Endlicher and Sequoia: Determination of the Etymological Origin of the Taxon Sequoia

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The genus *Sequoia* owes its taxonomic identity to Austrian botanist Stephen L. Endlicher (Fig. 1). Research of primary material in Vienna and other locations have revealed Endlicher as a gifted linguist and botanist, who corresponded and interacted with colleagues throughout the world. These included persons who were experts on both the Cherokee language and the person Sequoyah. Endlicher's botanical work of creating eponymous taxa combined with his knowledge of the person Sequoyah throws new light on the origin of the genus *Sequoia*.

The coast redwood (Sequoia sempervirens) and the giant sequoia (Sequoiadendron giganteum) share more than their immensity and co-occupation of California. The root genus, Sequoia, has presented an intriguing taxonomic origin question since the moment it was assigned by Stephan Ladislaus Endlicher in 1847 (St. John and Krauss 1954). Assumptions have been made that Endlicher assigned the name to honor the Cherokee linguist, Sequoyah, who had died just five years before. In 2012, Gary Lowe made an intuitive case for Sequoia being from the Latin "sequor" (to follow). I traveled to Austria in an effort to resolve this puzzle through an exhaustive review of primary sources, including original works in libraries and museums; a review of Endlicher's publications, correspondences, journals; and notes of persons who knew and interacted with him. My findings suggest that Endlicher, a botanist, linguist, and communicator with other scientists interested in indigenous people of the Americas, used his expertise and pattern of naming plants after people to name the coast redwood after the man, Sequoyah.

Stephan Ladislaus Endlicher-Stephan Ladislaus Endlicher (1804-1849) was born in Pressburg, a German-speaking town in the Austro-Hungarian Empire in 1804. He studied theology and languages, and became a librarian. In 1828, Endlicher was appointed as a librarian to the National Library in Vienna and was placed in charge of the Handwriting (Handschriftin) Department. In addition to obtaining specimens for the collection he began his studies in medicine. At that time, medicine was not just the study of pathology, but of botany and pharmacology. Plants were the basis for cures and physicians consulted their *Materia Medica*, a primarily plant-based tome for patient treatment (Reidl-Dorn 2013). In addition to handwriting Endlicher developed an interest in maps, in Hungary, and in China. He became an expert in Sinology and furthered his remarkable linguistic ability. Over time he became proficient in Hungarian, Czech, German, French, Latin, Chinese, Italian, English, ancient language forms (he transcribed old German to new), and American Indian languages. After he joined the National Library, Endlicher pursued prime appointments in his chosen areas of expertise. In 18th Century Vienna, a person had to be a Free Mason to receive political appointments but by the middle of the 19th Century, family connections had become more important. Endlicher's wife Caecilie had a sister who was married to the Secretary State Chancellor, and this link to royal patronage opened many doors for Endlicher (Reidl-Dorn 2013; Stangl 2013).

Through his connections, Endlicher became personal tutor to Emperor Ferdinand, developing both a personal friendship with the Emperor and a good relationship with the members of the larger royal court. There he solicited letters of recommendation from colleagues to the crown

