

**COLLECTION:**

El Palacio Collection

**CDI  
ACCESSION  
NUMBER:**

000846

**ERRATA:**

**COMMENTS:**

Includes info about materials used, and species identified from specimens.

**CITATION:**

Hocking, George M.  
1956 Some Plant Materials Used Medicinally and Otherwise by the Navaho Indians in the  
Chaco Canyon, New Mexico. El Palacio 63(5-6):146-165.



# SOME PLANT MATERIALS USED MEDICINALLY AND OTHERWISE BY THE NAVAHO INDIANS IN THE CHACO CANYON, NEW MEXICO \*

GEORGE M. HOCKING†

THERE are good reasons for examining the plants and other materials which come into intimate physical contact with the aboriginal peoples, especially when it is known that specific morbidity and mortality rates are at variance with those among civilized modern man. The study and recording of the medicinal, food, smoking, and similar plant and other materials for the New Mexican area is far from complete, as voiced by Dr. Paul C. Standley (ca. 1947):

Very little has been done in the field of ethnobotany in New Mexico so that every addition to knowledge of the subject is bound to have importance from the standpoint of folklore and quite possibly also in a practical way. (1)<sup>1</sup>

Drs. A. H. and D. C. Leighton (20) who lived among the Navaho for several years have noted the occasional greater efficacy of Navaho medical treatment over that of the white man.

\* One of the most interested and helpful of the patrons of the Department of Ethnology at the Museum of New Mexico is Mrs. Verda Josey of Aztec, who has been lending specimens and making gifts to the Department ever since its beginning. In 1941, Mrs. Josey presented a small collection of native dye plants and examples of yarn colored with them, as prepared by one of her Navaho friends. The following year, she gave eighteen specimens of plants used by the Navaho as foods and for medicinal purposes, along with certain other ethnological items. Then, in 1943, she sent in a collection of forty-five specimens which were collected in the Chaco Canyon, relatively close to the ancient ruin site, Pueblo Bonito.

The first gift and most of the second lot were placed on display in the Hall of Ethnology. In April, 1950, Professor George M. Hocking, Professor of Pharmacognosy and Pharmacology at the University of New Mexico, visited the museum and expressed his interest in our plant collections. As a result, it was arranged that he take the specimens not then being exhibited for the purpose of identification and study in relation to the uses indicated by the Navaho collectors.

When Professor Hocking was called for service with the Pakistan government, he resigned his position in New Mexico, in 1951. He is one of the best authorities on medicinal plants, and is widely known for his scientific papers. He is author of *A Dictionary of Pharmacognosy and Economic Botany*, and has in

The low cancer incidence among some North American native peoples has received attention in recent years. Warwick and Phillips (19) found the cancer mortality rate among Canadian Indians in 1949 to be approximately half that of the non-Indian population. Among the Navaho Indians, the rate is said to be only one-third that among the white people of the same area (18). The Navajo Cancer Research Program is now carrying on studies in Arizona under the direction of Dr. C. G. Salsbury (22). Dr. Bertucci (21) recently visited the Eskimos of Alaska and found that cancer is unknown among these peoples except for occasional skin lesions which resemble cancer. These matters are of particular interest in view of the great increase in cancer rates among the white populations of the United States and other countries. Cancer has risen to second place as a cause of death in the United States, and it is now said that approximately every third child born here will develop cancer sometime during his or her lifetime.

## Materials Used

The plant materials catalogued in this paper were collected within a short radius of Pueblo Bonito, one of the main ruins in Chaco Canyon, by members of the Navaho family of Roy Newton who lived close by. The specimens were gathered in 1942-1943, primarily by a daughter of the Newton family,<sup>2</sup> in this area which lies in the southern part of San Juan county, about ninety miles northwest of Albuquerque.

Many of the specimens were represented by sterile scraps of plants, but after persistent searches in the United States National

preparation a volume on field study of medicinal plants. Currently, Dr. Hocking is a professor of pharmacognosy at the School of Pharmacy, Alabama Polytechnic Institute, Auburn, Alabama.

Professor Hocking presented a paper on this material before the American Association for the Advancement of Science meeting, in Atlanta, Georgia, December 29, 1955.

