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RESEARCH ARTICLE

O-da-li Ga-li E-di-yo-ha: Mountain Climber, We Are All Looking For It

ALISSA BAKER

Creation stories are a potent medicine. When shared, they can transport the storyteller and listeners to a time before the Earth and its inhabitants existed as we see them today. These stories call us to imagine worlds at the limits of our imaginations, often invoking concepts of infinitude, nothingness, and elemental purity. Upon these vast canvases the earliest relationships between the Earth and all living things are defined. The cooperation, dissociation, unifications, and dissolutions of these relationships communicate the most fundamental relationships our people have experienced; our responsibilities and obligations that hinge upon our most noble virtues as well as most grievous failings. These stories provide what have been referred to as 'original instructions 'about our relationships and conduct within this world (Ausubel 18).

The Cherokee creation story, as many stories from oral cultures, is complex, branching into a multitude of seemingly episodic but interconnected stories. These stories are where we learn about how the animals first formed ᏒᎶᏫ (E-lo-(h)wi: the

Earth), the appearance and lives of the first humans ᎧᎾᏁ and 4M (Ka-na-ti and Se-lu), and how we received our most important food, corn (4M, se-lu). Within this epic we also learn how humans, nearly at the outset of our time on ᏒᎶᏫ, had already shown a tendency toward thoughtlessness and greed at the expense of other animals.

It is said that a long time ago, humans were not careful about where they walked, and at times would step on the toad who was wont to bury himself in the ground. This trampling upset the toad, as his once smooth and beautiful skin was now covered in warts from the dirt being ground into his body. He called together a council of animals who collectively aired their frustrations about the humans who not only trampled upon them but killed many of their brethren for food as well as harvested foods the other animals enjoyed eating. The animals decided that in order to punish the humans, they would lay curses on them to make them sick. All seemed lost for the humans at this point, as we already know that the animals formed ᏒᎶᏫ themselves and therefore had more experience and knowledge in almost all things compared to the humans. Fortunately for us, the plants came forward in our defense. The plants felt that humans had always treated them well. The plants decided that for every curse and illness the animals created to harm the humans, they would offer a cure. This story shows the deep relationship Cherokees have with plants, and how we came to receive many of our medicines (Teuton 138-139).

Among these medicines, there were some plants who were very generous indeed. A prime example of a plant that has formed a strong relationship with the Cherokee people is ginseng. This plant is treasured where it grows across the homelands of the Cherokee and is sorely missed by descendants of Cherokees forcibly removed to Indian Territory in 1830's (now Oklahoma). With assistance from an interview with Mr. Pat Gwin, the recently retired Senior Director of Cherokee Nation Environmental Resources, this paper will provide a brief ethnobotanical portrait of the North American varieties of ginseng, an overview of a ginseng project within the Cherokee Nation, as well as relevant ecological and sociocultural relationships that

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may inform the trajectory of the Cherokee Nation ginseng project.

Globally, there are six varieties of ginseng with two varieties occurring naturally within North America. Cherokee medicinal practices likely utilized both North American varieties: American ginseng (Panax quinquefolius) and Dwarf ginseng (Panax trifolius), as both plants could be found within the boundaries of the Cherokee homelands prior to removal (Keville 7). Maps denoting current distribution are shown below (United States Department of Agriculture). While Oklahoma is included in the contemporary distribution of American ginseng (Panax quinquefolius), few confirmed sightings of the plant have been reported. Observations within LeFlore County, Oklahoma, have been published and the plant is listed as highly imperiled at the state level (Hoagland and Buthod 80). Dwarf ginseng has been noted explicitly as one of the culturally salient species lost by removed Cherokees (Vick 402).

