One hundred and fifty years of ethnobotanical studies in North America

Pioneering contributions of Edward Palmer (1831-1911)

Cent-cinquante ans d'études ethnobotaniques en Amérique du Nord : les contributions pionnières d'Edward Palmer (1831-1911)

Ciento cincuenta años de estudios etnobotánicos en América del Norte: contribuciones pioneras de Edward Palmer (1831-1911)

Robert Bye and Edelmira Linares

Electronic version

URL: <https://journals.openedition.org/ethnoecologie/8248>

DOI: 10.4000/ethnoecologie.8248

ISSN: 2267-2419

Publisher

Laboratoire Éco-anthropologie

Electronic reference

Robert Bye and Edelmira Linares, "One hundred and fifty years of ethnobotanical studies in North America", *Revue d'ethnoécologie* [Online], 20 | 2021, Online since 31 December 2021, connection on 06 March 2022. URL: <http://journals.openedition.org/ethnoecologie/8248> ; DOI: <https://doi.org/10.4000/ethnoecologie.8248>

This text was automatically generated on 6 March 2022.

Revue d'ethnoécologie est mis à disposition selon les termes de la licence Creative Commons Attribution - Pas d'Utilisation Commerciale - Pas de Modification 4.0 International.

One hundred and fifty years of ethnobotanical studies in North America

Pioneering contributions of Edward Palmer (1831-1911)

Cent-cinquante ans d'études ethnobotaniques en Amérique du Nord : les contributions pionnières d'Edward Palmer (1831-1911)

Ciento cincuenta años de estudios etnobotánicos en América del Norte: contribuciones pioneras de Edward Palmer (1831-1911)

Robert Bye and Edelmira Linares

Introduction

- 1 Ethnobotany is an evolving transdisciplinary science that has developed from a listing of plants that people recognized and used locally to one of inquisitiveness and theorizing about how and why people selected plants for a wide range of purposes (Gaoue *et al.* 2017). The critical departure point for this process was the shift from incidental recording of plants by travelers who wondered through unexplored territories populated by unknown plants and unfamiliar peoples to curious inquiry accompanied by scrutinized observations and voucher specimens to authenticate the plant's identity and permit repeatable verification of the plants involved (Bye 1986).
- 2 Edward Palmer (1831-1911) was a fundamental pioneer in the founding of ethnobotany as a science prior to the coining of the formal term by Harshberger (1896). Upon concluding his first career as a medical doctor and amateur collector in 1868 (Figure 1), Palmer entered his second professional period to devote full time to "prosecution of science" (McVaugh 1956: 41). After 12 years of medical service with military expeditions during which he gathered natural history objects in his spare time, he dedicated his life to scientifically collecting archaeological, botanical, ethnographic,

and zoological specimens from western territories of the United States and northern Mexico for academic institutions.

Figure 1 : Edward Palmer en 1864, five years before his retirement (from medical service in the United States Army) and acceptance of employment by the Smithsonian Institution and the Department of Agriculture

National Anthropological Archives, Smithsonian Institution, lot 70, inv. no. 028810.00, neg. no. 80-17994

- 3 In 1870, Palmer's key publication that heralded the transition of ethnobotany was entitled "Food products of the North American Indians" and appeared in the "Report of the Commissioner of Agriculture for the year 1870" (Dexter 1990). His biocultural diversity report was "an inquiry into the means of subsistence of the aborigines [that was] attended with much curious interest" (Palmer 1871 : 404). The practice of natural history research of the 19th century was to sample the biological and cultural elements from across geographic spaces as had been done since the 16th century. Based upon the accumulation of specimens and observations of biological diversity, the questioning of why and how of distinct patterns fostered evolutionary theories that crystallized with Charles Darwin's "Origin of Species" that was published only 11 years prior Palmer's article. Hence the first stage of evolutionary and ecological sciences was based upon systematic collections that could be repeatedly studied over time to address novel questions and lines of inquiry.
- 4 Palmer provided the seminal article that projected ethnobotany to become an important science that it is today. Although the publication's structure as well as the bibliographic and specimen supports do not meet modern day criteria, they follow the norm of official reports and scientific articles of the day. During Palmer's lifetime, even the "the attitude toward documentation of specimens, even among the outstanding men in natural science, was a careless one by today's standards" (McVaugh 1956 : vi-

vii). The article's content is derived from various sources (e.g., personal observations as well as literature), covers a wide range of cultural groups, and spans North American geography from Alaska to Mexico. While 116 species and 8 genera were identified by scientific names, the degree of detailed information varied from some plants with only a few lines to others with a number of pages. Palmer's documentation of dynamic patterns of food plants ranged from archaeological samples of maize from Utah, through the European crops introduced during the colonial period, and to coveted native vegetal esculents that diminished in importance during the late 19th century when United States government policies disengaged indigenous peoples from their traditional foodways and forced them into alternative agricultural systems and unfamiliar vegetations.

- 5 The 139 vegetal edibles listed in the article (124 as scientific names and fifteen only by common names; honey excluded) are divided into eight categories based on each plant's edible structure (Table 1). A ninth section not considered here pertained to "Animal Food with Vegetable Substances" (such as herbivores or partially digested stomach contents of slaughtered animals). Each paragraph within a category treated one species (or more in case where other members of the same genus are mentioned). The categorization had certain anomalies such as the inclusion of wheat, beans and pumpkins in the "Miscellaneous" group as well as sugar maple, screwbean and arbovitae in the "Nut" category. Even though treatments varied, each usually included: scientific name, common name, geographic location, associated ethnic group, in addition to the plant part utilized along with its preparation and form of consumption.

Table 1 : Number of plants identified in the eight categories as reported originally in "Food Products of the North American Indians" (Palmer 1871)

CATEGORY	# ENTRIES
Roots and tubers	26
Dried fruits and nuts	7
Nuts	16
Berries	33
Fleshy fruits	14
Seeds	11
Miscellaneous	23
Cultivated fruits	9

- 6 The scientific names were those used by the standard floras of the era (Hooker 1829-1840; Torrey and Gray 1838-1843). In some cases, the plant's taxonomic identity was based upon a specimen examined by these scientists and others (e. g., George Engelmann, C.C. Parry, Sereno Watson). No specimens were specifically cited by collector's name and number in "Food Products..."; but this situation also occurred in taxonomic publications of the period. None the less, Palmer, being one of leading plant collectors of his time, deposited his specimens in herbaria worldwide (McVaugh 1956). Voucher specimens are essential to authenticate the taxonomic identification of the plants that are important to people (Bye 1986). Little progress has been made in connecting Palmer's unpublished notes with his plant and archaeological specimens (Bye 1972, 1979, Heizer 1954, Jeter 1990, Underhill 1984). The few bibliographic citations were cryptically mentioned in Palmer's text; a full bibliographic citation and a list of references were not provided, again, a pattern found in many scientific papers of

the period. Despite these limitations, a few of Palmer's records can be traced to previous botanical reports published by the US government and academic institutions in the United States and United Kingdom. Finally, ten plates with line drawings illustrated 17 plants.

- 7 "Food Products..." was the first of 17 articles of varying size that Palmer published on ethnobiological themes. The impact of Palmer's initial article is difficult to assess. His chapter appeared originally in the Report of the Commissioner of Agriculture for year 1870 without authorship credit. None the less, his contribution was specifically mentioned in the editor's introductory letter to the commissioner (Dodge 1871 : 155), in the report on the chemical composition of Indian foods (Antisell 1871 : 107), in Palmer's follow-up article (1878a : 593), and in a later republication (Putnam 1966). Unfortunately, subsequent authors failed to credit Palmer. For instance, Edward Lewis Sturtevant's major compilation on food plants (Hedrick 1919 : 634, 664) cited this source by the name of J. R. Dodge, editor of the "Report of the Commissioner ...". John W. Harshberger, originator of the term ethnobotany, recognized Palmer's pioneering contribution by citing his prior account of archaeological maize in the German republication of the "Food Products..." (Palmer 1874) rather than the original publication (Harshberger 1893 : 99). Harshberger did acknowledge the "material support" provided by various anthropologists and botanists who received specimens from Palmer but not Palmer himself. Even though Harshberger promoted agricultural botany throughout his academic career (Harshberger, 1920), it appears that he did not continue ethnobotanical studies, nor did he cite the botanical contributions of Palmer and of other ethnobotanists. In contrast, after publishing his seminal "Food Products...", Palmer followed up with his 1878 series (Palmer 1878a, 1878b) which amplified this 1871 publication as well as included new records. In addition to publishing, he continued ethnobotanical investigations in the field that were vouchered by his specimens and notes until 1910. After 1892, his contributions were archived in his private files as well as shared with botanical and anthropological colleagues for their specialized publications (e.g., Standley 1920-1926, Hough 1918, Mason 1904).