† The author wishes to thank the director and staff members of the U. S. National Herbarium, Washington, D. C., for their kind assistance on several personal visits; Miss Velva Rudd proved especially helpful. Other assistance is appropriately acknowledged in each instance.

1. See References.

2. Grateful thanks are due to Dr. Bertha P. Dutton, Curator of Ethnology, Museum of New Mexico, for loan of the materials, collecting data, etc.

Herbarium and elsewhere and with the assistance of various specialists (as credited), nearly all eventually were identified with a good degree of certainty. One specimen was quite hopeless and in seven other instances, while the genus may be definite enough, there is some question as to species.

Although the use of a few of these plants has been reported previously, most appear new to the record as far as could be learned from a literature search. In the listing which follows, the botanical name and common names are immediately followed by the data passed on by the informants (this has sometimes been re-worded) and after this, in some cases, comes a paragraph of other pertinent information supplied by the literature. To the compilation of medicinal plants based on identified material specimens is appended a list of plant species which according to Mrs. Josey are used in one way or another by the natives of the same part of New Mexico.

*Species Identified From Specimens*<sup>3</sup>

*Amelanchier utahensis* Koehne (Rosaceae). Service Berry. Shad Bush. Administered during labor and delivery.

The specific name is too restrictive since this species has been found in at least six western states. This plant has not previously figured as an economic species, but it is well known that the fruits of the various *Amelanchier* species have been popular with the Indians, both in the fresh state and dried-preserved for winter food usage. Some species have been used by the Navaho as emetics (2); some have been shown to contain hydrocyanic acid glycosides (Greshoff). [Catalogue No. 2-53/70 S.A.R.]

*Aster parviflorus* A. Gray (*Machaeranthera parviflora* Gray; *A. parvulus* Blake). (Compositae.) Used as a purgative.

Several other species of *Aster* are reportedly used by the Hopi Indians (3). *A. arenosus* (Heller) Blake is said to be used as a snuff and in oral diseases by the Navaho (2) and *A. canescens* Pursh likewise (16). [No. 2-53/97.]

*Atriplex canescens* (Pursh) Nutt. (*A. tetraptera* Rydb.; *Calligonum canescens* Pursh (*et al.*); *Obione canescens* Moq. var. *angustifolia* Torr.) (Chenopodiaceae). Salt-bush. Wing-scale. Used for ant bites; flowers used for puddings.

3. School of American Research catalogue number follows each identification.

This common shrub is widely distributed in the western states and northern Mexico. Used variously, the plant has proved so valuable that it is sometimes called the "alfalfa of the desert." The parched seeds are made into a flour or meal, which is often admixed with other meals (4). The herbage offers important drought and fall/winter forage. The Navaho Indians are reported to use preparations of the plant in such skin conditions as boils, warts, and itch (2); they used this and other *A.* species by topical application for stings of hymenopterous insects, and as a yellow dye for wool (16). The Indians in southern New Mexico use the plant with salt and water for stomach pain (1). [No. 2-53/59.]

*Atriplex confertifolia* (Torr. & Frém.) S. Wats. Salt Weed. (Spiny) Saltbush. Shad-scale. This plant is rubbed on horses to repel gnats.

According to the literature, it has served as a winter browse (4) furnishing salt (16); the seeds have served for human food. [No. 2-53/102.]

*Chenopodium album* L. (Chenopodiaceae) Goosefoot. Lamb's Quarters. Used as a nutrient: the seeds are ground and eaten.

Among the Navaho, the seed meal is used in preparing mush or porridge, cakes (sometimes with corn meal), stews, etc. (1). The leaves enter the dietary cooked as greens or even raw (16). [No. 2-53/67.]

*Cleome serrulata* Pursh (probably) (*C. integrifolia* T. & G.; *Peritoma serrulatum* DC.) (Capparidaceae) Rocky Mountain Bee Plant. Used as a seasoning.

