society for the Study of Religion, Nature, and Culture - www.religionandnature.com <<http://www.religionandnature.com>>

From: "Estella B. Leopold" <eleopold@u.washington.edu>

Date: Wed, 7 Apr 2010 16:28:00 -0700

To: Connie Barlow <cbtanager@bigplanet.com>

Subject: Re: Author of Dark Green Religion wants to send Estella a comp copy

Dear Connie-

I am probably more interested in your group, Torrey Guardians, than in the green book! I have one fossil record from the Wilkes Formation at Tenino, Washington, made by a senior paleobotanist, Ronald Brown in USGS. The list of my pollen identifications with Brown's megafossil fit perfectly- so that is a wonderful record! Dating from about 9 million years ago.

I would like to share our paper with you when we can finish it. I will look for my abstract now. EBL

From: "Estella B. Leopold" <eleopold@u.washington.edu>

Date: Wed, 7 Apr 2010 16:26:31 -0700

To: Connie Barlow <cbtanager@bigplanet.com>

Subject: Fwd: Seattle Poster

ABSTRACT FOR POSTER PRESENTATION:

The Wilkes Formation: using stratigraphy and paleobotany to study the effects of ancient volcanic activity on a Miocene forest

George E. Mustoe*, Geology, Western Washington University

Estella B. Leopold, Biology, University of Washington

Thomas E. Yancey, Geology & Geophysics, Texas A&M University

Linda Reinink-Smith, Earth & Space Sciences, University of Washington.

*e-mail: mustoeg@wwu.edu

Late Miocene clay beds exposed along the banks of Salmon Creek in Lewis County, Washington contain abundant specimens of iron carbonate (siderite) that have shapes reminiscent of animal dung. Investigators who have studied these objects have arrived at widely divergent interpretations, divided between those who strongly believe that the objects are true coprolites and those who are adamantly convinced that the objects are pseudofossils. One of the staunchest advocates of the latter viewpoint is University of British Columbia geology professor Dr. W.R. Danner. The doubly-pointed ends and striated surfaces indicate that the coprolite-shaped objects must have originated from plastic extrusion of a viscous parent material rather than from precipitation of minerals in pore spaces in water-saturated sediment, the geochemical process that ordinarily produces concretions. The shapes of the sinuous specimens appear to be perfect for coprolites, but several factors make an excremental origin problematic. Inclusions of undigested material (e.g., bone fragments, plant fibers, hair, or fish scales) are not present, and no animal fossils have been found anywhere in the Wilkes Formation. Also, it is difficult to envision a diagenetic process that would cause fecal material to become completely converted to microcrystalline siderite, while wood fragments in the same bed remained unmineralized. However, it is difficult to envision an inorganic depositional process that could produce shapes that look so much like animal dung.

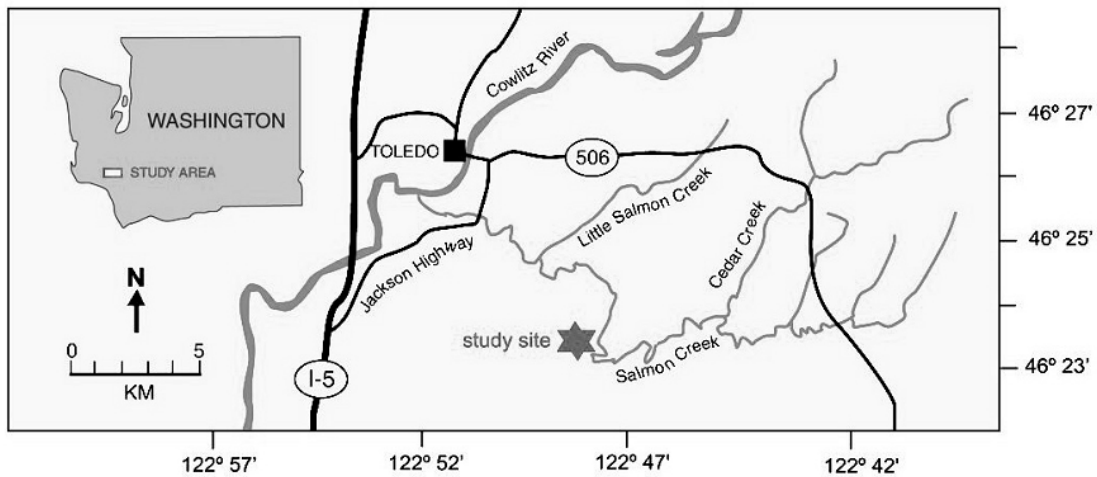
A limitation of past interpretations is that investigators based their hypotheses on specimens that had been fluviually transported, without finding the source strata. In 1993, a site where ferruginous "coprolites" were eroding from a bed within the Wilkes Formation was discovered. In 2007, our team of researchers studied this location in detail, combining stratigraphy, sedimentology, and analysis of fossil pollen from a 24m thick sedimentary sequence exposed along Salmon Creek. Although the alleged coprolites were a geologic attraction, our research focuses on the formation's geologic history, a story of catastrophic mudflows that episodically inundated a forested floodplain, followed by successional development of new plant communities.