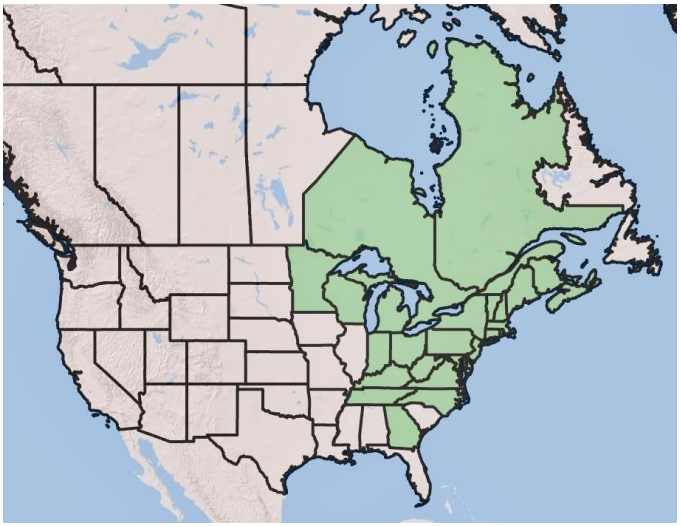

Figure 2. Distribution of *Panax trifolius* in North

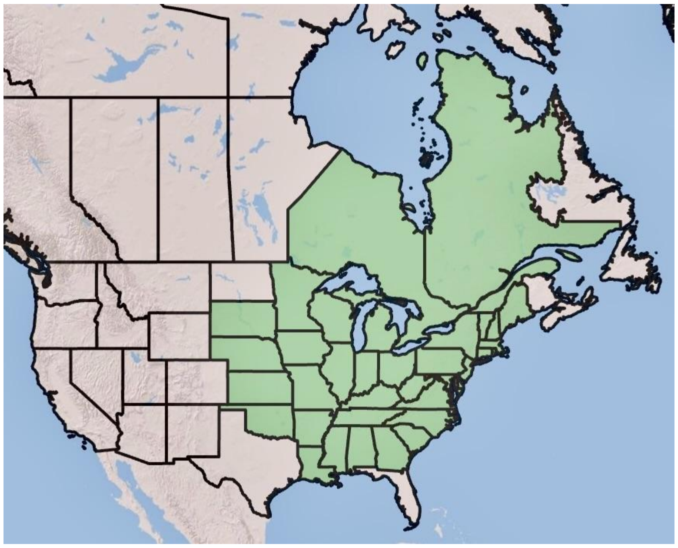

Figure 3. Distribution of *Panax quinquefolius* in North America.

In the course of research for this paper, multiple Cherokee names for ginseng were confirmed. Some examples include ᎣᏓᎵ ᎦᎵ (o-da-li ga-li: mountain climber), ᏍᎩ ᎣᏍᏗ (s-gi o-s-di: loosely (with emphasis) 'very good/nice'), and ᎠᏍᎦᏯ ᎣᏍᏓ (a-s-ga-ya o-s-da: good man). It is possible that multiple Cherokee names for ginseng refer to, or at one time referred to, the distinct American and Dwarf varieties. It is also possible these different names represent regional variations for the same plant. It is widely known among professional botanists as well as hobbyist plant and mushroom hunters that a wide variety of local names can describe the same organism.

The Cherokee language is a highly descriptive verb-based polysynthetic language (Kilarski 61-66). Given there exists multiple ways to reference objects and relationships, there is wide variability across common words in general (Ed Fields 2018). The cultural practices of the Cherokee people likely contribute toward a propensity for community dialects and localized linguistic preferences. Prior to contact and for some time afterward, Cherokees lived within independent towns with local councils in a confederacy-style nation (Carroll 37-56). Living within the Cherokee Nation reservation one can still see and feel this tradition today. Cherokees living in different counties may use different words to describe the same animals, relationships, events, and so on. Our community values focus on maintaining community harmony and developing empathy with instructions such as 'ᏚᏳᎪᏛ ᎢᏗᏢ ᏕᏣᏓᏎᎮᏍᏕᏍᏗ' (Du-yu-(k)-dv i-di-tlv de-tsa-da-se-he-s-de-s-di: direct one another in the right way, without

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confining or pushing (Adcock and Lasher 365-366). In these ways, Cherokees honor the individual by providing space and demonstrating trust to develop one's own interests, talents, and gifts in service to one's community (see Dvorakova 86-90). With these cultural nuances, it is not surprising that one community may come to name an object by describing how it looks, while another community may describe the object by the function it serves. Neither term should be considered incorrect, but preferences do emerge for individuals, families, and communities. For example, there are at least 3 words commonly used in reference to automobiles within the Cherokee Nation reservation: ᎯᏫᏚᎴᎾ (di-k-tu-le-na: 'big eyes', referring the vehicle's headlights), ᏓᏆᎴᎳ (da-qua-le-la: 'wagon', a carryover term from earlier transportation technology), and ᎠᏯ ᎯᏝᎢ (a-dla di-tla-i: 'rubber, mounted/layered', referring to the rubber tires that the vehicle cab is mounted upon) (Ed Fields). It would not be surprising for this variability to extend to medicinal plant descriptions.

