

Nature Trails

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Quigga and Katook. Illustration by T. Whitlatch, in her book *The Katurran Odyssey*

The Natural History of Creature Design

Terryl Whitlatch

President and CEO, Terryl Whitlatch Illustrations, Inc.

Friday, 19 February 2021, 7:30 p.m.

Here is how to join the audience for this presentation. The Zoom meeting will open at 7:00 but our meeting will begin at 7:30. This allows everyone time to get connected and join in informal conversation.

The Eugene Natural History Society is inviting you to a scheduled Zoom meeting.

Topic: February ENHS Meeting

Time: 19 Feb. 2021 07:00 p.m. Pacific Time (US and Canada)

Join Zoom Meeting: <https://zoom.us/j/97499095971> We plan to use this Zoom link for the remainder of ENHS meetings. However, please double-check each time to make sure the link hasn't changed. Please invite interested friends and family members. From anywhere.



Terry Whitlatch's career was in a way foreordained. Her mother was, and still is, a professional artist/illustrator. Her father taught biology and was always bringing things home: specimens in jars, skeletons, bugs, chicks, frogs, even

iguanas. Whitlatch began drawing before she turned three. Her first subjects were horses and birds. Horses were a natural because her grandparents had a horse farm. The first animal she touched was not a dog or a cat, it was a horse. Birds were also natural subjects because she and her family lived in Oakland, California, close to the Bay, and there were gulls everywhere—including an aluminum gull that adorned the screen door of their house.

After high school in Walnut Creek and a short stint in a local community college, Whitlatch went to Sonoma State University, where she studied zoology. Her artistic bent led her to the California College of Arts and then to the Academy of Arts University. With her BFA in hand she began a career specializing in animal anatomy, paleontological reconstruction, and wildlife illustration.

Whitlatch's first big professional job was as a creature designer for *The Dig*, a Stephen Spielberg project for LucasArts, the video game division of LucasFilm. She has spent over three decades designing creatures for the film and animation industry. Her list of clients gives a good indication of the scope and creativity of her art. She has worked with Lucasfilm Ltd., Pixar, Walt Disney Feature Animation, Walt Disney Imagineering, Electronic Arts, Industrial Light and Magic, Entertainment Arts, LucasArts, Paramount Studios, Universal Studios, Chronicle Books, Design Studio Press, Titan Books, and various zoos and natural history museums.

If you saw *Star Wars—The Phantom Menace* you have seen some of Whitlatch's work. She was the principal creature designer. Remember any of the non-human characters? They emerged from her imagination, guided by her illustrative and artistic powers. Jar-Jar Binx, Sebulba, the pod racers, the undersea monsters of Naboo, and the Naboo Swamp creatures are some of the creatures she took from concept to fully realized anatomies and animation.

Whitlatch couldn't come up with her least favorite job, but readily named her two favorites. First was *Brother Bear*. For this film, made by Disney Feature Animation, she designed bear, moose,

and other animal characters, proceeding from anatomical studies of real animals to the delightful characters in the film. Second was one of her books, *The Katurran Odyssey*, two creatures from which are on the cover of this issue of *Nature Trails*.

Other books she has created and illustrated are *The Wildlife of Star Wars: A Field Guide*; *Animals Real & Imagined*; *Science of Creature Design*; and *Principles of Creature Design*. Currently she is collaborating with paleontologist Dr. Michael Habib on *Flying Monsters and the Mechanics of Vertebrate Flight* (Design Studio Press, scheduled for release later this year). *Bestiary—The Natural History of Mythical Creatures* is to be released in late 2022.