Ethnobotany

- 8 The field of ethnobotany studies the interactions and relationships between plants and people over time and space at various dimensions (Bye 1993). The dimensions of plants as well as humans can vary from the all-encompassing collective unit (e.g., biosphere, humankind, etc.), through various subunits (e.g., populations, communities, etc.), to individuals with exclusive specialties (e. g., mutant plants, shaman, etc.). Interactions create the interfacing of plants and peoples such that the results impact each other. One prime example is that of domestication of edible plants in which reciprocity involves inheritable changes of information both in the plants (e. g., genetically altered characteristics over generations so that they depend upon human support to survive and reproduce) and in humans (e. g., changes in societies where information passed onto subsequent generations through cultural practices as well as in genetically based structural, metabolic and physiological characteristics). On the other hand, relationships facilitate the interfacing of plants and people such that any alterations of the plants and people are not necessarily inherited in future generations. An example

would be plant cultivation where human modification of environmental factors only causes a change of phenotypic expression in the plants (e. g., the addition of soil fertilizers increases the size of the plant). Examples of various dimensions of time may include the absolute, irreversible progression of chronological time, the span of the evolutionary scale from origin to extinction, the biological existence during an individual's lifetime, the shifts in the morphophysiological state of a plant, or the schedules of human social phenomena. Cases of different dimensions of space involve geographical occupation on earth (and beyond?), stratigraphic divisions of a physical entity or an organism, appropriation of resources, as well as cosmological, cultural, social, and political constructs.

- 9 The protocols of ethnobotanical studies start with considering antecedents of the subjects of inquiry and proceeds to the observational and experimental stages with documentation and specimens that permit a detailed and verifiable study. The recognition of both emic and etic expressions of knowledge is fundamental. The dialogue with collaborative consent among all participants permits sharing information and precludes the imposition of judgmental and prejudicial values; these actions provide the foundation for confidence among the participants and for the veracity of the data. The revalorization of biocultural resources and practices enables the bidirectional flow of information among the participants.

Ethnobotany – Examples of Palmer's contributions

- 10 The major components of ethnobotany are plants and people. In his seminal paper, Palmer focused on the individual plant species that were eaten rather than on their ecological, gastronomic, ethnotaxonomic, or cultural elements. The people in his report were primarily Native Americans whom he observed during his military travels as well as Caucasian settlers ("Anglo"), French Canadians and Mexicans. As an Army Surgeon, Palmer's duties included not only attending the injured and sick but also recognizing the indications of diseases and supervising food preparations. For example, a principal ailment on the frontier was scorbutus or scurvy which the doctors alleviated by including local fruits and vegetables in the soldiers' meals (Scheips 1978). Besides attending to these responsibilities, Palmer went beyond normal practice by inquiring into the scientific bases of edible, medicinal, inebriating, toxic, and material plants employed by the people he visited.
- 11 Prior to 1870, Palmer collected herbarium specimens to document the taxonomic identity of the plants. These were deposited with botanists in New York and Cambridge as well as the National Herbarium and the Department of Agriculture. With his career shift to full time field research in 1869, he was able to collect additional ethnological artifacts associated with food processing as well as samples of the transformation stages of the food products. Because some earlier specimens obtained during military travels were damaged or lost (McVaugh 1956 : 44-45, Underhill 1984), Palmer was able to revisit various Native American communities and recollect herbarium specimens as well as elucidate the taxonomic identity of plants listed only to the generic level in his 1871 publication. Ethnobotanical specimens that included a series of transformation products were those of mesquite (*Prosopis glandulosa* with fruits, meal of ground fruits, and bread as well as the gum resulting from incisions in the bark; Figure 2a) and screwbean (*Prosopis pubescens* with fruits and meal of ground fruits; Figure 2b).

Ethnobotanical specimens obtained after their initial documentation with herbarium specimens include one of the “panic” grasses of the Colorado River (*Echinochloa muricata*, Figures 2c and 2d), soapberry (*Sapindus saponaria*, Figures 2e and 2f), and Spanish bayonet (*Yucca baccata*, Figures 2g and 2h). Collections made after the 1871 publication verified previous identifications such as wild valerian (*Valeriana edulis*, Figures 2i and 2j) and acorns (*Quercus agrifolia* related to herbarium specimen at GH, Palmer 1875 : 461, Figure 2k) as well as modified taxonomic determination of the first reports such as manzanita (*Arctostaphylos pungens* in addition to *A. tomentosa*, Figures 2l and 2m), American aloe (*Agave deserti* in addition to *A. americana*; Figures 2n and 2o), and sunflower (*Helianthus annuus* ‘Mokeack’, in addition to various wild species, Figure 2p). Curatorial data of the illustrated specimens are listed in Table 2.

Figure 2 : Examples of voucher specimens related to Edward Palmer’s pioneering ethnobotanical research. See Table 2 for explanations

Table 2 : Examples of voucher specimens related to Edward Palmer's pioneering ethnobotanical research and illustrated in Figures 2 and 5. Ethnobotanical specimens are deposited in and distributed by the Anthropology Collections (Division of Ethnology) at the Department of Anthropology of the National Museum of Natural History of the Smithsonian Institution (AC) and in the Ethnobotanical Collection of Botanical Museum of Harvard University (EC). Data related to the catalogue numbers of the AC specimens are available at <https://naturalhistory.si.edu/research/anthropology/collections-and-archives-access>. Photos of the ethnobotanical specimens were taken by the authors. Data and images of the herbarium specimens are available online: Missouri Botanical Garden (MO) at <https://www.tropicos.org/>; New York Botanical Garden (NY) at <http://sweetgum.nybg.org/science/vh/>; and United States National Herbarium (US; Department of Botany of the National Museum of Natural History of the Smithsonian Institution) at <https://collections.nmnh.si.edu/search/botany/>

Figure	Scientific and common English names: with type of material or collection reference	Ethnobotanical specimen (AC, EB) and Herbarium specimen (NY, MO, US)	Locality and Tribe
2a	<i>Prosopis glandulosa</i> – mesquite: fruit, meal, bread and gum	AC 21086; 21796; 21797; 24189 EC 16/17	California: Cahuilla; Arizona: Mohave
2b	<i>Prosopis pubescens</i> - screwbean: fruits and meal	AC 24192 EC 16/16	Arizona: Mohave
2c	<i>Echinochloa</i> cf. <i>muricata</i> – panic grass: caryopsis ("grain")	AC 24197	Arizona: Mohave
2d	<i>Echinochloa</i> cf. <i>muricata</i> – panic grass: Palmer 1869: sn	US 976802	Arizona: Mohave
2e	<i>Sapindus saponaria</i> – soap berry: fruit	EC 16/108	Arizona:
2f	<i>Sapindus saponaria</i> – soap berry: Palmer 1869: sn	US 27653	Arizona:
2g	<i>Yucca baccata</i> – Spanish bayonet: fruit and processed fruit pulp	EC 16/14; 16/38	Utah: Pai Utes
2h	<i>Yucca baccata</i> – Spanish bayonet: Palmer 1869: 123	US 35845	Arizona: Pai Utes
2i	<i>Valeriana edulis</i> – wild valerian: root	EC 16/35	Utah: Pai Utes
2j	<i>Valeriana edulis</i> – wild valerian: Palmer 1887: 189 1/2	US 721589	Utah: Pai Utes
2k	<i>Quercus agrifolia</i> – acorns: fruit	AC 21104 EC 16/18	California: Cahuilla
2l	<i>Arctostaphylos pungens</i> – manzanita: fruit	EC 16/42	Utah: Pai Utes
2m	<i>Arctostaphylos pungens</i> – manzanita: Palmer 1877: 294	US 77411	Utah: Pai Utes
2n	<i>Agave deserti</i> – American aloe: "mescal" (roasted "heart" and leaf base) and leaf fiber	AC 21070; 21071 EC 16/85	California: Cahuilla
2o	<i>Agave deserti</i> – American aloe: Palmer & Hitchcock 1875: sn	MO 3347360	California: Cahuilla
2p	<i>Helianthus annuus</i> – 'Mokeack' sunflower: achene ("seed")	AC 21684	Utah: Pai Utes
5b	<i>Solanum jamesii</i> - wild potato: William Bowers sn (received September 1869)	NY bar code 823640	"Texas" [New Mexico]