The Cherokee people use ginseng for a variety of specific treatments as well as for a general tonic. One source finds that there are at least 14 distinct uses for Dwarf ginseng among the Cherokee (Vick 402-403). Some of the specific uses include as an expectorant, as a colic treatment, and for oral thrush (Setzer 52). The Cherokee are not the only Native people who have incorporated this herb within their medicinal practices; the Iroquois (Liu et al. 2), the Anishinaabe (Norrgard 58), Menominee (Ross et al. 484), Muscogee, Meskwaki, and Mohawk peoples (Stephenson) have all been noted to administer ginseng. Other noted indications for use of the herb include indigestion, gout, respiratory problems, hepatitis, hives, rheumatism, and various skin problems (McElhaney et al.; Keville 48-49). Ginseng provides additional benefits beyond curative properties which likely lend to its use as a more general tonic. The herb has been shown in double-blind randomized trials to improve working memory, reaction time, and induce a state of enhanced calm or focus (Scholey et al. 351-354).

The herb is also widely known through both clinical trials and medicinal practices to relieve fatigue (Barton et al. 1232-1236).

While the name ᎣᏓᏟ ᎦᏟ appears to be a description of where you would find plant growing on mountainsides, it is typical of Cherokee naming conventions for there to be multiple meanings within in a name. We can take the name ᎣᏓᏟ ᎦᏟ to also refer to the stamina gained from the plant, which would endow the practitioner the ability to climb mountains; while enhanced mental acuity would perhaps provide for insights to more easily allow the patient to overcome mountains of the psychological variety. The stamina and cognitive benefits make the herb an ideal component of ceremonial medicinal practices; ginseng bestows energy and mental clarity that would aid Cherokees taking part in stomp dancing, a ceremonial community event that takes place from dusk until dawn (longer for ceremonial chiefs). The multitude of benefits and alignment of ᎣᏓᏟ ᎦᏟ with our spiritual practices make it clear why Cherokees recognize this plant as sacred and hold a special relationship with it. For Cherokees whose families were forcibly removed from areas where the plant is easily located or procured from a medicine person, the loss of this sacred relationship is appreciable. The absence of this 'good man' takes with it practices, language, and knowledge specific to the maintenance of a respectful reciprocal relationship. The loss of access and relation to ginseng for Cherokees and other Native Americans is but one manifestation of cultural genocide directed at Native Americans by the ongoing settler colonial project of the United States.

The loss of plant medicines following removal was recognized as a crisis. Preserved oral histories speak of how Cherokee spiritual leaders and medicine people arriving in the "new country" of Indian Territory sought from via offerings and petitions to ᎤᏁᏝᏅᎯ (U-ne-tla-nv-hi: Provider) to provide new plant medicines. These calls for assistance were said to be answered, and Cherokees located relatives of traditional medicines from their homelands as well as found new medicines (Carroll 60-63). Local stories have also suggested that citizens across removed tribes such as the Cherokee,

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Absentee Shawnee, and the Muskogee supported one another in creating intertribal ceremonial grounds and medicine exchanges to increase access to healthcare (Dr. Daniel Howard 2017).

The observation of Panax quinquefolius occurred within the mountainous southeast corner of Oklahoma the sovereign lands of the Choctaw Nation (see Figure 3). By all available accounts, ginseng does not seem to be found within Cherokee territory (Pat Gwin 2019). This may not have always been the case. When the Cherokee were forcibly removed from their original lands in the Smokey Mountains in the winter of 1838, few were able to thoughtfully prepare for the arduous forced march. The Cherokees had been engaged in long series of proposals and deliberations with the United States federal government as well as the state of Georgia for years at that point. Chief John Ross, journalist Elias Boudinot, and warrior Major Ridge among others made numerous travels to delegate overturning the ill-gotten Treaty of New Echota; a treaty made with Cherokee representatives that did not have significant backing from the tribe as a whole. It was this treaty that promised the eventual removal of the Cherokees to Indian Territory, now Oklahoma (King 41-50).