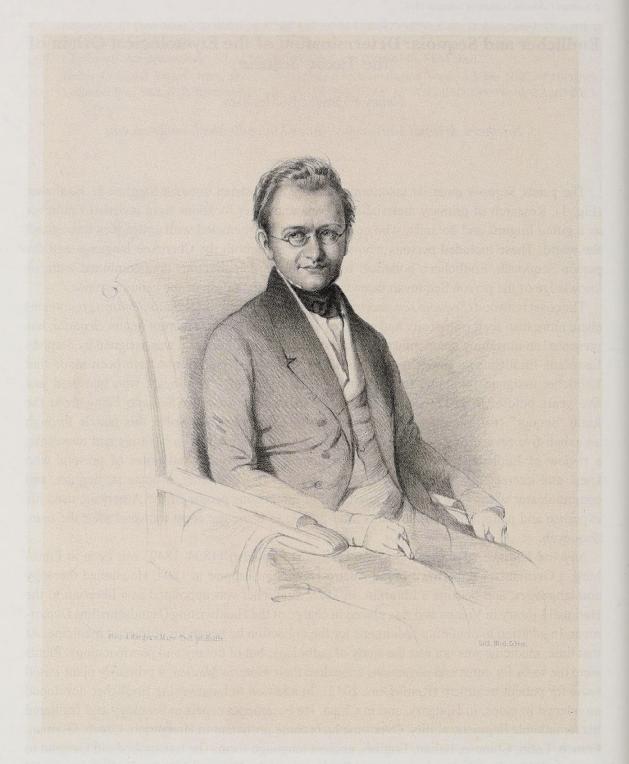


Fig. 1. Stephan Ladislaus Endlicher, early 1800's, Vienna Austria. (Courtesy of the National Library of Vienna).

for specific appointments. He soon received an appointment as the Director of the Botanical Gardens for the University of Vienna. He had the botanical collection of the National Museum sent to the Renweg Herbarium at the Botanical Gardens where he lived in a house on the grounds. His assistant for part of the time was Edward Fenzl who later succeeded Endlicher as Director of the same Botanical Gardens (Stangl 2013).

Botanical Eponyms-Among Endlicher's many pursuits were identification and classification of plants brought back from expeditions from around the world. One such set was from the Norfolk Islands. Working with this collection, Endlicher showed his propensity to name plant taxa for particular people. In Prodromus Florian Norfolk (1833) he named plants for the collector and Austrian botanical illustrator Ferdinand Bauer (1760–1826), (Zehneria baueriana). Another named plant for a person was Bryonia affinis, but the personal etymology is unknown (Endlicher 1833). Other examples of taxa named for persons by Endlicher include Verticordia huegelii, named by Endlicher in 1839 for Carl von Huegl (1795–1870), an Austrian Naturalist (George 2002); Ungeria floribunda in 1836 for Franz Unger (1800–1871), an Austrian Botanist (Schott and Endlicher 1832); and Stirlingia in 1837, for Sir James Stirling (1791–1854), first Lieutenant Governor of Western Australia (Quattrocchi 1999).

As a Gray (1810–1888), the American naturalist wrote of Endlicher's naming a genus for a recently deceased person. Gray recalled in his journal of his visit to Europe, a conversation with Endlicher on why a plant was named:

Ungnadia (the character of which Endlicher has not yet published, — the last plate in the "Atakta") was named in memory of Baron Ungnade, once an ambassador from Austria to Constantinople or Persia, I forget which, and the first to introduce *Esculus hippocastanum* into Europe, — hence the propriety of the name (Gray 1894).

Other than Gray's recollection of the dialog, there is no written record of this taxon's etymology by Endlicher. It was not common at this time for any taxonomist to record the reasoning behind the assignment of taxa. Lisa De Cesare, curator of the Harvard University archival collection of Gray's papers, notes that: "Gray wasn't too interested in preserving his correspondence during the early years of his career. It wasn't until he (Gray) married Jane and she took his correspondence in hand that [we find] the rich collection of letters appear" (De Cesare 2016).

Endlicher was unceasing in his work. He named or co-named over 1600 plants from the tropics alone (Tropicos 2016). In addition to assigning taxa designations for people, Endlicher also named taxa for specific characteristics of the plant itself. Endlicher worked with specimens that were sent to him as well as those already in the Botanical Garden's collection. Thaddeus Haenke (1761–1817), originally from an area now known as the Czech Republic, studied botany, medicine and minerology at the University of Vienna in 1780. He was a member of the Malaspina Expedition to the Americas in 1789. His work with the "Indianers" was extensive, learning the pharmacopeia of the plants and the indigenous people's uses of them. His collection was in Endlicher's hands (Bleichmar 2012).

Endlicher wrote works with Karl Martius (1794–1868) and Eduard Poeppig (1798–1868) on plants of Brazil and Chile (Martius, et al. 1840–1845). Eduard Poeppig, an Austrian botanist and naturalist explored Pennsylvania, Cuba, and South America and collaborated with Endlicher on two volumes of plant descriptions. Poeppig also studied North and South American Indian tribes and collected skeletons of indigenous people (Martin 1970; Poeppig 1839). Poeppig wrote to Endlicher about Indians and about the plants and people of North and South America (Reidl-Dorn 2013).