The people

- 12 Palmer (1871) reported 37 cultural groups including Canadians, Mexicans and "whites". During his lifetime, he had visited 27 Indian tribes (McVaugh 1956) of which at least seven were cited in the 1871 publication: Apache, Cocopa, Maricopa, Mohave, Moqui, Shoshone, and Yuma. In some cases, tribal affiliations were not named but rather indicated by geographic regions (e.g., Northwest Indians, California Indians, etc.). Although we have not confirmed all the records to date, some reported Native Americans appear to be people visited by earlier explorers such as Patrick Glass (1808), Meriwether Lewis and William Clark (1814), Frederick Pursh (1814), Thomas Nuttall (1818), David Douglas (Hooker 1836-1837), and Karl Geyer (1843-1844), and as well as tribes encountered by various government sponsored expeditions.

The plants

- 13 With the aim of facilitating the incorporation of the Palmer's data into contemporary studies, the taxonomic nomenclature of the plants with original scientific names is updated; the plants mentioned only by common names are excluded. For each scientific name, the basonym, synonyms and accepted name were examined in: Consortium of North American Lichen Herbaria, Flora of North America, Index Fungorum, International Plant Names Index, Plants of the World Online, The Plant List, Tropicos, World Flora Online, Flora of North America as well as the appropriate taxonomic monographs and floras. In addition to these sources, The Biota of North America Program (Kartesz 2015) was used to confirm the geographic distribution of the species

in question. Notes, photographs and digital images of selected specimens deposited at the herbaria¹ BM, ECON, GH, K, NY, and US were consulted; the digital images of voucher specimens collected by Palmer are available through the respective institutional web sites.

- 14 The reevaluation of the 124 scientific names has led to the acceptance of 108 species (Appendix 1) and 13 taxa at the generic level (Table 3). Originally, nine edible plants were identified to the level of genus, but because the original names of four scientific binomials could not be verified as to contemporary species, they were reduced to the generic names for a total of 13. Other nomenclatural changes include: 1) two pairs of original names are reduced to two accepted names, 2) one original name is included as synonym under another original name that is accepted, 3) three original names are reidentified, 4) two original names are amplified to two pairs of species in their respective genus, and 5) 31 original names that are synonyms were updated to currently accepted names. The 108 recognized species in Palmer's report reflect a broad biodiversity of families. One species of fungus, one of lichen, and 106 vascular plant species are distributed among 42 families (Figure 3). The nine families with the greatest number of species (ranging from 5 to 11 species per family) account for 57% as follow in declining order: Rosaceae, Ericaceae, Cactaceae, Pinaceae, Fabaceae, Poaceae, Apiaceae, Asteraceae, and Fagaceae.

Table 3 : Genera of food plants reported in "Food Products of the North American Indians" (Palmer 1871) arranged by contemporary scientific names (at genus level) and accompanied by the names originally reported, the section in which they were listed, and the Food Index calculated from data in "Native American Ethnobotany" (Moerman 1998)

Contemporary scientific name	Family ¹	Scientific name 1871	Common name 1871	Report section 1871 ²
<i>Astragalus</i> spp.	FAB	<i>Astragalus</i>	milk vetch, Indian pea, pop-pea, ground plum, rattlebox	S
<i>Crataegus</i> spp.	ROS	<i>Crataegus coccinea</i>	hawthorn	B
<i>Helianthus</i> spp.	AST	<i>Helianthus</i>	sunflower	S
<i>Panicum</i> spp.	POA	<i>Panicum</i>	panic grass	S
<i>Phaseolus</i> spp.	FAB	<i>Phaseolus</i>	kidney bean	S
<i>Ribes</i> spp.	GRS	<i>Ribes</i>	wild currant	B
<i>Rosa</i> spp.	ROS	<i>Rosa cinnamomea</i>	wild rose	B
<i>Rosa</i> spp.	ROS	<i>Rosa fraxinifolia</i>	ash-leaved rose	B
<i>Rubus</i> spp.	ROS	<i>Rubus villosus</i>	common blackberry	B
<i>Rumex</i> spp.	PLG	<i>Rumex</i>	sorrel, wild rhubarb	M
<i>Rumex</i> spp.	PLG	<i>Rumex</i>	dock, yerba colorado	S
<i>Sabal</i> spp.	ARE	<i>Sabal</i>	palmetto	M
<i>Trifolium</i> spp.	FAB	<i>Trifolium</i>	clover	M
<i>Vaccinium</i> spp.	ERI	<i>Vaccinium pennsylvanicum</i>	blueberry	B

1. The family acronyms follow those of Weber (1982).

2. Sections in Palmer (1871) in which species reported: B – Berries; M – Miscellaneous; S – Seeds.

Figure 3 : Number of species of edible plants (based upon current accepted scientific names) reported by Palmer (1871). The plant family acronyms follow those of Weber (1982) and Laferriere (1989) except as follows: 1) MTI: Montiaceae, and 2) PRL: Parmeliaceae.

- 15 The actualization of Palmer's pivotal ethnobotanical report permits a diachronic analysis of the changes in Native American foodways since 1871. Palmer's 108 edible species were compared to those registered principally from the 20th century based on "North American Ethnobotany" (NAEb; Moerman 1998). A Food Index (FI) is calculated by dividing the number of tribes reporting the species as food by the total number of tribes that listed the species as being of ethnobotanical importance. The values range from "1" (where all the reported tribes who recognized the plant also consumed it as food) to "0" (where even though some tribes may or may not have listed a species as being useful, there were no reports of its consumption as food). A total of 165 indigenous groups in NAEb used one or more of the verified species cited in Palmer (1871) (Appendix 1).
- 16 The 20th century compilation of NAEb lists 1649 species of food plants for 291 indigenous groups² based upon 206 bibliographic references (Moerman 1998). Most of these references were published after 1890; only two predated Palmer's contribution which was not cited (Figure 4). The nine food plants in NAEb with the greatest number of uses in descending order are: *Prunus virginiana*, *Yucca baccata*, *Zea mays*, *Amelanchier alnifolia*, *Prosopis glandulosa*, *Rubus idaeus*, *Carnegiea gigantea*, *Rubus spectabilis*, and *Rubus parviflorus*. This basic North American ethnobotanical pattern is anticipated because all nine species were listed in Palmer's groundbreaking paper.

Figure 4 : Number of ethnobotanical publications produced between 1840 and 1993 as reported in "North American Ethnobotany" (Moerman 1998).

- 17 Of the 108 edible plants registered Palmer (1871), 33 species (30%) continue as a source of food into the 20th century (FI = 1) for one to 17 tribes. A total of 58 species (53%) has a Food Index equal to or greater than 0.8 suggesting that more than half of the edible plants reported in the 19th century retain their nutrimental purposes into the 20th century. On the other hand, 14 species (13%) appear to have been abandoned since 1871 (FI = 0).

Interactions

- 18 The interaction between plants and people involves inherited benefits for both ethnobotanical components. Domestication, a coevolutionary process with various intermediate stages (Bye 1993), impacts the ecomorphophysiological properties of the plant as well as the social structure and knowledge systems of people. Although Palmer did not reveal in 1871 previously unknown domesticated plants, he observed possible cases of incipient domestication where: 1) grapes with superior flavor and size (compared to the wild grapes in the region) had been fomented near Indian villages, then abandoned, in Arizona; and 2) native potatoes (*Solanum jamesii*) from populations tended by Indians of New Mexico that produced larger tubers. The enduring effects of the improved grapes (*Vitis* spp.) and larger potatoes on the social organization and gastronomic heritage for the Pueblo Indians and for the Navajos, respectively, terminated for future generations when Indian relocation programs truncated these interactions.
- 19 Germplasm exchange among different communities diversifies and conserves crop plants within the coevolutionary domestication process (Astier *et al.* 2021). Palmer made general reference to various species of *Helianthus* (sunflowers, or "awk") that were important in indigenous people's diets. During the 20 years of contact with the Mormon settlers, the Pai Utes acquired a large-seeded sunflower and named it "mokeack" after their chief who promoted its cultivation (Palmer 1878a : 602) (Figure 2p). Palmer also documented the reverse flow of germplasm exchange. Native potatoes

(*Solanum jamesii*, originally cited and illustrated as *S. fendleri* (Palmer 1871 : 409, plate 20; Figure 5a) of the Navaho from New Mexico were distributed by the Department of Agriculture as part of its potato breeding program. A corroborative herbarium specimen verified the subsequent experimental cultivation this native potato in New York (Figure 5b).