Although given very little time to gather belongings, there were some Cherokees who had the presence of mind to consider what would be able to be planted to sustain the Cherokee people upon their arrival in Indian Territory. For instance, it is known that White Eagle corn kernels were brought for planting (Pat Gwin). White Eagle corn is a dent variety that is most suitable for grinding into cornmeal, a mainstay for many Cherokee foods (Nadine Mahaney 2015).

There is reason to speculate that ᏍᏓᏢ ᎦᏢ root stock may have been carried over the Trail and fostered by families who settled in northeastern Cherokee Nation territory. Pat Gwin, a lifelong outdoorsman, notes that the seasonal timing of removal made it possible that viable harvested root stock would have been available and easily

transported. In an interview, Mr. Gwin shared that when elders took him to sites where they or their grandparents had reported once harvesting ᎣᏓᎵ ᎦᎵ, there were no longer traces of the plant to be found. He believes that these sites could possibly be transplant sites where ancestors who had come across the Trail had planted root stock and cared for them. What is less clear, but of interest, is whether the sites eventually failed due to inadequate site conditions, neglect, over harvesting, climate change, or a combination of these and potentially other factors. It is worth noting that the southeast Oklahoma county in which ginseng was reported to be found in is 3-500′ higher in elevation than the Cherokee Nation lands in the northeast corner of Oklahoma.

Memories of the medicinal value of the plant, and presumably memories about the relationships families made with the plant and one other while working the site, creating medicine, or sharing knowledge about the plant have remained over time. The Cherokee Nation ginseng project grew out of the successful Seed Bank program. The Cherokee Nation Seed Bank began after it became apparent the tribe no longer held any of its heirloom seeds in 2005. Mr. Gwin spent a year traveling across the United States and working with the Minneapolis American Indian Center as well as our sister tribe the Eastern Band of Cherokee Indians (EBCI) to recover a stock of 20 varieties of traditional medicine and food plants (Danovich). Cherokee Nation citizens were able to place a request for free seeds for the first time in 2006, and the program has only become larger and more popular since.

The success of this program made it possible for the tribe's ethnobotanical work to continue to expand, and partnerships were born across different programs within the tribe. An early and natural partnership that emerged was between Environmental Resources and the various language programs. As first language speakers are overwhelmingly elders, Mr. Gwin and other Environmental Resource employees were able to begin seeking the input of community elders about what projects they would like to see undertaken. There were two plants that elder Cherokee speakers were keen to re-establish: river cane (ᎢᎯᏯ: i-hi-ya) and ᎣᏓᎵ ᎦᎵ. The river cane project continues

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today on the grounds of our sister tribe, the United Keetoowah Band of Cherokee Indians, and is hailed as a success (Gourd; Graham), but the ginseng project has proven more challenging.

To launch the project, Mr. Gwin purchased several hundred dollars' worth of ginseng root stock from a wildcrafter on the East coast. Ideal planting sites were scouted, and the roots were planted in the fall of 2008. As its name suggests, ᎣᏓᎵ ᏧᎵ prefers northern slopes of mountains with good soil. Mr. Gwin soon found that it was not only elders who were interested in the project; the roots of wild ginseng, or wild-cultivated (woods-grown) ginseng, can sell for exorbitant prices, so care was taken to keep the locations private and protected in order to prevent poaching (Pat Gwin). The global market for ginseng continues to expand as the total supply is dwindling, driving the price per pound ever higher and enticing poachers to risk federal and state prosecution to harvest the plant in protected areas. Poachers present the most significant threat to the endangered plant, as they may harvest too early in the plant's life cycle to allow the plant to reproduce successfully or may not resist the temptation to harvest an entire plant community (Dr. Eli Suzukovich 2019; Arnold; "American Ginseng").

The thought and care that went into planting paid off. The seedlings sprouted ahead of schedule by at least 6 weeks and at a 100% success rate, surprising the wildcrafter who had sold the root stock upon hearing the news. It seemed that many of the early pitfalls that can befall a new planting project had been avoided. Yet, as any gardener knows, you shouldn't count your tomatoes before they are on your plate. While the sites selected for the Cherokee Nation plantings managed to prevent the detection of poachers, the plants did not elude local wildlife. The healthy plants were soon consumed by animals, who ate them down to the ground. There were no wildlife cameras installed at the site, but deer or possibly groundhogs were the suspected

culprits. Whatever the animal, ᎣᏓᏅ ᎦᏅ tried to come back year after year but was eaten each time, eventually killing off the root stock entirely (Pat Gwin). If deer were responsible for consuming the plants, it is unlikely that any of the early seeds consumed were dispersed. Study has found that ginseng seeds are most likely destroyed during the digestive process when eaten by deer (Furedi and McGraw 271-275).