The Wilkes Formation comprises three stratigraphic members. The lowest 10 m were deposited by three successive lahars (volcanic mudflows). Each cycle begins with massive sandy silt from the mudflow, topped by fine sediment deposited in standing water, with an upper carbonaceous layer produced by settling of floating organic debris. The 7m middle unit contains alternating beds of mudstone and woody peat, representing episodes of reforestation disrupted by mudflows. Two peat horizons contain an interlayer of volcanic ash. The lower ash layer has a poorly constrained radiometric age of 11.6 ± 0.4 Ma. An upper 5.7m unit of sandy clay was deposited in a lake, produced by blockage of watershed drainage. The highest 2m of clay contain numerous excrement-shaped ferruginous "coprolites".

The Wilkes Formation contains one of the richest pollen records known from the Pacific Northwest. The presence of swamp-dwelling trees such as *Nyssa* (Tupelo) and *Taxodium* (Swamp Cypress) in the lower unit indicates a wet floodplain habitat. Pollen from aquatic plants and algal cysts may represent endemic inhabitants as well as material transported from an upstream lake breached during lahar genesis. Pollen from alder, birch, and other deciduous trees in the middle unit is evidence of episodes of reforestation, consistent with upright woody stems preserved in adjacent mudstone layers.

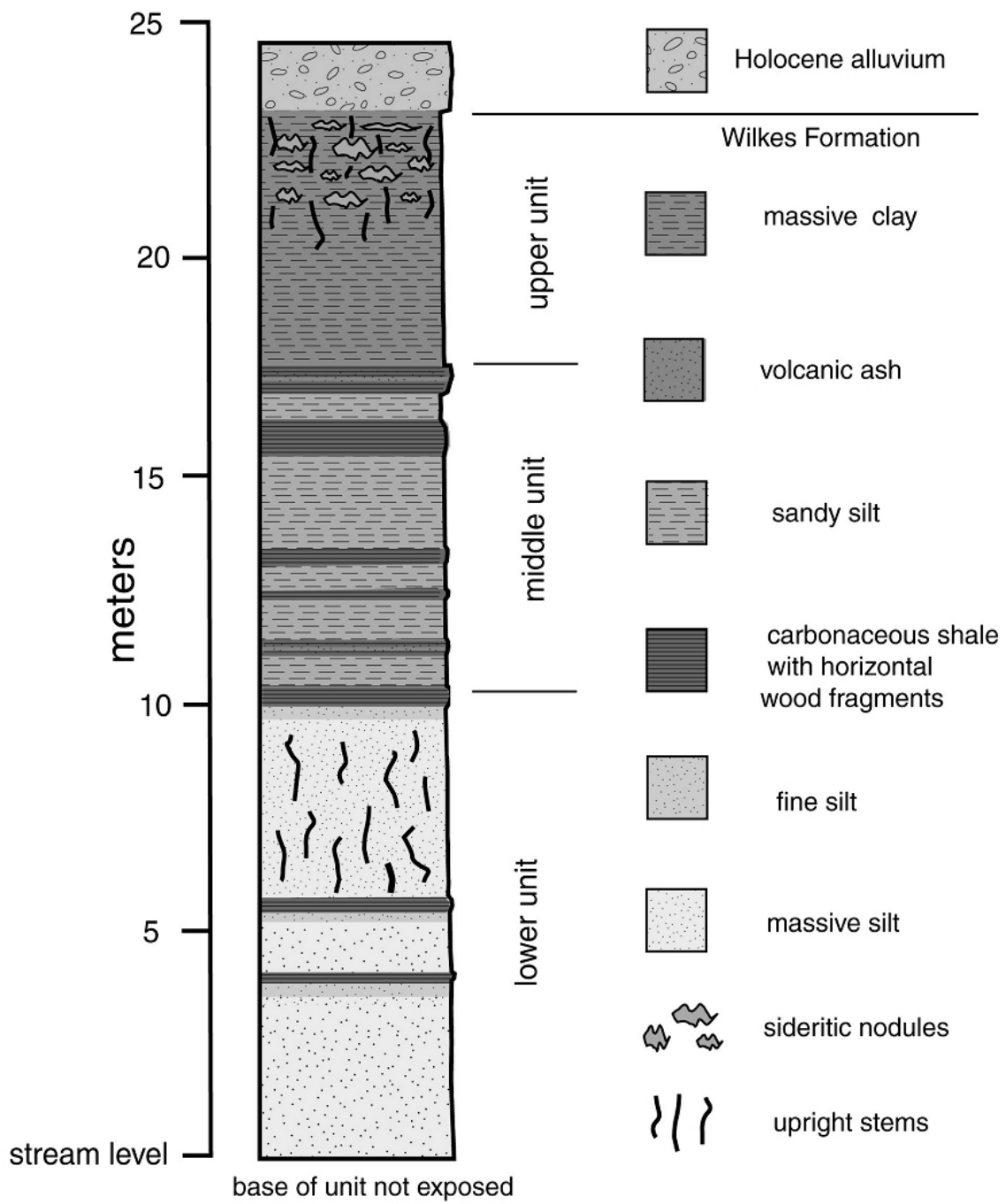
Fossil pollen indicates a summer-wet and warm-temperate climate (>100 cm precipitation annually), with a flora similar to modern coastal deciduous forests of the southeastern United States. Leaf fossils include *Torreya* (Stinking Cedar), a tree that today lives only along the Florida coast, suggesting a mean annual temperature of around 20°C. Similarities of the Wilkes Formation flora in southwest Washington with contemporaneous paleofloras in Oregon and Washington demonstrate that the Cascade Range had not yet been elevated in the late Miocene to produce a regional rain shadow.