Figure 5 : Wild potato (*Solanum jamesii*) mentioned by Palmer (1871 : 409) that was distributed by the Department of Agriculture as part of its potato breeding program. 5a - plate 20 (Palmer 1871); 5b - A corroborative herbarium specimen that verified the subsequent experimental cultivation this native potato in New York

Relationships

- 20 Exchange of food products is one of many facets of relationships between plants and people where actions of one component correlate with activities of another but may not be inherited reciprocally by subsequent generations. Palmer observed that the occasional surplus production of gathered food plants prompted tribal commerce among different groups of people. Pine nuts (*Pinus* spp.) and acorns of certain oaks (*Quercus* spp.), which were universally esteemed by indigenous people as well as Mexican and white settlers, had a ready market. In contrast, breads made from juniper fruits (*Juniperus occidentalis*) were eagerly traded among Indians of Arizona and New Mexico as well as with Mexicans who had acquired taste for them but rejected by white settlers who found the resinous flavor to be repulsive. Further relationships developed between the Indians of California and birds; the Digger Indians would pilfer the acorn caches of woodpeckers to augment their winter food supplies. In the cosmological world, the Indians of St. Croix River presented the roots of prairie potato (*Pediomelum esculentum*) as a peace-offering.

Time

- 21 Indians took advantage of different dimensions of time when dealing with plants. Indigenous peoples from Sonora and Arizona responded to the seasonal calendar of the plant's ecophysiological timing by migrating to and congregating at the giant cactus (*Carnegiea gigantea*) stands in the deserts for festivals where they drank "tiswein" made from its fermented fruits. Entire villages of Native Americans, who were resettled in Indian Territory, would travel to wild plum (*Prunus* spp.) grounds when the fruits ripened to feast upon the fleshy fruits and convert the excess into preserves. The Alaskan Indians scrapped trunks of contorta pines (*Pinus contorta*) and the Columbian River Indians stripped the boles of giant arbor-vitae (*Thuja plicata*) to obtain the expanding cambium from the previously dormant trees that shifted into their seasonal growth during the spring. After June when the Colorado River subsided, the Indians of Arizona planted panic grass (*Panicum* spp. among other grasses) that would rapidly produce grain before winter. Most of the Indians that Palmer documented practiced the preservation of portion of their wild plant harvests in anticipation of food scarcity during the winter season of the annual cycles and the drought periods of the longer climatic cycles. The annual migration patterns of the Utahs and Colorado River Indians coincided with the partitioned fruiting calendar for the edible pods of desert legume trees such as mesquites (*Prosopis glandulosa*) in early summer and screwbeans (*P. pubescens*) in the fall that permitted subsequent consumption during the summer and winter, respectively.

Space

- 22 The use of geographic space varied depending upon the relationships of the plants and people. Palmer observed that lamb's-quarter plantlets (*Chenopodium berlandieri*) grew abundantly around camp sites in Arizona and were eagerly gathered by the Navaho. The Colorado River Indians planted panic grass (*Panicum* spp.) near their houses to avoid travelling farther to the river. On the other hand, the dandelion (*Taraxacum officinale*) was scattered across southern California and Arizona such that the Diggers and Apaches had to travel over a wide range to find sufficient greens to appease their ravenous appetite for this exotic weed. The Papago sought the subterranean sand food (*Pholisma sonora*) and succulent fruits of prickly-pears (*Opuntia* spp.) in scattered patches of Southwestern deserts where the unpredictable rains promoted their ephemeral appearance in the otherwise arid lands that "produce nothing better" (Palmer 1871 : 418).

Antecedents and reciprocity

- 23 Specific ethnobotanical studies have an initiation and a conclusion. A fundamental start of any ethnobotanical study is the consultation of antecedents of related themes; or as Hernández (1971) has advised ethnobotanists "Siempre hay antecedentes" [always there are antecedents]. Although Palmer did not list the bibliography he consulted, throughout the texts he referred to botanical and chemical literature (e.g., Torrey 1821, 1867, Booth and Morfit 1862, respectively) and "Reports on Indian Affairs of the Department of War" (e.g., Morse 1822). Ethnobotanical studies involve dialogue and reciprocity among the parties. Upon completion of an ethnobotanical study, it is

important to revert the information with value added to the communities of interest. After observing the tragedies of the Indian relocation programs, Palmer attempted to remedy the situation through an administrative appointment at the Bureau of Indian Affairs but was unsuccessful (McVaugh 1956) and, consequently, unable to implement native food programs. Even though the official policy forced agricultural practices on nomadic tribes as well as supplied reservation Indians with nutriment poor foods (such as flour and lard), Palmer was interested in demonstrating the nutritional value of traditional foods, as repulsive as they seemed to the military and reservation authorities. His initial results were presented in the same “Report of the Commissioner of Agriculture...” that included his seminal paper on indigenous foods (e. g., *Juniperus* and *Sapindus*, Antisell 1871).

Conclusions

- 24 Edward Palmer established the scientific basis of ethnobotany in North America. As of 1871 with his publication of “Food products of the North American Indians”, the earlier cursory accounts on useful plants of North American Indians by previous explorers of western USA as well as adjacent Canada and Mexico were replaced by scientific investigation of the biological and cultural aspects of interactions and relationships between plants and people over time and space. Based upon Palmer’s seminal article, 108 species are identified. A diachronic comparison of this biocultural resource to that recorded during the century after indigenous people’s food ways were forcibly disrupted indicates that 13% of the food plants have been abandoned. Nine of the other plants identified before 1870 are known to have had the greatest number of gastronomic uses among Native Americans during the 20th century.

We acknowledge the logistic and financial support received from: Universidad Nacional Autónoma de México (Instituto de Biología; Programa de Apoyo a Proyectos de Investigación e Innovación Tecnológica); Harvard University (Botanical Museum; Harvard University Herbaria; David Rockefeller Center for Latin American Studies); Smithsonian Institution (National Museum of Natural History; Project Latino); Comisión Nacional para el Conocimiento y Uso de la Biodiversidad; Consejo Nacional de Ciencias y Tecnología; The Royal Society of London and Academia Mexicana de Ciencias. We thank our colleagues for all the attention and support they offered us while working at their libraries and herbaria MEXU, GH, ECON, US, MO, NY, F, K, and BM. We acknowledge the collaboration of the directors, curators and collection managers of the Botanical Museum and the Gray Herbarium of Harvard University as well as the Department of Anthropology and the Department of Botany of the National Museum of Natural History of the Smithsonian Institution. In particular, we appreciate those who assisted in the study of specimens at Harvard University (R.E. Schultes[†], M.A. Towle[†], Mike Canoso[†], Emily Woods, Henry Kesner, Jessica Dolan, Melinda Peters, Stephanie Zabel), Smithsonian Institution (W.A. Archer[†], Lyman Smith[†], James White[†], Rusty Russell, Paul Peterson, Jamie Whitacre, William Merrill), and Jardín Botánico del Instituto de Biología, UNAM (Virginia Evangelista, Ernesto Cid). Images of herbarium specimens are courtesy of the C. V. Starr Virtual Herbarium of The New York Botanical Garden, the Missouri Botanical Garden, and the United States National Herbarium, Smithsonian Institution. The availability of the digital resources cited above, especially Biodiversity Heritage Library, Tropicos, Global Plants, and SEINet, has greatly facilitated this and related studies.

BIBLIOGRAPHY

Antisell T. 1871 – Report of the Chemist. In : Capron H., *Report of the Commissioner of Agriculture for the year 1870* [United States. Department of Agriculture]. Washington, DC, Government Printing Office : 91-107.