Young plants of the genus are used as potherbs by the Indians of Arizona and New Mexico (3). The Navaho eat the pods (16); the Tewa Indians, who live to the east of the Navaho in New Mexico, eat the boiled plant along with cornmeal porridge (15). Under the name *guaco*,<sup>4</sup> this plant is considerably used medicinally by the people of New Mexico (1). The herbage when crushed gives off a very unpleasant odor, for which reason the plant is sometimes called "stinkweed." This odor fortunately is lost in cooking (16). [No. 2-53/72.]

4. Note: Dr. Dutton states that hardened cakes of *guaco* are soaked in hot water, and then fried in grease and eaten by the Tewa. *Guaco* is also mixed with water and used as a pigment for painting pottery; it fires a deep black color, or provides the matte finish for black burnished-and-matte wares (24).

*Comandra pallida* A. DC. (Santalaceae). Bastard Toadflax. Used for corns, the feet being soaked in a water decoction of the plant.

The fruits have been eaten by the Indians of Nevada (11). [No. 2-53/75.]

*Cosmos* (?) (Compositae). The name "jilla flower" was pencilled on the attached note. This vernacular name (Navaho?) could not be found in reference works. (c'il is Navaho for plant.) Used for burns.

Actually the specimen was too poor for adequate and positive identification.<sup>5</sup> [No. 2-53/77.]

*Cryptantha fulvocanescens* (A. Gray) Payson (Boraginaceae). This plant is boiled in water and the decoction taken at childbirth.

No usage seems to have been published heretofore; however, Vestal (23) notes use in "birth injury" of *C. jamesii*. Some *Cryptantha* species are foraged. [No. 2-53/64.]

*Cucurbita pepo* L. (Cucurbitaceae) Pumpkin. Leaves are used for "upset stomach."

As with the white population, the New Mexico Indians use the fruit pulp of this widely grown plant as a food. Additionally, they eat the seeds. *C. foetidissima* HBK. is used in a similar manner, and a number of medicinal applications for this species are also reported for New Mexico (1) (15). [No. 2-53/85.]

*Eriogonum rotundifolium* Benth. (Polygonaceae). Root used as medicine, leaves for sore throat. The stems are eaten.

Wyman reports (16) that the Navaho use this plant as an emetic in gastric disorders or genito-urinary conditions which are attributed to the swallowing of a red ant. The plant is also used for fuel and the construction of shelters, and it serves as a winter browse. [No. 2-53/83.]

*Eriogonum* species (probably). Used during confinement after childbirth.

Three species of this genus have been reported used as food by the Indians; many other species are browsed. Vestal (23) speaks of Navaho use of the whole plant of *E. leptophyllum* to hasten delivery of placenta and reduce postpartum pains. [No. 2-53/74.]

5. Dr. Dutton suggests that the pencilled notation might refer to the flowers of *Gilia*, many species of which grow in this area. (Cf. discussion of *Gilia* in second alphabetical listing of this article.)

*Euphorbia lata* Engelm. (Euphorbiaceae). (identity confirmed by Dr. E. F. Castetter). Used for "upset stomach," a rather indefinite entity.

*E. montana* Engelm. has been reported used in admixture as a purge (16), and *E. fendleri* T. & G. in infusion for stomach ache (23). [No. 2-53/73.]

*Eurotia lanata* (Pursh) Moq. (Chenopodiaceae). Winter Fat. White Sage (this last a misnomer). Said used for smallpox, sores, and boils.

The Navaho used the leaves chewed and applied to sores (23) and the plant as an emetic (2) and to allay hemoptysis (16). Kearney and Peebles (3) reported (*vide* Mrs. Collum) that the Indians of Arizona applied the root to burns and treated fevers with a decoction of the leaves. Winters, sheep forage the plant (16). [No. 2-53/78.]

*Franseria tenuifolia* Harv. & Gray (Compositae; confirmed as probably correct by Dr. E. F. Castetter). Bur-sage. A little bit of the herb is used mixed in tobacco.

This and other *F.* species are used by the Navaho to facilitate delivery of the placenta in childbirth (2). The roots and leaves are eaten by the Papago (10). [No. 2-53/71.]

*Gutierrezia lucida* Greene (probably) (Compositae). Snakeweed. Plant is applied to the back and legs of horses; purpose not stated. [No. 2-53/90.]