Ginseng has a number of important relationships across the forest ecosystem, deer accounting for only one. Rodents and turkey are noted to eat ginseng in addition to deer (Carroll and Apsley). Turkey, in particular, have been discussed in relation to ginseng, as they enjoy eating the berries of the plant. Research has found that turkeys damage crops of ginseng intended for sale and distribution through scratching. As turkeys scratch the soil around the plants while foraging and eating berries, they expose and damage the crown of the ginseng roots. This damage has been found to be exacerbated in wild-cultivated ginseng where turkeys have longer intervals of accessibility to ginseng sites due to less frequent human visits. In these instances, flocks of turkeys can damage several hectares of ginseng in just one passing (Werner et al. 226). The high price point of the crop translates to thousands of dollars being lost even in instances where the actual damage is small (Groepper et al. 3; Werner et al. 222). Not addressed by the literature is a study of wild turkeys as a vector of ginseng distribution. It is possible that wild turkeys both damage plants but also create new sites for ginseng growth through their consumption and contingent dispersal of seeds (Dr. Eli Suzukovich 2019).

Future study would do well to consider whether the terrains that wild turkeys frequent are ideal for ginseng growth, perform chemical analyses of the effects of turkey digestion on ginseng seeds, and conduct field study and observation of turkey flocks in known ginseng-growing areas to try to determine whether ginseng plants are indeed being distributed. There is reason to believe that birds, or at least songbirds, may be effective ginseng seed dispersers. Recent research found that thrushes enjoy eating ginseng seeds more than other potential dispersers and are prone to

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regurgitating viable seeds 5-37 minutes after consumption (Hruska et al. 50). Both the hermit thrush (Catharus guttatus) and the gray-cheeked thrush (Catharus minimus) have been identified with the boundaries of the Cherokee Nation (Kaufman). In addition to animal-plant relationships, ginseng also shares relations with a number of plants; ᎣᏓᎵ ᏕᎵ is known as an understory plant requiring shade, so one important set of relationships are those to overstory trees. In a study of overstory tree species present at naturally occurring ginseng sites in Arkansas, white oaks, mockernut hickories, northern red oaks, American beeches, and black oaks were found to be the most important (see Figure 4 on the following page for the full list of 20 species documented; Fountain 44). Notable is the dominance of oak varieties found at naturally occurring ginseng sites. Cherokee territory in Oklahoma is a mixture of tall grass prairie, oak-hickory, postoak-blackjack, and oak-pine forests (Tyrl et al. 7-9), thereby containing a diversity of oak species within its bounds.

Table 1. Importance values for overstory tree species (stems greater than 10.0 cm dbh) associated with natural populations of ginseng in Arkansas (all study plots combined)

SPECIES	Average Basal Area (m^2/ha)	Average Density (stems/ha)	Frequency %	Importance Value
White oak	4.222	87.55	66.7	57.51
Mockernut	1.799	37.15	41.7	28.70
Northern red oak	2.295	26.52	50.0	26.26
American beech	3.702	21.23	25.0	24.54
Black oak	2.384	21.22	41.7	25.54
Yellow-poplar	0.267	5.30	25.0	23.37
White ash	0.792	29.17	33.3	18.01
Blackgum	0.849	18.56	41.7	16.88
Hophornbeam	0.252	18.56	25.0	13.25
Sassafras	0.369	15.92	25.0	10.64
Basswood	0.316	7.96	16.7	8.61
American elm	0.165	10.61	16.7	8.24
Black cherry	0.130	7.96	16.7	6.27
Sweetgum	0.267	5.30	16.7	5.60
Sugar maple	0.187	5.30	16.7	5.14
Dogwood	0.130	10.62	8.3	5.07
Red maple	0.053	5.30	16.7	4.73
Cucumbertree	0.032	2.65	8.3	2.78
Shagbark hickory	0.096	2.65	8.3	2.62
American hornbeam	0.024	2.65	8.3	2.16

Figure 4. Important overstory tree species at natural ginseng sites in Arkansas (Fountain, 44).