As a polyglot, Endlicher spoke with many scientists, and corresponded with many more. His fluency allowed him to pick a variety of words to indicate a noun or descriptor in German, Latin, English, French, Czech, Hungarian, Italian, and Chinese. He was one of the era's noted Sinologists and frequently corresponded with Peter Steven Du Ponceau (1760–1844) about the language, culture and history of China (Du Ponceau was a French linguist who served in the Continental Army during the American Revolution, was a Sinologist, and an expert

on American Indigenous peoples' languages) (Du Ponceau 2016). Du Ponceau's authoritative knowledge of the indigenous languages of North America included the Cherokee syllabary created by Sequoyah (c.1776–1843, Fig. 3), the illiterate son of a Virginia Fur Trader father and Cherokee mother (Du Ponceau 2016; King 2016).

The Sequoia Connection-Sequoyah created a syllabary-based language for the Cherokee Nation, the only person known ever to perform such a feat (King 2016; Rhodarmer 2016). Sequoyah presented his syllabary to the Cherokee nation in 1821. The name "Sequoyah" has had a variety of spellings, an interpretation of the Cherokee, 4V° ending in "ie," making it Sequoie or Sequoia (Rhodarmer 2016), a direct link to the extant genus name. Samuel Knapp (1783–1838), who personally interviewed Sequoyah spelled his name See-quah-ya (Knapp 1828). Sequoyah's English given name of George Gist also had a variety of spellings (Guess, Guest) (Rhodarmer 2016; Knapp 1828).

Endlicher's collaborator Du Ponceau's interest in Sequoyah was preceded by an interest he developed in indigenous cultures in the late 18th Century. Du Ponceau shared this interest through correspondence with Albert Gallatin (1761–1849), an ethnographer, linguist, and President Thomas Jefferson's Secretary of the Treasury. From 1801 to 1843, Du Ponceau and Gallatin discussed American Indian languages and linguistics and collaborated on a volume about Indian languages commissioned by Jefferson (DuPonceau 2016). Gallatin wrote *A Synopsis of North American Indian* Tribes in 1836. Therein he described the syllabary created by Sequoyah in great detail, including an analysis of the construction of the language itself (Gallatin 1836).

Gallatin, along with Thomas McKenney (1785–1859), American Superintendent of Indian Affairs in the mid-1820s, championed the cause of America's indigenous peoples, citing Sequoyah's work as an example of their intellectual abilities:

Responding both to Congress's impending consideration of a removal bill and to a literary debate over the character of Native languages, the retired statesman Albert Gallatin convinced the executive branch to fund the collection and publication of linguistic materials in 1826. To Gallatin, 'all that belongs to human knowledge and its progress, to the formation of language 8c to political institutions is connected together and belongs to us.' Just weeks later, the director of the Indian office, Thomas L. McKenney, sounded a similar note. Since receiving news, about a year earlier, that the previously unlettered Sequoyah had invented a syllabic alphabet for the Cherokee language, McKenney had been concerned about its consequences for Indian progress, for he 'esteemed language to be the very centre of power that will reform and bless our Indians' (Harvey 2010).

Gallatin and Du Ponceau were noted collaborators promoting the need for understanding the implications of the alphabet invented by Sequoyah. Du Ponceau's correspondences with Endlicher covered more than just Sinology. The American Philosophical Society (APS), founded by Benjamin Franklin in 1743, and still in existence today, was and is an organization where one must be nominated for membership. Endlicher became member #1166, in March of 1841. Endlicher's nomination (Fig. 2), put forward by J.G. Schwarz, American Consul in Vienna, was confirmed by APS members Peter S. Du Ponceau, John Vaughan, R. M. Patterson, Franklin Peale, and Isaac Lea (Spamer 2016). Two of these, Du Ponceau and Vaughan, were authorities on the Cherokee language and great admirers of Sequoyah (Goodman and Swiggers 1994).