Whitlatch has lectured and led workshops in such venues as Creative Talent Network Animation Exposition, Spectrum Fantastic Art Live, Guild of Natural Science Illustrators, Industrial Light and Magic, Disney Feature Animation, Disney Interactive, Pocket Gems, and Industry Giants Animation Convention. She has guest lectured at the Academy of Art University, Art Center, Savannah School of Art and Design, Utah Valley University, California State University at Monterey Bay, San Diego Zoo, and National Art Educators Association National Conference. She gave keynote presentations at the Anomaly 2015 Conference (Vancouver, BC), the Animal Gallery Show at the Gnomon School of Visual Effects (Hollywood, CA), and at the FMX 2015 Conference of Animation, Effects, Games, and Transmedia (Stuttgart, Germany). In April 2020 Whitlatch received the Spectrum Award for Grand Master, which has been awarded annually since 1995 by the Spectrum Fantastic Art Advisory Board. A Grand Master is an artist who has worked for at least twenty years at a consistently high level of quality; who has influenced and inspired other artists; and who has left his or her mark on the field as a whole. Whitlatch now lives in Albany, Oregon, where she is President and CEO of Terry Whitlatch Illustrations, Inc.

In her Zoom presentation to us, Whitlatch will show us how she goes from the anatomy of real animals to the outline, final design, and animation of her creatures. Once she has in her head an image of a creature, her zoological and anatomical knowledge guide her in its construction. She might enclose the skeleton she has created in an armature, which allows her to experiment with its range of motion. This exercise will aid in determining where muscles should attach to bone and how large they need to be to make credible the motions the finished creature will be capable of. The next steps must be fun. What color should it be? What adornments will it have? Is it a good guy or a bad guy?

Please join the Zoom meeting between 7:00 and 7:30 p.m. on Friday, 19 February to hear Terry!

Whitlatch's presentation, "The Natural History of Creature Design." Invite anyone! From anywhere!
John Carter

Frost or Not by Dean Walton

As on more than a scattering of winter mornings in the Willamette Valley, water condensed from the sky and adhered, as frost, on our car's windshield in a mosaic pattern of flat crystals, so ice was already on our minds. Our goal that day was to visit the Drift Creek waterfall and walk across the suspension bridge there, above where the water cascades down to the larger creek below. It was a place I had yet to see. The drive was about two and a half hours from our home in Eugene, with a good bit of it on the Interstate. We were about an hour into the drive when we began to notice the car's antenna. It was beginning to wave back and forth in the wind as we went north. I can say that I haven't typically noticed the antenna wave much, even traveling at faster speeds, faster than I will admit to here.

As we continued, clumps of fog wavered back and forth across the fields and highway. One moment we would be centered in a cloud and the next, viewing one from the outside. This pattern continued for many miles and soon our antenna was waving back and forth faster and faster as though it were a poplar leaf, tremulating with the breeze. Freezing fog, microscopic particles of ice, were piling up as layers on the antenna, giving it added mass and resonance to vibrate wildly at the speed we traveled. We used that moment to perform our parental duties and discussed the hazards of freezing fog and driving with our newly licensed daughter.

Moving from the interstate to the main road traveling west to the coastal range, the fog congealed into a silvery pruinose landscape with frost everywhere, on the grass, on the trees, and, disturbingly, on the road. To use a rodent analogy, the road was getting squirrely. When the sun could prey upon and consume a cloud, I could see a sheen reflect off the asphalt.

At this point, I figure, I might want to mention the concept of frost. Frost comes from the air. It occurs when the atmosphere around us cools to the point where water vapor, those gaseous particles of water, begin to lose enough energy that they coalesce into droplets of water forming dew, or, sometimes in winter, moving directly from independent little gas molecules into solid ice, however small. There is a bit more to the physics of the whole process, as there needs to be some very small surface irregularity to touch that allows the water molecule to dispense with a bit more energy to overcome issues of surface

tension. In any event, you would need a powerful microscope to see this. To our eyes, frost suddenly occurs across the landscape just as some old piece of bread becomes covered in mold, yet here it occurs on the microscopic hairy and irregular surfaces of grass, and leaves, and bark.

We were primed.