*G. sarothrae* (Pursh) B. & R. (*G. longifolia* Greene) (probably). Matchweed. Plant is used for headache and "nervousness."

The last-named species is said to have been used by the Navaho for expediting childbirth, especially delivery of after-birth: the herb was also used as an emetic and in treating red ant and snake bite and bee and wasp sting by local application (3) (16). The ashes were reported used externally for headache (16). Species of the genus are called "broom weed" in parts of New Mexico, where the Spanish-speaking people use the plant to sweep their houses (5). (The name "brownweed" (16) is probably a corruption.) Medicinal uses have been reported for the Tewa Indians (15). [No. 2-53/86.]

*Haplopappus* (*Aplopappus*) *spinulosus* (Pursh) DC. subsp. *typicus* Hall (*Eriocarpum wootoni* Greene; *Sideranthus wootoni*

Standl.) (Compositae). Mesa Daisy. Devil Plant (in Navaho). This plant or some part of it is used for headache.

The Navaho use this species in toothache (2) and members of the genus are comminuted and used as a medicinal snuff in rhinitis, etc. (2) (16). In New Mexico, this species is applied, powdered with salt, to the treatment of abscesses or "swellings" of the face and neck (1). In northern Mexico, where the plant is called *yerba de vibora* it is used in gastric and uterine disorders, and as a "blood purifier" (Coahuila) (6). [No. 2-53/61.]

*Helianthus annuus* L. (Compositae). Sunflower. The achenes (popularly "seeds") are eaten and are thought to give appetite. The plants are probably growing wild as escapes from cultivation.

The Navaho, it is said (2), burn powdered sunflower pith directly above warts to remove them: this appears to be a form of moxibustion. The seeds are also used to make dyestuffs. Mrs. Curtin details a number of uses by Indians and Spanish-Americans in New Mexico (1). [No. 2-53/68.]

*Juniperus osteosperma* (Torr.) Little. (Possibly *J. utahensis* [Engelm.] Lemmon) (Pinaceae). The seeds (fruit probably intended) are consumed for headache: some part of the plant (unspecified) is used to wash the hair.

The Navaho were previously known to use the fruit in influenza and various parts of the plant in many religious medicinal observances, etc. (16). Various species are reported used medicinally by the Hopi Indians and others (1) (3). [No. 2-53/69.]

*Kochia trichophylla* Stapf (Chenopodiaceae). Used for sores. The medicine man uses this for painting a patient during a healing ceremony.

Like almost all herbaceous plants of this general area, this is a sheep forage plant, especially valuable in winter (Aven Nelson). The species is native to Asia, and in this country has escaped from cultivation. [No. 2-53/94.]

*Lactuca virosa* L. (Compositae). Wild Lettuce. The plant is used for "sick stomach" (no doubt meaning gastroenteritis—nausea, vomiting, and diarrhea).

Some *Lactuca* species have been employed by the Navaho in treating snake-bite (3). [No. 2-53/99.]

*Lappula texana* (Schceele) Britton (Boraginaceae). Stick Seed. Some part or parts of the plant are used at confinement and for nosebleed.

As with most of the items of this catalogue, the uses cited could not be found recorded in the literature. [No. 2-53/84.]

*Lepidium lasiocarpum* Nuttall (Cruciferae). Pepper Grass. Used as a "disinfectant"—possibly the smoke is intended.

Around Tularosa, a species of *Lepidium* is mixed with lime and applied to the wounds of animals (1). [No. 2-53/76.]

*Lycium pallidum* Miers (Solanaceae). Pale Matrimony Vine. Wolf Berry. The label states: "Berries good to eat. They [the Navaho] eat them every spring. Burn wood and die [dye?]" (meaning unclear). Identity confirmed by Dr. E. F. Castetter.

The Navaho, Zuñi, Hopi, and other Indians of New Mexico and of northern Arizona relish these berries, eaten alone (raw or cooked) or as a sauce to other foods (1) (3) (15) (16). [No. 2-53/33.]

*Monarda pectinata* Nutt. (Labiatae). Horsemint. Used for headache.