Another APS member and frequent correspondent with Endlicher was Asa Gray. On Gray's first visit to Europe in 1839, he visited Endlicher, staying in Vienna for 12 days. He described Stephan as "...extremely good-looking, and younger even in appearance than I expected, although Bentham told me he was about his own age; he looks about thirty-three. I had the

march 1841 Extract of whether to milauxper from Hy Schwarg . am Cons. Vienna I send you awork of M Stephen Endlicher of Vienna towich will show you how far he has you on the Jujut of Chinese & Japonese Coins It gives on acts of the loins of Ching Japan the Cubenet of this Imp major at Viscourse with a View of wining in the Itany of the lovery in those Lungaryer in the Impurial Library He is propopor of Bothy in our Mriverily, & hublatty published algenera Plantanim feundim Graines naturales Disposita 1836-1840 and Inconographia generum Muntar son 1027-1840 Anadeones flow norfalkine five latalogus frispin. que in produ norfall 1104 5 1804-5 which are heighly prized - berider feveral works on Milotogy & Mibligaaphy & is fin fact accounted one of the first Talents in this Country To the Sheriand & Members Phil 5 Min 1041 of am. Willow 1041 Endlichon god we beg have to propose for membership in omforiety . M Stephen Indicher of Vienna . an accor of which whom is given above extract framion Consulat Vienna his work on the boing Chine Spapen is anemys the Donativers to the locidy this . S. Da Ponecaer Evenny In Vaugung Mo. 125. Y.M. Patterson a. 1. J. 5 nov. 1871. Countingealo

Fig. 2. Endlicher's nomination to the American Philosophical Society and below, the signatories Du Ponceau, Vaughan, Patterson, Peale and Lea. (Courtesy of the American Philosophical Society).

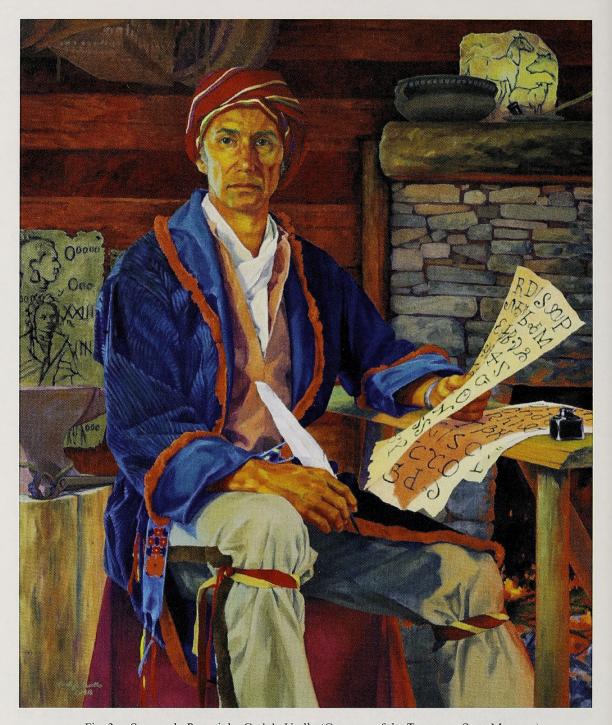


Fig. 3. Sequoyah. Portrait by Carlyle Urello (Courtesy of the Tennessee State Museum).

pleasure to present in person the copy of the *Flora* designed for him" (Gray and Torrey 1838–1843; Gray 1894). Gray's ability to reproduce his conversations with Endlicher and to, in essence, record Endlicher's thoughts is shown in a passage Gray wrote commenting on the strictness of publication in Austria at the time of his visit:

Nothing can be printed and published here, without first being examined and approved by a censor of the press. The government appoints four or five persons in Vienna, who examine in different departments. . .. Every author must send his manuscript to the police-office, whence it is handed over to the proper censor, who certifies that it contains nothing

immoral, nothing against the government, and that it is good literature, or science, or poetry, as the case may be, and worthy of being published; it is then returned to the author, with permission to print it... To my great surprise, Endlicher, who gave me all this information, informed me that all the manuscript of his 'Genera Plantarum' is sent to the police, who transmit it to Baron Jacquin, the censor for natural history, etc., and who is well paid for the business, but who knows just as much about it as if it were written in Arabic...Endlicher spoke of all this in terms which there is no necessity for me to record just at present. He gave me an anecdote respecting the publication of his earliest botanical work of any consequence, a Flora of his native town, the "Flora Posoniensis" the manuscript being duly sent to Jacquin, that worthy refused to give it his imprimatur, because it was arranged according to the natural system! which Jacquin did not like; and Endlicher was obliged to apply personally to the ministers and take great pains, when he obtained permission to print in spite of the censor; he took his revenge by dedicating the work to Baron Jacquin himself! This system sufficiently explains the low state of literature in Austria, as compared with northern Germany. I could hardly believe all I have heard, had I not obtained my information from such authentic sources (Gray 1894).

By the 1840's Endlicher was working on a wholesale update of groups of plants. His *Generum Plantarum* was a turning point for him as a botanical scholar. His books were written in Latin and here he used the Latin "sequentia" to indicate "follow" ("Signa sequentia literis subposita sic intelligenda.") (Endlicher 1836–1840). In notes written in German, he emphasized the need to understand botany in order to understand pharmacopeia for medicinal uses. He also knew that understanding plant use by "Indianer" [Indians] was important, and specifically mentions North American plants and Indians: "wie in den Wäldern von Nordamerika Plantago major den europäischen Ansiedler verräth, daher diese Pflanze von dem eingeborenen Indianer (aboriginal indian)» die Fußstapfe der Weissen « genannt wird. Die rasche Ver" (Endlicher and Unger 1843).

His greater effort was with the Synopsis Coniferum (Endlicher 1847). Here he reviewed several genera and reclassified several, including Taxodium sempervirens, the extant genus of the Coast Redwood of California. There is no doubt that Endlicher changed the genus of Taxodium to Sequoia, but why Sequoia? Endlicher was familiar with other researchers' findings and taxonomies before undertaking a revision of the conifers in his Synopsis. This included the British Publication, Description of the Genus Pinus by Aylmer Bourke Lambert (1761–1842) with David Don (1799-1841) and an account of the Lambertian Herbarium by Lambert in 1824 (Don worked for Lambert as a botanist). Here Lambert with Don described the Coast Redwood as Taxodium sempervirens. First published in 1803 by Lambert, in the 1828 edition preface, Lambert explains that Don updated this edition with a description of Taxodium sempervirens (Lambert and Don 1824). One of the indicators of Endlicher's awareness of other researchers' works and his communication with their authors was his election as a "Foreign Member" of the Linnean Society of London on May 7, 1839. The American botanist John Torrey, was also inducted as a "Foreign Member" on this date. In the bound issue of the Proceedings of the Linnean Society (LSL 1839) were articles written by the famous English botanist George Bentham (1800-1884) and David Don.

Communication between scientists from around the world was commonplace and vital at the time. Fraser and Sellers (2014) note:

By the middle of the 19th century, there was sufficient worldwide knowledge of plants for the development of a more elaborate plant classification system based on the differing features of the whole plant, enabling them to be grouped into families with common elements. By

this time George Bentham...and Joseph D. Hooker... in England, Stephen Endlicher...in Austria, John Torrey... and Asa Gray...in America had with their worldwide contacts, developed plant classifications based on 'natural systems.'

In 2012, Gary Lowe, writing in *Fremontia: The Journal of the California Native Plant Society*, made a case for *Sequoia* being from the Latin "sequor" (to follow) for the species' place among the Cypress conifers. However, this analysis is in question. Mark T. Riley, a Professor of Classics Studies and Latin at the California State University, Sacramento, comments:

The idea that this is the Latin word for sequence is false. It does look like it should be derived from the verb (and only a verb) sequen 'I follow.' Sequens means 'following' secutus means 'having followed' and so on. You can say 'in sequence' or 'sequentially' by 'per ordinem' (Riley 2016).