Arriving at the trailhead, we were happy to have gotten there early and had a choice of parking spots. This was not true for those who pulled in later. The hike to the waterfall is a relatively short and easy two kilometers. It is along this trail that I came across the real subject of this story, which, upon its finding, I did not really yet understand.

About three-quarters of the way to this waterfall, as we dropped down into a drainage of Drift Creek, we were suddenly presented with branches covered with hoarfrost. I have seen some amazing examples of hoarfrost up on the Appalachian Front in the Dolly Sods Wilderness. There, I once came across seven-centimeter-wide white wings of frost covering everything, but only one aspect or side of a stem or a leaf or a trunk. It was as though a picture of the landscape had been slid sideways in Photoshop, leaving part of the picture, the part where the image had been, now blank, a white shadow. Short trees and shrubs were shifted in a single Krummholz-direction and the hoarfrost just added to the exquisite landscape of the Sods.

Here at Drift Creek, however, this wasn't the case. There was something odd, very odd about our putative hoarfrost. It wasn't everywhere. It wasn't all on the same side of leaves and twigs. It was just in a few spots. Had the rest melted or not frozen in the first place? As I looked closer, I noticed it was always on dead twigs, never on a leaf or anywhere else. It looked like spun wool, not the rugged, jagged ice crystals I saw at Dolly Sods. There were hair-thin, even less than hair-thin, long threads of ice. If you breathed upon a spot it disappeared as quickly as dropping cotton candy into water.

What I saw was hair ice, also called ice wool or ice flowers. It was not frost at all; no droplets dashing out of the atmosphere and freezing onto any surface they could find. For many years, this phenomenon was unexplainable. The physics just didn't add up. Then some researchers realized that the ice threads were being pushed out through pores in the wood of the dead branches. So, as these twigs drop below freezing in the cold air, water in the sticks also begins to freeze. This process creates a moving wall of ice,

freezing more water along the way, and pushing the unfrozen liquid out of the saturated twigs as the ice expands. Now if, by chance, the wood in this area has



Photo by D. Walton

hosted a small fungus, one related to witches jelly, one in the scientific order Tremellales, then there could be pores in the wood, small hypodermic-needle-like holes. It is from hundreds, if not

thousands, of these pores caused by the fungus *Exidiopsis effusa* that these linear ice crystals form. Water is pushed out through these holes whereupon it freezes in the air, followed by more water that also freezes forming multi-centimeter long ice-threads hanging from the twigs. And in some cases, when there is a slight shift in temperature, these threads fuse together into ribbons of ice forming fleeting ephemeral flowerlike oddities on winter mornings.

This was not the last that we saw of unusual ice. The pedestrian suspension bridge over the waterfall was also covered with layer upon layer of frozen fog, a centimeter or two thick. One could literally ice-skate across the bridge. We were unprepared, so we shuffled uneasily as best we could in our sneakers. It just added to the ambience of being in a freezing mist, thirty meters above a waterfall, in the middle of nowhere, on a frosty winter day.

Follow the Beak and Find the Species

by Reida Kimmel

Can you even picture a bird without a beak? Or feathers? We are constantly learning more about early birds and their ancestors, including small flightless but feathered carnivorous dinosaurs. Some of these species and also some early birds had small, flexible keratin tips at the ends of their toothy jaws. Lacking hands to perform tasks requiring precision control—such as foraging, grooming, courting, nestbuilding, defense and aggression—the keratin beak that continued to grow so as to replace worn parts for a bird’s entire life became its most important tool. But why lose teeth? Perhaps just to lighten the skull and facilitate flying. Or, because embryonically, teeth with their dermal bone develop late. If teeth do not develop at all, the embryo will be ready to hatch more quickly. Birds with accelerated growth could mature and breed earlier, outcompeting more slowly growing competitors.