Results of our examinations of the mineralogic and textural features of the alleged coprolites using optical and scanning electron microscopy are not reported here, and we have resisted the temptation to draw conclusions as to the origin of the alleged coprolites. However, any hypothesis for the origin of the ferruginous masses found in the highest clay bed needs to be consistent with the unusual environmental conditions that caused this sedimentary sequence to be deposited.





Late Miocene Wilkes Formation strata exposed along Salmon Creek



Stratigraphic section of the Late Miocene Wilkes Formation at Salmon Creek



Ferruginous "coprolite" from Salmon Creek.

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From: Connie Barlow <cbtanager@bigplanet.com>
Date: Mon, 12 Apr 2010 15:43:05 -0700
To: "Estella B. Leopold" <eleopold@u.washington.edu>
Cc: George Mustoe <mustoeg@cc.wvu.edu>
Subject: Re: Seattle Poster of Wilkes Formation Barlow suggestions

Estella -

Thank you for sending the poster session write-up. A couple possible fact/interpretation corrections re *Torreya*:

You wrote: "Leaf fossils include *Torreya* (Stinking Cedar), a tree that today lives only along the Florida coast, suggesting a mean annual temperature of around 20°C."

Suggestion:

1. *Torreya* genus is represented in mountainous reaches of northern California today by *T. californica*, so that would be the closest species hit -- not *T. taxifolia*. See my photo essays on site visits to *T. californica* at:

<http://www.torreyaguardians.org/california.html>

2. Most, if not all, of us *Torreya* Guardians subscribe to the idea that *T. taxifolia* is endangered today primarily because it was unable to move back north out of its "pocket refuge" in the Apalachicola of northern Florida after the peak glaciations. All its conspecifics elsewhere in the world live in mountainous habitat where cool, shaded microclimates are easy to find and where altitudinal migration is possible. I have personally seen natural propagation of seedlings around parent *T. taxifolia* trees planted decades ago in Asheville NC and Cashiers NC, so there is good evidence that their northward range limit in Florida has nothing to do with ability to survive and propagate. Also, I just posted on our website a photo-essay by a teacher in northern Wisconsin whose recent *Torreya taxifolia* and

Taxodium floridana (another endangered plant limited to the Apalachicola site) plantings made it through a snowy winter. You can also see an older Taxodium on his property in the essay:

<http://www.torreyguardians.org/wisconsin-heim.html>

For more on the pocket-refuge theory for why Torreya taxifolia and Taxodium floridana got stuck in Florida, see my article co-authored with Paul S. Martin:

<http://www.torreyguardians.org/barlow-martin.pdf>

Best wishes,
Connie Barlow

From: "Estella B. Leopold" <eleopold@u.washington.edu>
Date: Mon, 12 Apr 2010 18:07:04 -0700
To: Connie Barlow <cbtanager@bigplanet.com>
Cc: George Mustoe <mustoeg@cc.wvu.edu>
Subject: Re: Seattle Poster of Wilkes Formation Barlow suggestions

Hi Connie-- Good comments. I guess I am swayed by the fact that in this flora were a number of plants typical of summer-wet SE swamp areas. Here are some important ones:

Taxodium cf distichum (megafossils), Torreya bonseri (megafossils), Myrica, Juglans, Fagus, Ilex, Liquidambar, Nyssa (abundant), cf. Carpinus, Tilia, Persea (megafossils), Platanus (megafossils), Acer (leaves), Carya (megafossils), Ulmoideae, and a number of Betulaceae, Pinus, Vitis (megafossils).