Astier M., Perales H., Orozco Q., Aragón F., Bye R., Linares E. & Mera L.M. 2021 – *Conservación de la agrobiodiversidad en México: propuestas y experiencias en el campo*. Ciudad de México, CDMX, Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (CONABIO) / Comisión Nacional de Áreas Naturales Protegidas (CONANP), 212 p.

Booth J.C. & Morfit C. 1862 – *The encyclopedia of chemistry, practical and theoretical: embracing its application to the arts, metallurgy, mineralogy, geology, medicine, and pharmacy*. Philadelphia, PA, H.C. Baird, 968 p.

Bye R. 1972 – Ethnobotany of the Southern Paiute Indians in the 1870's: with a note on the early ethnobotanical contributions of Dr. Edward Palmer. In : Fowler D.D. (Ed.), *Great Basin Cultural Ecology*. Reno, NV, Desert Research Institute, Publications in the Social Sciences, no. 8 : 87-104.

Bye R. 1979 – An 1878 ethnobotanical collection from San Luis Potosi: Dr. Edward Palmer's first major Mexican collection. *Economic Botany* 33 : 135-162.

Bye R. 1986 – Voucher specimens in ethnobiological studies and publications. *Journal of Ethnobiology* 6 : 1-8.

Bye R. 1993 – The role of humans in the diversification of plants in México. In : Ramamoorthy T.P., Bye R., Lot A. & Fa J. (Ed.), *Biological Diversity in México: Origins and Distribution*. New York, NY, Oxford University Press : 707-731.

Dexter, R.W. 1990 – The F.W. Putnam-Edward Palmer relations in the development of early American ethnobotany. *Journal of Ethnobiology* 10 : 35-41.

Dodge J.R. 1871 – Report of the editor. In : Capron H., *Report of the Commissioner of Agriculture for the year 1870* [United States. Department of Agriculture]. Washington, DC, Government Printing Office : 153-155.

Gaoue O.G., Coe M.A., Bond M., Hart G., Seyler B.C. & McMillen H. 2017 – Theories and Major Hypotheses in Ethnobotany. *Economic Botany* 71 : 269-287.

Geyer K.A. 1845-1846 – Notes on the vegetation and general character of the Missouri and Oregon territories. 1843-1844. *London Journal of Botany* 4 : 479-492, 653-662 ; 5 : 22-41, 198-208, 285-310, 509-524.

Glass P. 1808 – *A journal of the voyages and travels of a corps of discovery under the command of Captain Lewis and Captain Clarke of the army of the United States from the mouth of the river Missouri through the interior parts of North America, to the Pacific Ocean during the years 1804, 1805, & 1806 ... and an account of its inhabitants, soil, climate, curiosities and vegetable and animal productions*. Pittsburgh, PA, David M'Keehan, 381 p.

Harshberger J.W. 1893 – Maize: a botanical and economic study. *Contributions from the Botanical Laboratory* [University of Pennsylvania] 1 : 75-202.

Harshberger J.W. 1896 – The purposes of ethno-botany. *Botanical Gazette* 21 : 146-154.

Harshberger J.W. 1920 – *Text-book of Pastoral and Agricultural Botany for the Study of the Injurious and Useful Plants of Country and Farm*. Philadelphia, PA : P. Blakiston's Sons & Co., 294 p.

- Heizer R.F. 1954 – Notes on Utah Utes by Edward Palmer, 1866-1877. *Anthropological Paper, University of Utah* No. 17. 8 p.
- Hedrick U.P. (Ed.). 1919 – Sturtevant's notes on edible plants. *Twenty-seventh Annual Report, State of New York Department of Agriculture* 2 (2) : 1-686.
- Hernández Xolocotzi E. 1971 – *Exploración Etobotánica y su Metodología*. Chapingo, Estado de México, Colegio de Postgraduados, DAG, ENA, 69 p.
- Hooker W.J. 1829-1840 – *Flora Boreali-americana, or the botany of the northern parts of British America: compiled principally from the plants collected by Dr. Richardson & Mr. Drummond on the late northern expeditions, under command of Captain Sir John Franklin, R.N. to which are added (by permission of the Horticultural society of London,) those of Mr. Douglas, from north-west America, and of other naturalists*. 2 vols. London, H.G. Bohn, 370 p.
- Hooker W.J. 1836-1837 – A brief memoir of the life of Mr. David Douglas, with extracts from his letters. *Companion to the Botanical Magazine* 2 : 79-192.
- Hough W. 1918 – The Hopi Indian collection in the United States National Museum No. 2235. *Proceedings of the United States National Museum* 54 : 235-296
- Jeter M.D. (Ed.) 1990 – *Edward Palmer's Arkansaw Mounds*. Fayetteville, AR, University of Arkansas Press, 423 p.
- Kartesz J.T. 2015 – *Floristic Synthesis of North America, Version 1.0. Biota of North America Program (BONAP)*. Chapel Hill, NC, Taxonomic Data Center.
- Laferriere J.E. 1989 – Mnemonic three-letter acronyms for the names of fungal families. *Mycotaxon* 34 : 461-473.
- Lewis M. & Clark W. 1814 – *History of the Expedition under the Command of Captains Lewis and Clark, to the sources of the Missouri, thence across the Rocky Mountains and down the River Columbia to the Pacific Ocean*. 2 vol. 2. Philadelphia, PA, Bradford and Inskeep, 990 p.
- Mason O.T. 1904 – Aboriginal American basketry: studies in a textile art without machinery. In : Rathbun R., *Annual Report of the Smithsonian Institution for the Year Ending June 30, 1902, Report of the U.S. National Museum, Part II*. Washington, DC, Government Printing Office : 171-548.
- McVaugh R. 1956 – *Edward Palmer – Plant Explorer of the American West*. Norman, OK, University of Oklahoma Press, 430 p.
- Moerman D.E. 1998 – *Native American Ethnobotany*. Portland, OR, Timber Press, 927 p.
- Morse J. 1822 – *A report to the Secretary of War of the United States, on Indian affairs, comprising a narrative of a tour performed in the summer of 1820, under a Commission for the President of the United States, for the purpose of ascertaining, for the use of the government, the actual state of the Indian tribes in our country*. New Haven, CT, S. Converse, 400 p.
- Nuttall T. 1818 – *The Genera of North American Plants, and a Catalogue of the Species to the year 1817*. 2 vols. Philadelphia, PA, D. Heartt, 566 p.
- Palmer E. 1871 – Food products of the North American Indians. In Capron, H., *Report of the Commissioner of Agriculture for the year 1870* [United States. Department of Agriculture]. Washington, DC, Government Printing Office : 404-428.
- Palmer, E. 1874 – Die vegetabilischen Nahrungsmittel der Indianer in Nordamerika. *Monatsschrift des Vereines zur Beförderung des Gartenbaues in den Königl. Preussischen Staaten für Gärtnerei und Pflanzenkunde* 17 : 22-28, 76- 84, 133-136, 154-175, 236-240.

- Palmer E. 1878a – Plant used by the Indians of the United States. *American Naturalist* 12 : 593-606, 646-655.
- Palmer E. 1878b – Plant used by the Indians of the United States. *American Journal of Pharmacy* 50 : 539-548, 586-592.
- Pursh F. 1814 – *Flora Americae Septentrionalis; or a Systematic Arrangement and Description of the Plants of North America*. 2 vols. London, White, Cochran, & Co., 751 p.
- Putnam J.A. 1966 – A commentary on Dr. Edward Palmer – Food Products of the North American Indians. *Washington Archaeologist* 10 (1) : 2-31.
- Scheips P.J. 1978 – Albert James Myer, an Army Doctor in Texas, 1854-1857. *The Southwestern Historical Quarterly* 82 : 1-24.
- Standley P.C. 1920-1926 – Trees and Shrubs of Mexico. *Contributions from the United States National Herbarium* 23 : 1-1721.
- Torrey J. 1821 – Observations on the Tuckahoe, or Indian Bread of the Southern States,...; Analysis of the *Sclerotium giganteum*, or tuckahoe. *The Medical Repository* 21 : 34-44.
- Torrey J. 1867 – On *Ammobroma*, a new genus of plants allied to *Corallophyllum* and *Pholisma*. *Annals of the Lyceum of Natural History of New York* 8 : 51-56, pl. 1.
- Torrey J. & Gray A. 1838-1843 – *A Flora of North America: containing abridged descriptions of all the known indigenous and naturalized plants growing north of Mexico, arranged according to the natural system*. 2 vols. New York, NY, Wiley & Putnam, 1215 p.
- Underhill L.E. 1984 – Dr. Edward Palmer's Experiences with the Arizona Volunteers 1865-1866. *Journal of the Southwest* 26 (1) : 43-68.
- Weber W.A. 1982 – Mnemonic three-letter acronyms for the families of vascular plants: a device for more effective herbarium curation. *Taxon* 31 : 74-88.