The story of beaks and their ongoing role in evolution continues to fascinate us today. Birds’ beaks are shaped primarily by what they eat, but other factors may influence the optimal shape, length and depth of beaks, says Nicholas Friedman in *Proceedings of the Royal Society B*, December 2019. Climate is important. Australian black-headed honeyeaters live in cool regions. Their short, delicate beaks conserve heat but also allow them to produce faster songs, which could influence mate attraction and breeding success. Noisy friarbirds have longer beaks and sing more slowly. Honeyeater species, with long and narrow beaks specialized for

nectarivory, sing at lower frequencies. Different songs for different species.

The finches of the Galapagos are known as “Darwin’s finches.” Their beaks have inspired research for more than a century. Charles Darwin knew nothing of computerized tomography scans for visualizing fossils or of genes and gene expression, but he had two Eureka realizations years after his voyage around the world on the *Beagle*. First, the thirteen species of finches he had collected on the remote Galapagos Islands were excellent examples of evolution through natural selection, the theory that he had been painstakingly developing at Down Cottage. Second, new species could come into existence when members of a population diverged. All the Galapagos finches had descended from a single colonizing species, geologically not so long ago because the Galapagos archipelago is relatively young. Now, as his collection of specimens showed, there were large finches with large bills, smaller finches with smaller bills, delicate finches with long narrow bills and other species of small finches with small bills. Darwin visited only a few of the many islands and did not encounter all the finch species. Not all of the finch species inhabit any one island. But wherever they were, species remained distinct, never interbreeding.

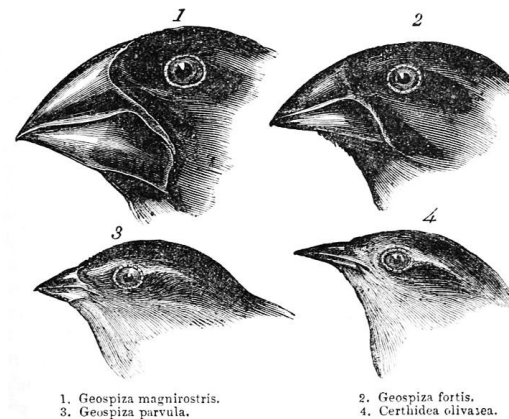
When Darwin published *On the Origin of Species by Means of Natural Selection, or the Preservation of Favored Races in the Struggle for Life*, the storm of debate over evolution, both whether and how, began. Although Darwin believed that evolution was ongoing and change was occurring over generations, even in modern times, he could never offer any proof of ongoing evolution in nature. His examples were

domestic pigeons and bulldogs. We forget, I think, that even though many prominent thinkers accepted evolution as a fact, because Darwin could not prove it the man and his theories fell into a sort of disrepute until the twentieth century, when new tools, especially in genetics, and laboratory research with flies and other species made it clear that Darwin's theory was correct. Now we needed to see natural selection operating in real time and in real situations.

Peter and Rosemary Grant's research on several of the Galapagos Islands, especially Daphne Major, begun in the early 1970s and still ongoing, is incredible for being so thorough. In his iconic book, *The Beak of the Finch*, Jonathan Weiner interweaves their group's real-time meticulous research with Darwin's story. Chance brought the Grants to the Galapagos at the perfect time to see evolution in action. During the first three years of their study the climate was relatively moist. Some rain fell even in months other than March and April, the wettest months on this semi-arid archipelago. The finches bred and fledged young at reasonable rates. The Grant team confined itself to studying the six species of ground finches, the largest of which are *Geospiza fortis* and *G. magnirostris*, the smallest *G. fuliginosa*. Those with the most slender and sharp beaks are cactus finches, *G. conirostris* and *G. scandens*. The research team measured everything: beak length, depth and shape, bird weight and the plants and seeds they ate. They came to know all the food sources and many individual birds. One fact became apparent. The birds differed markedly from each other within each species. One *G. fortis* could have a much deeper and heavier bill than another. Beak shapes and sizes were heritable. And very small differences, one half to one millimeter in size or depth of the beak, could make a huge difference in the individual's fitness, its strength cracking seeds or ability to penetrate a cactus flower for its seeds. Weights varied. The differences were heritable. Large individuals had large offspring.