These oaks are currently threatened by red oak decline, fungal infections (Biscogniauxia cankers in particular), and defoliators. In the case of the Biscogniauxia canker, there is not a cure; rather, preventative maintenance is the only way to prevent infection. This fungus is more prone to infect trees stressed by drought, heat, and wounds (Olson). Red oak decline is also precipitated by drought and environmental stressors (Pat Gwin; Kabrick et al. 181, 185). Oklahoma weather is predicted to become warmer with more severe droughts and flooding as the climate changes more rapidly in the immediate future (United States Environmental Protection Agency, 1-2), so it is

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likely that oak fungal infections and red oak decline will continue to shift the composition of our forests.

In envisioning which tree species might take the place of oaks if the aggregate population begins to dwindle, Mr. Gwin that sugar maples, among other species, appear to be increasing in number. The Caddo sugar maple is a native variety that originated in Caddo county in southwestern Oklahoma considered to be highly drought-resistant, possibly making it easier for this species to migrate north to the Cherokee Nation reservation (Oklahoma State University). It has been noted for some time that red maples have been rapidly expanding their distribution across North America and are able to tolerate a wide range of soils, including those found in Oklahoma (Abrams 355-356). While not listed within the top 10 important overstory tree species (Figure 4), red and sugar maples are considered important over- and understory species within Arkansas forests for creating appropriate habitat for ᎣᏓᏅ ᏕᏅ (Fountain 46).

Notably, Cherokee Nation citizens were recently granted permissions to forage ginseng and other plants within the Buffalo National River Park in Arkansas (Hunter). Therefore, the health and composition of Arkansas forests may be just as important to Oklahoma Cherokees as our local forests. While this pact is laudable, questions of true accessibility remain as the park is about a two and a half hour drive from the Cherokee Nation capital in Tahlequah, Oklahoma. Native Americans are almost twice as likely to live in rural areas compared to the general US population (Cromartie and Parker), a figure that is likely higher for practitioners of Cherokee ceremonial plant practices. Rural US citizens are known to face challenges in accessing transportation (Wang et al. 1) which is further compounded by factors specific to Native American communities (Carther). It is presently unknown if the pact has increased foraging options in practical ways for rural Cherokees given that rural Native Americans often face difficulties

completing everyday tasks that rely upon transportation, such as attending medical appointments or getting children to school (Hensley-Quinn and Shawn 1).

The health of and access to forests are not the only relevant factors in the maintenance of communities capable of including ginseng among its members. Given the interrelation of lands, changes in non-woodland ecosystems must be considered as vectors of second- and third-order effects within Oklahoma woodland habitats. One phenomenon that stands to impact the composition of forests in northeast Oklahoma is woody plant encroachment (WPE), which is the migration of Indigenous woody plants into grassland and savannah ecosystems. This migration transforms these unique ecosystems into closed woodlands, enacting fundamental shifts in local biodiversity (Shipley et al. 753-754). The central and Southern Great Plains (SGP) that stretch across Oklahoma demonstrate a higher rate of WPE (~1.7%/year^{-1} of land area) than the Great Plains, Africa, South America, or Australia (Yang et al. 1).

Mirroring the migration patterns of their human counterparts (Wilkerson and Farha), central Texas plants such as eastern red cedar, post oak, honey mesquite, and Ashe juniper are relocating into central and eastern regions of Oklahoma. Species distribution models project that honey mesquite could overtake up to 2/3 of non-agricultural areas in the southern Great Plains by the end of the 21st century (Yang et al. 1). As a complex phenomena, WPE can effect positive local changes such as enhanced carbon storage within soil and vegetation pools as well as increased vegetation productivity. Yet, WPE is also associated with decreases in biodiversity, productivity, and coverage of herbaceous vegetation due to increased shading created by migrating woody plants and contingent competition among floor-level plants. Additionally, WPE has been found to impact multiple facets of water system dynamics that ultimately reduce surface water runoff and groundwater recharge. If left unmanaged WPE can impact river flow and the availability of water across watershed and regional levels (Yang et al. 2). Each of these major shifts, as well as the minor mechanisms underlying such systems-level changes, directly impacts the ability for

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communities comprised of both humans and more-than-humans (see Abrams 14-15) to maintain established food and water system practices that sustain populations. Dramatic changes in the availability of water, native grasses, and forbs can lead to extinction as well as migration of local species into neighboring areas, creating cascading shifts across both directly and indirectly impacted ecosystems (Yang et al. 2).