DIGITAL SOURCES

Biota of North America Program (BONAP) <http://www.bonap.net/tdc>
 Consortium of North American Lichen Herbaria - <https://lichenportal.org/cnalh/index.php>
 Global Plants <https://plants.jstor.org/>
 Index Fungorum - <http://www.indexfungorum.org/names/names.asp>
 Index Herbariorum <http://sweetgum.nybg.org/science/ih/>
 International Plant Names Index - <https://www.ipni.org/>
 Plants of the World Online - <http://powo.science.kew.org/>
 SEINet (Southwestern Environmental Information Network) <https://swbiodiversity.org/seinet/>
 The Plant List - <http://www.theplantlist.org/>
 Tropicos - <https://www.tropicos.org/>
 World Flora Online - <http://www.worldfloraonline.org/>

APPENDIXES

Species of food plants reported in *Food Products of the North American Indians* (Palmer 1871) arranged by contemporary scientific names and accompanied by the names originally reported, the section in which they were listed, and the Food Index calculated from data in *Native American Ethnobotany* (Moerman 1998)

Contemporary scientific name	Family ¹	Scientific name 1871	Common name 1871	Report section 1871 ²	Food Index	Groups who used species as Food / Total groups reported
<i>Acer saccharinum</i> L.	SAP	<i>Acer saccharinum</i>	sugar maple	N	0.6	6/10
<i>Achnatherum hymenoides</i> (Roem. & Schult.) Barkworth	POA	<i>Ericoma</i> [?] <i>cuspidata</i>	-	S	1	12/12
<i>Aesculus californica</i> (Spach) Nutt.	SAP	<i>Aesculus californica</i>	California horse-chestnut	RT	0.9	9/10
<i>Agave americana</i> L.	ASG	<i>Agave americana</i>	American aloe, mescal	RT	1	9/9
<i>Alectoria jubata</i> (L.) Ach.	PRL	<i>Alectoria jubata</i>	beard moss	M	1	3/3
<i>Amelanchier alnifolia</i> (Nutt.) Nutt. ex M. Roem.	ROS	<i>Amelanchier canadensis</i>	shadberry	B	0.91	42/46
<i>Anethum graveolens</i> L.	API	<i>Anethum graveolens</i>	dill, yampah	RT	0	0
<i>Apios americana</i> Medik.	API	<i>Apios tuberosa</i>	ground-nut, pomme de terre	RT	1	15/15
<i>Arbutus menziesii</i> Pursh	ERI	<i>Arbutus menziesii</i>	Menzie's arbutus	B	0.45	9/20
<i>Arctostaphylos tomentosa</i> (Pursh) Lindl.	ERI	<i>Arctostaphylos tomentosa</i>	manzanita, manzanita	B	0.5	3/6
<i>Arctostaphylos uva-ursi</i> (L.) Spreng	ERI	<i>Arctostaphylos uva-ursi</i>	bearberry, killiknick	B	0.57	31/54
<i>Asclepias tuberosa</i> L.	ASC	<i>Asclepias tuberosa</i>	milkweed	RT	0	0/9
<i>Avena fatua</i> L.	POA	<i>Avena fatua</i>	wild oat, pin grass	S	1	6/6
<i>Balsamorhiza incana</i> Nutt.	AST	<i>Balsamorhiza incana</i>	-	RT	0.5	1/2
<i>Balsamorhiza sagittata</i> (Pursh) Nutt.	AST	<i>Balsamorhiza helinathoides</i>	-	RT	0.78	15/19
<i>Berberis aquifolium</i> Pursh	BER	<i>Berberis aquifolium</i>	barberry, false Oregon grape	B	0.65	13/20
<i>Callirhoe pedata</i> (Nutt. ex Hook.) A. Gray	MLV	<i>Callirhoe pedata</i>	pimple mallow	RT	0	0/2
<i>Calochortus luteus</i> Douglas ex Lindl.	LIL	<i>Calochortus luteus</i>	wild sago, sago	RT	1	3/3
<i>Camassia quamash</i> (Pursh) Greene	ASG	<i>Camassia esculenta</i>	kamass root, wild hyacinth	RT	0.85	24/28
<i>Carnegia gigantea</i> (Engelm.) Britton & Rose	CAC	<i>Cereus giganteus</i>	giant cactus, monumental cactus	FF	1	12/12
<i>Carya alba</i> (L.) Nutt.	JUG	<i>Carya alba</i>	hickory nuts	N	0.66	2/3
<i>Carya illinoensis</i> (Wangenh.) K. Koch	JUG	<i>Carya olivaeformis</i>	pecan nuts	N	0.5	1/2
<i>Celastrus scandens</i> L.	CEL	<i>Celastrus scandens</i>	staff tree, bois retors, twisted wood, bitter-sweet	M	0.25	3/12
<i>Chenopodium berlandieri</i> Moq.	AMA	<i>Chenopodium album</i>	lamb's quarter	S	0.73	30/34
<i>Corylus americana</i> Walter	BET	<i>Corylus americana</i>	hazel nuts	N	0.88	10/10
<i>Datura stramonium</i> L.	SOL	<i>Datura stramonium</i>	stramonium, Jamestown weed	M	1	0/6
<i>Datura wrightii</i> Regel	SOL	<i>Datura metel</i>	stramonium, Jamestown weed	M	0	2/27
<i>Diospyros virginiana</i> L.	EBN	<i>Diospyros virginiana</i>	persimmon	FF	0.07	4/4

Contemporary scientific name	Family ¹	Scientific name 1871	Common name 1871	Report section 1871 ²	Food Index	Groups who used species as Food / Total groups reported
<i>Empetrum nigrum</i> L.	ERI	<i>Empetrum nigrum</i>	crowberry	B	1	9/10
<i>Erodium cicutarium</i> (L.) L'Hér. ex Alton	GER	<i>Erodium cicutarium</i>	storksbill	M	0.9	6/9
<i>Ferocactus wislizeni</i> (Engelm.) Britton & Rose	CAC	<i>Echinocactus wislizeni</i>	biznacha	FF	0.66	4/5
<i>Fragaria virginiana</i> Duchesne	ROS	<i>Fragaria virginiana</i>	wild strawberry	B	0.8	26/28
<i>Gaultheria procumbens</i> L.	ERI	<i>Gaultheria procumbens</i>	wintergreen	B	0.92	7/14
<i>Glycyrrhiza lepidota</i> Pursh	FAB	<i>Glycyrrhiza lepidota</i>	licorice	RT	0.5	2/16
<i>Helianthus tuberosus</i> L.	AST	<i>Helianthus tuberosus</i>	wild artichoke	RT	0.12	14/14
<i>Ipomoea leptophylla</i> Torr.	CNV	<i>Ipomoea leptophylla</i>	wild potato vine	RT	1	3/8
<i>Juglans nigra</i> L.	JUG	<i>Juglans nigra</i>	walnuts	N	0.37	11/16
<i>Juniperus occidentalis</i> Hook.	CUP	<i>Juniperus occidentalis</i>	western juniper	DFN	0.68	5/10
<i>Lewisia rediviva</i> Pursh	MTI	<i>Lewisia rediviva</i>	white lewisia, spatulum	RT	0.5	11/15
<i>Lomatium ambiguum</i> (Nutt.) J.M. Coul. & Rose	API	<i>Peucedanum ambiguum</i>	kouse root, racine blanc	RT	0.73	2/2
<i>Lonicera ciliata</i> Muhl.	CPR	<i>Lonicera ciliata</i>	honeysuckle, twinberry	B	1	0
<i>Lonicera involucrata</i> (Richardson) Banks ex Spreng.	CPR	<i>Lonicera involucrata</i>	honeysuckle, bearberry	B	0	7/24
<i>Lycoperdon solidum</i> L.	LCP	<i>Lycoperdon solidum</i>	tuckahoe, Indian head	M	0.29	0
<i>Malus fusca</i> (Raf.) C.K. Schneid.	ROS	<i>Pyrus coronaria</i>	crab apple	B	0	21/26
<i>Malus fusca</i> (Raf.) C.K. Schneid.	ROS	<i>Pyrus rivularis</i>	Indian pear	FF	0.80	21/26
<i>Medicago lupulina</i> L.	FAB	<i>Medicago lupulina</i>	bur clover	S	0.80	0
<i>Microseris nutans</i> (Hook.) Sch. Bip.	AST	<i>Scorzonella pilophora</i>	-	RT	0	1/1
<i>Moneses uniflora</i> (L.) A. Gray	ERI	<i>Moneses uniflora</i>	one-flowered pipsissewa	B	1	1/8
<i>Morus rubra</i> L.	MOR	<i>Morus rubra</i>	mulberry	FF	0.11	5/9
<i>Nuphar advena</i> (Alton) W.T. Alton	NYM	<i>Nuphar advena</i>	yellow pond lily	RT	0.55	4/13
<i>Odontostomum hartwegii</i> Torr.	TEC	<i>Odontostemum hartwegii</i>	seaweed	M	0.30	0
<i>Oenanthë sarmentosa</i> C. Presl ex DC.	API	<i>Helosciadium californicum</i>	-	RT	0	5/14
<i>Olearya tesota</i> A. Gray	FAB	<i>Olearya tesota</i>	iron-wood	N	0.35	9/9
<i>Optopanax horridus</i> (Sm.) Miq.	ARL	<i>Panax horridum</i>	ginseng	RT	1	1/32
<i>Opuntia</i> « occidentalis Engelm. & J.M. Bigelow	CAC	<i>Opuntia occidentalis</i>	prickly pear, tuna	FF	0.03	1/1