The Navaho are reported to use this species for headache (23) and for "general aches and pains" (2). Robbins *et al.* (15) reported *M. menthaefolia* Graham used for headache among the Tewa, also for fever in sore throat. Castetter (12) reports the leaves in use by New Mexico Indians for seasoning. Several species are used in domestic medicine in Arizona (3) and New Mexico (16). [No. 2-53/80.]

*Muhlenbergia (Muehlenbergia) dubia* Fourn. (Gramineae). "(Pine) Muhly." Root ground up and mixed with sheep's fat, ground corn, and blood to make sheep's blood cake. (Identification made by Mr. E. R. Sohns, U.S. Natl. Herb.).

The Navaho are known also to use *M.* species in making brooms and brushes (16). [No. 2-53/95.]

*Orobanch* species (Orobanchaceae). Broom Rape. Plant used for infections.

*O. fasciculata* Nuttall is applied to wounds and open sores by the Navaho (2) (16). Various species are used by the same tribe in the form of a decoction for ulcers (3). The plants are eaten by some southwestern Indians (3). [No. 2-53/103.]

*Oryzopsis hymenoides* (Roem. & Schult.) Ricker (Gramineae). Mountain Rice. Silk Grass. (Indian) Rice Grass. The ground seeds are eaten.

This is a well-known food. The plant also serves usefully as a forage and fodder for both wild and domesticated animals. [No. 2-53/79.]

*Petalostemum* (*Petalostemon*) *purpureum* (Vent.) Rydb. (probably) (Leguminosae). Prairie Clover. Used for pneumonia; "important to Navaho."

It is known that this and other *P.* species are used medicinally by the Navaho and other aborigines of New Mexico (1) (2) (16). In the Great Plains area, a beverage tea is brewed from the leaves. [No. 2-53/100.]

*Physalis lanceolata* Michaux (Solanaceae). (Prairie) Ground Cherry. The berries are eaten. Corolla and spherical fruit are yellow.

Many Indian groups eat the fruit, fresh or dried (3), and there is some medicinal usage for at least one *Physalis* species (1) [No. 2-53/88.]

*Plantago purshii* Roem. & Schultes (Plantaginaceae). Indian Wheat. The broth (from the seeds?) is administered to babies when "they spoil" (!?), probably meaning when they are distressed because of colic or constipation.

Seeds of this species and of *P. fastigiata* Morris and others are called "Indian wheat" and are said to be used as psyllium seed substitutes (3) in digestive disorders. [No. 2-53/92.]

*Portulaca retusa* Engelm. (Portulacaceae). The plants are eaten. The leaves of several species of this genus, including *retusa*, are used as pot herbs by the Indians (15) and mush and bread are made from the seeds (16); (cf. "pulsey," *P. oleracea* L.). [No. 2-53/98.]

*Purshia tridentata* (Pursh) DC. (*Kunzia tridentata* [Pursh] Spreng.) (Rosaceae). Antelope Brush. Taken during confinement. The bark is used for diapers. "Small-some." (This cryptic statement may mean that some shrubs or some plant parts, such as flowers, were small in size.)

This species is an important browse plant. According to Vestal

(23), the root has been used to facilitate expulsion of afterbirth. [No. 2-53/81.]

*Ribes inerme* Rydberg (*Grossularia inerme* [Rydb.] Cov. & Britt.) (Saxifragaceae). (White Stem) Gooseberry. The berries are eaten in winter.

Indians of the west use the fruit both fresh and dried as a food (3). [No. 2-53/93.]

*Rumex crispus* L. (Polygonaceae) Curly Leaf Dock. Used for "faint" (fainting? faintness?).

The root is applied to sores by the Navaho (2) (23). The plant was reputedly medicinal, and was used as a potherb in Arizona (3) and New Mexico (12). Under the vernacular name *lengua de vaca* (cow's tongue), it has been used medicinally in New Mexico; for instance, the leaves are bound to the head for headache, and the roots are chewed for "pyorrhea." The roots have also served to treat diarrhea (1). [No. 2-53/87.]

*Salix exigua* Nutt. or its variety (Salicaceae). (Coyote) Willow. Sandbar Willow. The leaves (?) were used to prepare a drink "like orange juice." (The specific determination could not positively be made from the specimen.)