An accelerated loss of vegetative biodiversity and dramatic changes in local water systems present real challenges to the proliferation of ᎧᏓᎵ ᎦᎵ in Oklahoma forests. Site suitability for ᎧᏓᎵ ᎦᎵ is often marked by the presence of a diverse community of plants that commonly grow alongside ᎧᏓᎵ ᎦᎵ. These often-sensitive plants include jack-in-the-pulpit, green dragon, rue anemone, trillium, and Solomon's seal. The most consistent plant mentioned in conjunction with ginseng is goldenseal (Hydrastis canadensis L.). The plant appears to be an indicator of habitability for ginseng but may also provide benefits to ginseng as a companion plant. Goldenseal is popularly known for offering antifungal properties and given that ginseng prefers to grow in damp understories, these properties may improve the health of its roots. Goldenseal already grows naturally in Oklahoma and was planted with the Cherokee Nation ginseng plants, which may have aided their robust growth (Pat Gwin; Carroll and Apsley 2; Frazier et al. 8-10). This partnership between goldenseal and ᎧᏓᎵ ᎦᎵ underlines the importance of soil moisture dynamics that stand to be impacted by complex changes in climate, water systems, and community memberships in Oklahoma forests.

As the profitability of ginseng continues to drive research agendas, more will be learned about the plant and its relations over time. Cherokees seeking to re-establish a relationship with the plant are motivated by traditional relational exchanges rather than capitalist profit. Mr. Gwin shared that ginseng successfully produced through his

work would be made available to ceremonial practitioners likely free of charge as is already the practice with other important medicines such as Red Root (also known as prairie willow). He noted that elders in the community tend to feel that it is inappropriate to put a price on knowledge or sacredness, and are therefore generally opposed to using the plant to generate revenue. Mr. Gwin shared that there may be efforts to grow ginseng in a controlled greenhouse environment but given the ceremonial use of the plant, this process would need to be co-developed by traditionalists, speakers, and tribal natural resource employees to ensure appropriate handling of the plants and environment.

This work and other projects emerging from Cherokee Nation Natural Resources and its internal collaborators are demonstrative of Cherokee cultural practices. Like many Native American tribes, environmental resource management is considered an important aspect of practical and political management of sovereign tribal lands for the Cherokee Nation. The inclusion of community voice and focus on community needs reflect the community value of drawing our people together to work toward common goals, a concept known as ᏕᏍᎩ (gadugi) that marks many of Cherokee people's greatest endeavors. The ginseng project may also hint at some of the foundational elements of a Cherokee model of science: careful observation of environments; background research via multiple trajectories that expand beyond traditional academic sources to include stories and histories in both oral and written forms; meditation upon our language as a guide to understanding the phenomena or agents they describe; a willingness to experiment toward more successful outcomes in ways that are ethically anchored within our shared values; and a progressive incorporation of diverse technologies when it can serve our needs. The efforts of the Cherokee Nation Natural Resources department are examples of Cherokee sovereignty and investments in our futurity to remain Cherokee through ties to our lands and practices, despite forced removal and efforts by the United States and the state of Oklahoma in attempting to eliminate our peoples and culture.

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Cherokee epistemology, our ways of thinking and knowing, are transmitted through cultural practices that are important in the preservation of our heritage, advancement of sovereignty, and nation-building. Many Native peoples, including the Cherokee, recount stories of dramatically shifting environments that demonstrate the capacity of Indigenous communities to survive many changes in climate as well as oppressive social regimes. Our relationships with plants, including our process of making relationships with plants, is likely one of the practices that has bestowed resiliency and success in the face of environmental and social challenges. Continued revitalization and study of our plant sciences, language, traditional and contemporary wisdoms, and value systems will serve to connect Cherokee people to our histories as well as our futures.

The author would like to thank and acknowledge Mr. Pat Gwin and Mr. Ed Fields for their assistance and support in producing this work.

Dr. Alissa Baker (Cherokee Nation) is a 7th-generation resident of the Cherokee Nation. Her work is informed by the mentorship of her family and broader community on traditional knowledges and Cherokee language in addition to formal study of Western cognitive sciences. She is a mother and lifelong student of traditional Cherokee lifeways and language, as well as the founder of Tohi Consultation, an independent consultation business that advances Indigenous and community-based research solutions.
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