Contemporary scientific name	Family ¹	Scientific name 1871	Common name 1871	Report section 1871 ²	Food Index	Groups who used species as Food / Total groups reported
<i>Opuntia engelmannii</i> Salm-Dyck ex Engelm.	CAC	<i>Opuntia engelmannii</i> [f]	prickly pear, tuna	FF	1	14/14
<i>Opuntia ficus-indica</i> (L.) Mill.	CAC	<i>Opuntia vulgaris</i>	prickly pear, tuna	FF	1	1/1
<i>Opuntia humifusa</i> (Raf.) Raf.	CAC	<i>Opuntia rafinesquii</i> [f]	prickly pear, tuna	FF	1	3/4
<i>Opuntia phaeacantha</i> Engelm.	CAC	<i>Opuntia camanchica</i>	prickly pear, tuna	FF	0.75	5/5
<i>Oxyria digyna</i> (L.) Hill	PLG	<i>Oxyria digyna</i>	round-leaved sorrel	M	1	6/6
<i>Pediemeleum esculentum</i> (Pursh) Rydb.	FAB	<i>Psoralea esculenta</i>	prairie potato, bread root indian tump, pomme de prairie, tip-sin-nah	RT	1	11/11
<i>Perideridia gairdneri</i> (Hook. & Arn.) Mathias	API	<i>Edosmia montana</i>	-	RT	1	17/17
<i>Pholisma sonoreae</i> (Torr. ex A. Gray) Yatsk.	LNN	<i>Ammobroma sonora</i>	sand food	M	1	2/2
<i>Phragmites australis</i> (Cav.) Trin. ex Steud.	POA	<i>Arundo phragmites</i>	bent grass	M	1	7/25
<i>Pinus contorta</i> Douglas ex Loudon	PIN	<i>Pinus contorta</i>	-	N	0.28	13/34
<i>Pinus coulteri</i> Lamb. ex D. Don	PIN	<i>Pinus coulteri</i>	pine nuts	N	0.38	0/1
<i>Pinus edulis</i> Engelm.	PIN	<i>Pinus edulis</i>	edible pine	N	0	15/18
<i>Pinus flexilis</i> E. James	PIN	<i>Pinus lambertiana flexilis</i>	pine nuts	N	0.83	8/9
<i>Pinus lambertiana</i> Douglas	PIN	<i>Pinus lambertiana flexilis</i>	pine nuts	N	0.88	2/4
<i>Pinus monophylla</i> Torr. & Frém.	PIN	<i>Pinus monophylla</i>	pine nuts	N	0.5	13/13
<i>Pinus quadrifolia</i> Parl. ex Sudw.	PIN	<i>Pinus parryana</i>	pine nuts	N	1	2/2
<i>Pinus sabiniana</i> Douglas ex D. Don	PIN	<i>Pinus sabiniana</i>	pine nuts	N	1	10/16
<i>Portulaca oleracea</i> L.	POR	<i>Portulaca oleracea</i>	common purslane	M	0.62	12/16
<i>Proboscidea fragrans</i> (Lindl.) Decne.	MAR	<i>Martynia violacea</i>	unicorn plant	M	0.75	1/1
<i>Prosopis glandulosa</i> Torr.	FAB	<i>Algarobia glandulosa</i>	mesquite, mosquit	DFN	1	10/11
<i>Prosopis pubescens</i> Benth.	FAB	<i>Strombocarpus pubescens</i>	screw bean, tornillo	N	0.90	9/12
<i>Prunus americana</i> Marshall	ROS	<i>Prunus americana</i>	-	FF	0.75	17/21
<i>Prunus pumila</i> L.	ROS	<i>Prunus pumila</i>	dwarf cherry, sand-hill plum	FF	0.80	2/2
<i>Prunus virginiana</i> L.	ROS	<i>Cerasus virginiana</i>	wild cherry, choke-cherry	B	1	36/49
<i>Pteris aquilina</i> L.	PTR	<i>Pteris aquilina</i>	brake, bracken	RT	0.53	29/54
<i>Quercus agrifolia</i> Née	FAG	<i>Quercus agrifolia</i>	acorns, bayotis	DFN	0.83	5/6

Contemporary scientific name	Family ¹	Scientific name 1871	Common name 1871	Report section 1871 ²	Food Index	Groups who used species as Food / Total groups reported
<i>Quercus emoryi</i> Torr.	FAG	<i>Quercus emoryi</i>	acorns, bayotis	DFN	1	3/3
<i>Quercus lobata</i> Née	FAG	<i>Quercus lobata</i>	acorns, bayotis	DFN	0.81	9/11
<i>Quercus lobata</i> Née	FAG	<i>Quercus hindsii</i>	acorns, bayotis	DFN	-	-
<i>Quercus oblongifolia</i> Torr.	FAG	<i>Quercus oblongifolia</i>	acorns, bayotis	DFN	1	2/2
<i>Ribes aureum</i> Pursh	GRS	<i>Ribes aureum</i>	Missouri currant	B	0.90	10/11
<i>Ribes hirtellum</i> Michx.	GRS	<i>Ribes hirtellum</i>	gooseberry	B	1	1/1
<i>Rubus canadensis</i> L.	ROS	<i>Rubus canadensis</i>	dewberry	B	0.6	3/5
<i>Rubus idaeus</i> L. subsp. <i>strigosus</i> (Michx.) Focke	ROS	<i>Rubus strigosus</i>	raspberry	B	0.85	17/20
<i>Rubus parviflorus</i> Nutt.	ROS	<i>Rubus nutkanus</i>	thimble berry	B	0.88	37/42
<i>Rubus spectabilis</i> Pursh	ROS	<i>Rubus spectabilis</i>	salmon berry	B	0.93	30/32
<i>Sagittaria latifolia</i> Willd.	ALI	<i>Sagittaria variabilis</i>	arrowhead, swan potato, swamp potato, wab-es-i-pinig	RT	0.85	12/14
<i>Sapindus saponaria</i> L.	SAP	<i>Sapindus marginatus</i>	soap berry	N	0	0/4
<i>Scirpus lacustris</i> L.	CYP	<i>Scirpus lacustris</i>	cattail flag	RT	0.41	7/17
<i>Shepherdia argentea</i> (Pursh) Nutt.	ELE	<i>Shepherdia argentea</i>	buffalo berry	B	1	16/16
<i>Solanum jamesii</i> Torr.	SOL	<i>Solanum fendleri</i>	potato	RT	1	8/8
<i>Stenocereus thurberi</i> (Engelm.) Buxb.	CAC	<i>Cereus thurberi</i>	Thurber's cactus, pitahaya	FF	1	4/4
<i>Symphoricarpos albus</i> (L.) S.F. Blake	CPR	<i>Symphoricarpos racemosus</i>	snowberry	B	0.07	2/26
<i>Symphoricarpos albus</i> (L.) S.F. Blake	CPR	<i>Vaccinium stamineum</i>	squaw huckleberry	B	-	-
<i>Taraxacum officinale</i> F.H. Wigg.	AST	<i>Taraxacum dens-leonis</i>	dandelion	M	0.55	15/27
<i>Thuja plicata</i> Donn ex D. Don	CUP	<i>Thuja gigantea</i>	great arbor-vitae	N	0.08	3/36
<i>Triticum aestivum</i> L.	POA	<i>Triticum vulgare</i>	wheat	M	0.83	10/12
<i>Vaccinium macrocarpon</i> Aiton	ERI	<i>Vaccinium macrocarpon</i>	cranberry	B	0.85	6/7
<i>Vaccinium myrtillus</i> L.	ERI	<i>Vaccinium myrtillus</i>	huckleberry	B	1	2/2
<i>Valeriana edulis</i> Nutt.	CPR	<i>Valeriana edulis</i>	wild valerian, kooyah, tobacco-root, raceme de labad	RT	0.5	5/10
<i>Ventia crocea</i> (Nutt.) Hauenschild	RHM	<i>Rhamnus crocea</i>	buckthorn	B	0	0
<i>Vitis arizonica</i> Engelm.	VIT	<i>Vitis arizonensis</i> [f]	wild grape	B	0.85	6/7
<i>Vitis californica</i> Benth.	VIT	<i>Vitis californica</i>	wild grape	B	0.88	8/9
<i>Yucca baccata</i> Torr.	ASG	<i>Yucca baccata</i>	Spanish bayonet, banana	FF	0.93	27/29
<i>Zea mays</i> L.	POA	<i>Zea mays</i>	Indian corn	S	0.93	30/32
<i>Zizania aquatica</i> L.	POA	<i>Zizania aquatica</i>	wild rice, pshu, man-om-in	S	1	8/8