If Endlicher were to name the Coast Redwood for its place in a sequence, it would more properly have become *Sequentia sempervirens*.

Dr. Christa Reidl-Dorn, Department Head at the Natural History Museum of Vienna has studied Endlicher at the museum archives. She, and others in Vienna, e.g. Robert Stangl (2013), University of Vienna Director of the Botanical Library and Maria Petz-Grabenbauer (2013), an Endlicher scholar, Culture and Science Historian and professor, feel strongly that rather than simply applying a Latin term, Endlicher deliberately named *Sequoia* for the person. Dr. Reidl-Dorn noted in Endlicher's work with plants that he wrote on pharmacopeia and referred to "Seneca the Indianers" (Endlicher 1842). Reidl-Dorn (2013) argues that Endlicher would have been aware of the linguist Sequoyah.

Following an intense and thorough review of all primary papers related to Endlicher at his place of work and residence and in the archives in Vienna, Austria as well as works of those who wrote of him and corresponded with him allowed insight into the man. This knowledge revealed how his work was often centered on patronage, money, and notoriety. In particular, his motives for the assignment of *Sequoia* as a genus was revealed through his associations, communications with others and how they in turn often revealed his thoughts when he himself left no written details.

As fluent as he was in so many languages, his use of "sequor" solely as a word for 'to follow' would be an egregious error for such a scholar. Endlicher had already shown the proper use of the word for 'in a sequence' (sequential) and, in this matter, *Sequenta sempervirens*, would have been more correct and proper.

Endlicher knew of the person Sequoyah. There were stories in the German language newspaper about Sequoyah dated to his time period as well as English print stories. John William Parker's *Saturday Magazine*, Vol 20, April 23, 1842, had an extensive story on the person Sequoyah titled, "Ingenuity of a Cherokee Indian," that was in the Heidelberg Germany Library Archives. In addition, Endlicher corresponded with the very persons who highlighted the achievements of Sequoyah, his fellow members of the American Philosophical Society, Du Ponceau and Vaughan.

While there is nothing in any written work by or to Endlicher that states he named *Sequoia* either for its place in a sequence or for the person Sequoyah, we have seen he has discussed his motives for assigning taxa with colleagues who, in turn recorded them, e.g. Gray and *Ungnadia*. Gray was also responsible for recording Endlicher's motives for assigning the taxon *Sequoia*. Gray wrote a history of *Sequoia* and presented this as a talk in Dubuque, Iowa in 1872. He also edited a book of George Engelmann's work where Engelmann and Gray reiterated the origin of the genus *Sequoia* for the man, Sequoyah:

SEQUOYAH

In last Sunday's issue you revive the almost forgotten, though most interesting history of the invention of the Cherokee alphabet and written language by the half-breed, Sequoyah, and mourn that to-day no man can point out the spot where moulders the dust of the Cherokee Cadmus.

His resting-place may be unknown, but his name and his memory live in the most magnificent vegetables of this continent. The mammoth tree of California has been claimed by English as well as Americans for their greatest men, and has been named by the former Wellingtonia and by the latter Washingtonia, but a celebrated Vienna professor, Endlicher, as eminent a botanist as he was a linguist, had already, in 1847, established a genus which comprises the mammoth trees as well as the scarcely less magnificent Red Woods of California, and had named it Sequoia, in commemoration of the aboriginal linguist; and as long as botanical science exists both these wonders of the western world will perpetuate the name of the Cherokee Cadmus. — Missouri Republican, Sept. 28, 1873. (Trelease and Gray 1887).

Endlicher's linguistic skills and knowledge allowed him to become a polyglot and student of world-wide languages. He corresponded with and knew people who studied the syllabary of Sequoyah. Endlicher also named many plant taxa for both scientists and persons of note. Endlicher knew and admired the work of the man Sequoyah. Once he realized the previously assigned *Taxodium* required a change in genus, this evidence supports that he honored the recently deceased Sequoyah, by assigning the genus *Sequoia* to the Coast Redwood.

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