When times are good, and they were especially good during the record wet year of 1976, all the finches eat the numerous soft seeds. When times are hard and the easy pickings are scarce, species whose beaks are large and sturdy, such as the powerful *G. fortis* and the even larger *G. magnirostris*, can eat

seeds from tough and viciously armored *Tribulus* plants whose seeds are barely accessible to the *G. fuliginosa* with the largest beaks and not at all to the other ground finches. The times became very hard in 1977. And they continued hard throughout 1978. All the finches ate all the soft accessible seeds, meat, blood, fish scraps, guano—whatever would sustain life. The large-billed finches avoided starvation by eating *Tribulus* seeds. Few or no chicks survived. The *G. fortis* did not even breed. *G. fortis* populations



Drawing by J. Gould, from Voyage of the Beagle

1. *Geospiza magnirostris*.
2. *Geospiza fortis*.
3. *Geospiza parvula*.
4. *Certhiidea olivacea*.

were down 85%, and cactus finches were down 65%. When the rains finally returned, the birds with the biggest, strongest bills, mostly males, were the survivors. Surviving females chose them for mates, and resulting generations were large with strong, deep, but generally narrower beaks.

But after 1983, the year of record rains, the purebred *G. fortis* and *G. fuliginosa* populations did not recover. Amazingly, some species, *G. fortis* and *G. fuliginosa* and especially *G. fortis* and *G. scandens*, a sharp-beaked cactus finch, began interbreeding, and their offspring were fertile. Their breeding was so successful they could be called the island's fittest finches! Could we be seeing evolution happening? Nothing is so simple. If El Niño events bringing rain become more frequent, changing the climate, perhaps the hybrids would become new species of finches on Daphne Major. Were La Niña droughts to become more frequent and severe, perhaps the old species would recover and the new proto-species would fail. Evolution may indeed be ongoing, but its salient feature is its constant state of flux.

Events of Interest in the Community

McKenzie River Trust <https://mckenzieriver.org/events/#event-listings>

Saturday, 13 February, 2 to 4 p.m. Green Island Ambassadors Training. Help connect people to conservation! We're opening the gates to Green Island every second Saturday from March through December in 2021. Visitors will be welcomed to come and enjoy all that this 1,100-acre conservation area has to offer. To help facilitate a positive experience, McKenzie River Trust is looking for Volunteer ambassadors to help guests feel welcomed and oriented to the site. As an ambassador, you will

receive on-the-ground training and orientation to Green Island. We'll prepare you with the tools to help make this special conservation area more accessible to everyone in our community. Join us! Register online.

Wednesdays, 17 and 24 February, 3 and 10 March, 9 to 11:30 a.m. Watershed Wednesdays at Green Island. Each week we'll take on a different stewardship project.

Friday, 5 March, 9:30 a.m. to noon. Friends of Finn Rock Reach. Sign up if interested in helping landowners affected by the Holiday Farm fire.

Lane County Audubon Society lanecountyaudubon.org

Saturday, 20 February, 8 a.m. Third Saturday Bird Walk. Folks (maximum: 10; minimum: 1) wishing to join a walk can email Bex at rebecca.waterman@gmail.com. All participants must wear a mask for the entirety of the walk and maintain the recommended 6-foot distance from each other. No carpooling.

Tuesday, 23 February, 7 p.m. New Hikes in the Central Oregon Cascades. William Sullivan takes us on a tour of new or dramatically changed trails in the area between Salem and Bend. All are featured in the newly released fifth edition of his guidebook, *100 Hikes in the Central Oregon Cascades*.