The leaves and bark have furnished food to both wild and domesticated animals. A number of medicinal usages in New Mexico have been cited for the species (1), but among the Navaho the plant is mainly used in various religious-medicinal ceremonies. (16) (23). [No. 2-53/65.]

*Salsola kali* L. var. *tenuifolia* Tausch (*S. pestifer* A. Nels.) (Chenopodiaceae.) Russian Thistle. Salt-wort. Seeds are roasted and eaten.

This plant originated from Eurasia, but now is one of the best known plants of the western United States—the commonest of the "tumbleweeds." The plant serves as forage and fodder, and parts have been used in the preparation of dyestuffs (8) and medicines (23). [No. 2-53/62.]

*Sarcobatus vermiculatus* (Hook.) Torr. (Chenopodiaceae.) Greasewood. The "seeds" (actually fruits) are eaten.

The plant is browsed (but to sheep is sometimes toxic); used as a fuel in the kiva (3) and elsewhere; chewed and applied to the stings of hymenopterous insects; and used in many other ways (16) (23). [No. 2-53/66.]

*Senecio* species, possibly *S. multicapitatus* Greenm. (Compositae). The plant is boiled in water and the sores of the patient are exposed to the steam.

Some species are used in the New Mexico materia medica (1) (2) (23) and some are poisonous. A decoction of *S. douglasii* DC. is drunk to improve the voice in Navaho chanting ceremonies (16). [No. 2-53/60.]

*Shepherdia argentea* (Pursh) Nutt. (*Elaeagnus utilis* A. Nels.) (Elaeagnaceae). Silver Buffalo Berry. The berries are administered in fever.

The popular Indian usage of the fruit as a food (fresh and dried) throughout the western states and Canada is well known. The foods prepared from a sister species, *S. canadensis* (L.) Nutt., by the Indians of British Columbia have been described (7). [No. 2-53/101.]

*Tetradymia canescens* DC. (Compositae). Horse Brush. Used for (inducing?) menstruation by putting plant in (warm or hot) water and taking (sitz) bath in the infusion.

This is one of the many species of plant used by the Navaho as an emetic (2), although the application seems to have been intended for various gastro-intestinal disorders. The Hopi Indians in Arizona applied the leaves and roots as a tonic and in uterine troubles (3). [No. 2-53/82.]

*Townsendia incana* Nuttall (probably) (Compositae). Used in labor to facilitate delivery of the baby.

It has previously been reported that the Navaho used *Townsendia* species at parturition to aid in passage of the child and placenta (2) (16) (23). They also use it as a snuff for nasal congestion and otherwise medicinally (16). [No. 2-53/96.]

*Tragopogon porrifolius* L. (Compositae) Oyster Plant. This is claimed to be a "milk plant," the latex being "used as milk."

This statement appears to rest on exaggeration or misunderstanding. The coagulated latex has been used as a masticatory by British Columbia Indians (13), and hence is probably non-toxic. [No. 2-53/63.]

*Verbascum thapsus* L. (Scrophulariaceae).—Mulle[n]. The plants are "lighted and smoked for worms in sheep's nose."

While this specific use could not be found in the literature studied, this plant has long been known as a fumitory. The leaves

and flowers are dried and smoked in combination with *Macromeria thurberi* (A. Gray) Mackenz. for mental disturbances (Arizona) (3); the plant is much used, smoked, orally administered, etc., in asthma, bronchitis, etc., in New Mexico (1). [No. 2-53/91.]

Aside from the forty-five specimens above discussed, there were two which were included in Mrs. Josey's 1941 collection of dye-stuffs, which are as follows:

*Artemisia tridentata* Nuttall (Compositae) Common (or Black) Sage (Brush). Chamiso Hediondo. No use was mentioned on the specimen label, but in notes accompanying these materials was found a dye-stuff formula.<sup>6</sup>

The dominant species over large areas of several states from British Columbia province of Canada to northern New Mexico, this plant was considerably used by the Indians and early settlers for its supposed medical effect, as in influenza, colds, fevers, rheumatism, hemorrhage, etc. (1). The Tewa Indians use the leaves of this and other *A.* species for indigestion, especially with flatulence, and as an expectorant (15). The Navaho use it similarly, also to relieve headache, and to aid delivery (16). A United States patent recently issued claimed use of the volatile oil emulsion for treating gingivitis and as a cosmetic application to the skin (17). [No. 2-53/116a.]