1. The family acronyms follow those of Weber (1982) except as follows: 1) MTI: Montiaceae; 2) PRL: Parmeliaceae.

2. Sections in Palmer (1871) in which species reported: B – Berries; DFN – Dried fruits and nuts; FF – Fleshy fruits; M – Miscellaneous; N – Nuts; RT – Roots and tubers; S – Seeds.

NOTES

1. Details about the herbaria are available at Index Herbariorum <http://sweetgum.nybg.org/science/ih/>
 2. We follow the opinion of Moerman (1998 : 23) in using the tribal names recorded in the bibliographic sources and apply equally such terms as Native American, American Indian, Indian, Native Peoples, First Nations, indigenous peoples, tribes, and “Pueblos originarios” for the autochthonous peoples of North America without implying ethnocentric perspectives nor intentions of destroying their identity
-

ABSTRACTS

Even though the term “ethnobotany” was created and characterized by John Harshberger in 1896, ethnobotanical investigations were conducted more than a quarter of a century earlier. The pivotal publication in the United States of America was issued anonymously in the 1870 Report of the Commissioner of Agriculture of the US government. It marked the shift from the cursory observations on plants used by “native” peoples to a systematic documentation and analysis of plant-people interactions and relationships over time and space; this transition coincided with the expansion of the USA into the western provinces of the North American continent. To attend to the author’s curiosity of plants with cultural significance that he encountered during his field experience with indigenous peoples as well as published literature, Dr. Edward Palmer (1831-1911) produced “Food Products of the North American Indians” for the 1870 report of the Department of Agriculture. This article was the first of 17 publications that he generated based upon his field work, botanical and ethnological specimens, laboratory analyses, and literature from the western provinces of the USA and northern Mexico. After 1892, his contributions were archived in his private files or shared with botanical and anthropological colleagues for their specialized publications. Our contribution provides updated scientific nomenclature of the 124 plants mentioned in his 1871 article as well as examples of Palmer’s ethnobotanical observations. A diachronic comparison between the food plants registered in 1871 and those listed in subsequent ethnobotanical studies suggest that 87% of the plants continued to be consumed into the 20th century.

Bien que le terme « ethnobotanique » ait été créé et caractérisé par John Harshberger en 1896, des enquêtes ethnobotaniques avaient déjà été menées plus d’un quart de siècle plus tôt. La publication déterminante aux États-Unis d’Amérique a été livrée anonymement dans le rapport de 1870 du commissaire à l’agriculture américain. Cette publication marque une transition : des observations sommaires sur les plantes utilisées par les peuples « indigènes », l’on passe à une documentation et une analyse systématique des interactions et des relations plantes-hommes dans le temps et dans l’espace ; cette transition a coïncidé avec l’expansion des États-Unis dans les provinces de l’ouest du continent nord-américain. En réponse à la curiosité de l’auteur au sujet des plantes dotées d’une signification culturelle qu’il a rencontrées au cours de son expérience sur le terrain avec les peuples autochtones ainsi qu’à la littérature existante, le Dr Edward Palmer (1831-1911) a produit « Food Products of the North American Indians » pour le rapport du ministère de l’Agriculture de 1870. Cet article était la première des 17 publications produites à partir de son travail sur le terrain, de spécimens botaniques et ethnologiques,

d'analyses de laboratoire et de la littérature des provinces de l'ouest des États-Unis et du nord du Mexique. Après 1892, ses contributions sont conservées dans ses archives privées ou partagées avec des confrères botanistes et anthropologues pour leurs publications spécialisées. Notre contribution fournit une nomenclature scientifique mise à jour des 124 plantes mentionnées dans son article de 1871 ainsi que des exemples d'observations ethnobotaniques de Palmer. Une comparaison diachronique entre les plantes alimentaires enregistrées en 1871 et celles répertoriées dans des études ethnobotaniques ultérieures suggère que 87% des plantes ont continué à être consommées jusqu'au ^{xx}e siècle.

Aunque el término “etnobotánica” fue creado y caracterizado por John Harshberger en 1896, se llevaron a cabo otras investigaciones etnobotánicas un cuarto de siglo antes. La publicación fundamental en los Estados Unidos de América se publicó de forma anónima en el Informe de 1870 de la Comisión de Agricultura del Gobierno de los Estados Unidos. La cual marcó el cambio de las observaciones superficiales de las plantas utilizadas por los pueblos originarios a una documentación y análisis sistemáticos de las interacciones y relaciones entre plantas y personas a lo largo del tiempo y el espacio; esta transición coincidió con la expansión de los Estados Unidos en las provincias occidentales del continente de América del Norte. El Dr. Edward Palmer (1831-1911) produjo para el Departamento de Agricultura “Productos alimenticios de los indios norteamericanos” sobre las plantas con significado cultural que encontró durante su experiencia de campo con los pueblos indígenas, así como la literatura publicada. Este artículo fue la primera de 17 publicaciones que generó a partir de su trabajo de campo, especímenes botánicos y etnológicos, análisis de laboratorio y literatura de las provincias occidentales de Estados Unidos y el norte de México. Después de 1892, sus contribuciones fueron archivadas en sus archivos privados o compartidas con colegas botánicos y antropólogos quienes las incluyeron en sus propias publicaciones especializadas. Este capítulo proporciona la nomenclatura científica actualizada de las 124 plantas mencionadas en su artículo de 1871, así como un resumen de los grupos étnicos asociados. Una comparación diacrónica entre las plantas alimenticias reportadas por Palmer en 1871 y las registradas en estudios etnobotánicos posteriores sugiere que el 87% de las plantas continuaron consumiéndose en la América del Norte del siglo XX.

INDEX

Mots-clés: ethnobotanique, plantes alimentaires, Amérindiens, analyse diachronique, ouest des États-Unis

Keywords: ethnobotany, food plants, Native American Indians, diachronic analysis, western United States

Palabras claves: etnobotánica, plantas alimenticias, indios nativos americanos, análisis diacrónico, oeste de Estados Unidos

AUTHORS

ROBERT BYE

Jardín Botánico del Instituto de Biología, Universidad Nacional Autónoma de México, Ciudad de México, CDMX, MEXICO

EDELMIRA LINARES

Jardín Botánico del Instituto de Biología, Universidad Nacional Autónoma de México, Ciudad de México, CDMX, MEXICO