See the February issue of *Quail* for summaries of the 2020 Christmas Bird Count.
http://www.laneaudubon.org/sites/default/files/quail_pdf/Feb2021%20Quail_web.pdf

Mt. Pisgah Arboretum

For MPA activities go to <https://mountpisgaharboretum.com/festivals-events/>

University of Oregon's Museum of Natural and Cultural History <https://mnch.uoregon.edu/museum-home>

Darwin Days 2021. Celebrating science and intellectual courage. February marks the 212th anniversary of Charles Darwin's birth. Join us for a month-long celebration of his legacy, featuring virtual talks, a science-fueled family program, and a special museum store event! Our annual Darwin Conversations will be held virtually this year. Join us as we explore current extinction trends and weigh the pros and cons of bringing extinct species back to life.

Thursday, 18 February, 6 p.m. Can De-Extinction Reverse Mass Extinction? Join Douglas McCauley, marine ecologist at the University of California, Santa Barbara, and explore the science behind the mass extinction that is currently unfolding—and whether de-extinction can help put on the brakes.

Thursday, 25 February, 6 p.m. Can (and Should) We Bring Back Extinct Species? Bringing back extinct species sounds like a good idea. But what's involved, ethically as well as scientifically? Join Ross MacPhee, the American Museum of Natural History's senior mammalogy curator, for a lively discussion of the possibilities and pitfalls of de-extinction biology. Visit our [website](#) to learn more and register for the free talks.

Native Plant Society of Oregon, Emerald Chapter <https://emerald.npsoregon.org/>

Monday, 15 February, 7 to 9 p.m. Online Program: Return to Crete: Wildflowers and History on a Mediterranean Island. Presented by Ed Alverson. The Greek island of Crete is one of the largest of the Mediterranean islands. The island hosts a diverse landscape of beaches, mountains, gorges, and plateaus and a flora that is the result of many millennia of interaction between nature and the island's residents. As a child, Ed lived on Crete for a year with his family, and in 2019 he returned to explore the island's history and botany. Ed's presentation will highlight the many interesting features of Crete's flora and the ways that traditional land uses sustain the native flora. The program will be available (live) on YouTube. The link will be provided at our website closer to the date.

Nearby Nature <https://www.nearbynature.org/>

Friends of Buford Park and Mt. Pisgah <https://www.bufordpark.org/>

Because people and nature need each other, the Park is OPEN during the Coronavirus/COVID-19 pandemic. Please refer to [Lane County](#) for instructions about the park and updates.

WREN (Willamette Resources and Educational Network)

Tuesday, 9 March, 9 to 11 a.m. Wetland Wander. Location to be determined. All tour attendees will be asked to wear masks for the duration of our exposure to one another, and attendees are asked to maintain 6-foot physical distancing between households. To register contact Laura at info@wewetlands.org. For location details and for other upcoming events go to <https://www.facebook.com/WRENintheWEW/>.

ENHS welcomes new members! To join, fill out the form below. Membership payments allow us to give modest honoraria to our speakers and pay for the publication and mailing of *Nature Trails*. Our web address: <http://eugenenaturalhistorysociety.org/>

MEMBERSHIP FORM

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I (we) prefer electronic copies of *NT* rather than paper copies. ___ Yes ___ No
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ANNUAL DUES: Family \$25.00
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Annual dues for renewing members are payable in September. Memberships run from September to September. Generosity is encouraged and appreciated.

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The Eugene Natural History Society website has moved to a new host at: <http://eugenenaturalhistorysociety.org/> This is a new site under old management. Changes and improvements to the site will be ongoing. If you have any questions or concerns, please let Tim Godsfil know at tgodsil@gmail.com



Illustration by T. Whitlatch. from her book, *The Katurran Odyssey*

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2020–2021 Speakers and Topics

19 Feb.	Terryl Whitlatch	The Natural History of Creature Design
19 Mar.	Pepper Trail	Fighting Crime with Feathers: The Casebook of a Forensic Ornithologist
16 Apr.	Daphne Stone	Lichens: How They Tell Us About Their Environment
21 May	TBD	



Illustration by T. Whitlatch. from her book, *The Katurran Odyssey*