*Rumex altissimus* Wood (Polygonaceae). *Tda saf ka china* (Navaho); Yebitcai probably refers to use in Yeibichei or nine-days' chant ceremonies.<sup>7</sup> [No. 2-53/117a.]

In 1940, Dr. Dutton was working with an old Navaho singer, or medicine man, Kin a'ani Neez, from the region north of Ft. Defiance and Sawmill, Arizona. He was in need of some "blue med-

6. "Sagebrush and Indigo (green color): 4 gallons of sagebrush dyewater; 1 tablespoonful indigo blue; ½ lb. yarn; 1 tablespoonful raw alum. To secure green, add enough indigo to the dye bath of sagebrush. Dye yarn with sagebrush first—this produces a light yellow color. Re-dye by adding blue indigo to sagebrush dyebath. Bring to a boil, add the raw alum, stir well, and add wet yarn. Boil 2 hours; rinse." (This formula is not given in Bryan [8].)

7. Dr. Dutton notes that *Rumex* species, such *R. hymenosepalus*, known locally as *cañaigre*, dock, or wild rhubarb, are included in the "family" of the Life Medicine plants (2) of the Navaho. The dried root is ground and used on sores, as it has a drying effect.

*Tda-saf*, or *Tdsap*, is equivalent to Navaho Kachina. As personifier of the Fringed Mouth God, he may take part in the Night Way ceremonial, or Yeibichei.

icine," and knew of only one place where it could be obtained. Accordingly, Dr. Dutton followed the old man's directions, to a location south of Gallup, New Mexico, on the way to Zuñi. There, they dug up roots of the plant which the singer indicated. When they were first dug, Dr. Dutton reports, the roots had a distinct blue color; and the singer said that the roots get blue when put into water. The Navaho name for the plant is *aze'doll'ish*, which is identifiable as *Ditaxis cyanophylla* Woot. & Standl. It is one of the Life Medicine plants, used specifically for the Life Way chants (2) [No. 2-53/119.]

*Species Reported by Botanical Name without Specimens.*

The following additional species are stated on the authority of Mrs. Verda Josey to be found in the Chaco Canyon region, and to be used by the Navaho Indians there for food, medicine, in ceremonies, and so on.<sup>8</sup> The collection was made by a ranger working with the National Park Service.

*Abronia fragrans* Nuttall (Nyctaginaceae). Sand Verbena. This with other *Abronia* species has been reported used by the Navaho to treat boils, the bite of a certain species of black beetle (2), and the poison of spiders (16), and otherwise (23). The roots have been used as human food (12).

*Artemisia tridentata* Nutt. var. *trifida* Nutt. (*A. trifida* Nutt.; *A. tripartita* Rydb.) Black Sagebrush. The Navaho used this in their religious-medicine ceremonies; also for treating corns (16). The fruit ("seeds") have been bruised for pinole (meal) in California (Barrows, 1900).

*Astragalus* species (Leguminosae). Milk Vetch. Loco Weed. Several species, such as *A. allochrous* A. Gray, are used by the Navaho as emetic and diuretic agents (23); *A. ceramicus* Sheld. is also applied as a hemostatic (2). Species have been used in Navaho religious-medicinal ceremonial (16) (23).

*Atriplex canescens* (Pursh) Nutt. var. *angustifolia* S. Wats.: a synonym for either subspecies *typica* or *linearis*. (Cf. *supra*)

*Bouteloua hirsuta* Lag. (*Chondrosium foeneum* Torr.; *C. hirtum*

8. With the exception of *Castilleja integra*, all data in this section on specific uses were obtained from various reference works.

HBK.) (Gramineae) Mesquite Grass. Hairy Grama. Used as a forage grass and to make a "sacred charcoal" for ceremonial use (16).