Admittedly the conifer pollen present are not all regular natives of Florida today but some do not grow far away: Tsuga, Larix type, Abies, And some are weird Tertiary fossils we see in the Miocene out here: Cedrus type. Typical of late Tertiary floras there are a few asian genera present too: pollen of Podocarpaceae, Cercidiphyllum (megafossils), Eucommia.

What I said in our oral paper to GSA was that "If the Torreya bonseri were indeed closely related to T. taxifolia, then a bunch of these associates strongly suggest an environment like that of coastal Florida. If the Torreya was for some reason misidentified, then the assemblage could be something like that of coastal N. Carolina up to Virginia. "

In terms of the environment, the fossil site near Tenino is less than 1000 ft in elev., and shows a number of lignite layers suggesting swampy conditions. And In these lignites the pollen of Taxodium type and Nyssa are esp. abundant.

We are of course still trying to figure out this flora out but it is hard to try and match this flora up with a more montane assemblage. Admittedly at 11 million years ago the floras on the west coastal area were suggestive of summer moist warm temperate conditions, unlike the summer dry conditions of today. I suppose we ought to try and keep in mind about Torreya californica et al. I will try and get back to the original and check out the megafossil again.

I did read your paper with Martin and found it extremely interesting, as well as the other reports on trying to raise Torreya and Taxus seedlings.

Thank you very much for your comments and your interest.

Regards- Estella L

From: Connie Barlow <conniebarlow52@gmail.com>
Subject: **Torreya taxifolia assisted migration news for Estella**
Date: December 13, 2013 1:04:05 PM MST
To: eleopold@u.washington.edu
Cc: susitna@u.washington.edu

Hi Estella -

This is Connie Barlow, founder of Torreya Guardians. I just wanted to let you (and your botanical colleague at UW) know about a VIDEOBLOG I created last month that conveys what our group has learned since it got involved in 2004 helping *Torreya taxifolia* "migrate" from its historically native range (peak glacial refuge) in n. Florida to North Carolina and points even north of that. Here is the info for watching the video online:

"Helping Plants Move North in Anthropene Climate"

http://youtu.be/N_9SCSB5wfM

[00:01](#) Helping the most endangered conifer move north — now

[03:40](#) DANGERS OF CLIMATE CHANGE

[06:02](#) Thomas Berry: Humans as a geological force

[06:25](#) We are now in the Anthropocene epoch

[07:14](#) N-S migrations during Pleistocene shifts in climate

[08:03](#) A deep-time and wide-space perspective

[09:38](#) History of "ASSISTED MIGRATION" controversy

[11:03](#) Patrick Shirey 2013 confirms Torreya actions legal

[11:53](#) "Rewilding" the endangered *Torreya taxifolia* tree

[12:28](#) Torreya genus tracks climate for millions of years

[13:16](#) Excerpts of Shirey et al paper 2013 (on legality)

[13:58](#) Introducing the leaders of Torreya Guardians volunteers

[14:56](#) Might Torreya take the place of dying Hemlock trees?

[15:24](#) Site visits to sister species' habitats in California

[18:05](#) "REWILDING" Torreya: poster plant for climate change

[20:03](#) Hypothesis: Torreya left behind in peak glacial refuge?

[22:44](#) Torreya is not invasive; it is "return of a native"

[23:27](#) Shirey et al: why citizens can act faster than ESA

[25:34](#) REPORT on 2013 seed harvest of Torreya in North Carolina

[25:55](#) A.J. Bullard's role in protecting North Carolina Torreya

[26:51](#) The Clinton NC tree: Photo-rich report of 2013 harvest

[31:39](#) Squirrels as the crucial seed disperser for Torreya

[37:26](#) Torreyas in Mt. Olive, NC (planted by A.J. Bullard)

[41:05](#) Horticultural propagation of Torreya is not "rewilding"

[43:40](#) Torreya can produce female and male on same tree

[46:33](#) REPORT on 2013 seed distribution and planting of seeds

[46:58](#) The mountainside Evans property, Waynesville NC

[47:55](#) 2008 historic plantings: Torreya "rewilding" (photos)

[49:48](#) Testing Torreya's possible affinity for deciduous canopy

[50:47](#) Barlow and Martin 2004 paper on assisted migration

[52:08](#) Naturally preventing squirrels from eating seeds

[57:03](#) Artificially preventing squirrels from eating seeds

[59:23](#) The fastest growing tree from our 2008 NC plantings
[01:00:10](#) Audubon Magazine reported on 2008 NC plantings
[01:00:30](#) Recruiting new sites and ensuring genetic diversity
[01:03:55](#) Dissection: Green v. ripe (purple) seeds harvested
[01:07:32](#) Do not call this tree "Stinking Cedar" (common name)
[01:10:17](#) Recruiting youth to become Torreya Guardians
[01:13:09](#) SUMMARY of assisted migration in a changing climate

For more information: <http://TorreyaGuardians.org>