*Castilleja integra* A. Gray (Scrophulariaceae). (Indian) Paint Brush. According to Mrs. Josey, this plant is used to treat burns. This use was previously reported by Vestal (23), together with several others. The Navaho are reported to use aqueous preparations of the leaves for gastric ailments (16), and as a dye material (8). According to Kearney and Peebles (3), the Hopi Indians use various *C.* species in their medicine.

*C. lineata* Greene. Painted Cup. The plant has been used in aqueous extract by the Navaho for gastric trouble (16).

*Cercocarpus montanus* Raf. (*C. foetigilloides* HBK.; *C. parvifolius* Nutt.) (Rosaceae). Mountain Mahogany. The Navaho used the plant in dyeing wool red (9) and in religious-medicine ceremonies (16); the root and bark have been used by them for gastric distress (16). The wood of some species was used to make tool handles; various species furnish deer and sheep browse. Vestal (23) reports other usages. The Tewa of New Mexico used the powdered leaves mixed with salt as a laxative (15).

*Chenopodium Fremontii* S. Wats. Frémont Pigweed. The seeds were used as food by the Navaho (16), and both seeds and leaves by some other tribes (14). The Navaho reportedly prepared a crude glucose from the seeds "by parching" (16).

*Chrysothamnus nauseosus* (Pall.) Britt. and var. *albicaulis* Nutt. (or Rydb.) (*Bigelovia graveolens* A. Gray var. *albicaulis* A. Gray). Chamiza. Chamizo. Chamise. White-stemmed Rabbit B[r]ush. This species has been suggested as possible source of a commercial volatile oil. The heads of some species are used by the Navaho to dye wool yellow (9); the plants are sometimes browsed; they serve as kiva fuel.

*C. nauseosus* (Pall.) Britt. var. *graveolens* (Nutt.) Piper. Golden Bush. It is reported that the Navaho use this plant in rheumatism and as an emetic (2). Dyeing and other uses by Navaho and others have also been reported (15) (16).

*Cleome lutea* Hook. Bee Weed. Spider Flower. No uses are reported for this decorative plant (23).

*Cowania Stansburiana* Torr. (Rosaceae). Cliff Rose. Quinine Bush. The Navaho (2) and the Hopi (3) use the plant as an emetic.



The Navaho also have used it as a dye plant, "signal plant" (to predict seasonal weather) (8), and in various other ways (16) (23). The plant serves for deer and livestock forage.

*Datura meteloides* DC. (Solanaceae). Thorn Apple. Sacred Datura. The leaf infusion is applied by the Navaho to wounds after castration of sheep; the seeds are used internally in ceremonies (16), also by some tribes in Arizona as a delirifacient and in their medicine, thus for instance to prevent miscarriages (3). The Zuni, Yuman, and Hopi tribes are reported to use the plant medicinally (15).

*Echinocereus coccineus* Engelm. (Cactaceae). Cereus. Hedgehog Cactus. The fruit are juicy and edible (12), although sometimes in this species are regarded by the Navaho as poisonous (16); used as a heart stimulant by the Navaho (16).

*Encelia* species (Compositae). Brittle Bush. *Encelia farinosa* Gray exudes a "gum" used as a masticatory (12).

*Ephedra trifurca* Torr. Joint Fir. Mexican Tea. The Navaho use the dried plant to treat genito-urinary diseases, gastric disorder, also in making a reddish dye (16).

*Erigeron concinnus* (H. & A.) T. & G. (Compositae). Fleabane. Uses by the Ramah Navaho are given in Vestal (23). It has been reported that *E. divergens* T. & G. was used by Navaho in religious medicine ceremonies and in facilitating childbirth (16).

*Eriogonum alatum* Torr. and other *E.* species. (Polygonaceae). Winged Eriogonum. The large root of *E. alatum* is eaten by the Navaho, is used as a mild analgesic, and is an important medical chant item (16) (3). (Compare Vestal [23].) Various species are used in Navaho medicine for sore throat and diarrhea (2). *E. Jamesii* Benth. is used orally by the Navaho of both sexes as a contraceptive, the root infusion being drunk. (2) (23).

*Euphorbia montana* Engelm. Golondrina. This plant has been used by the Navaho for boils and pustules, for a beverage during parturition, and as a purge (16).

*Gilia* species (Polemoniaceae). Several species have been used by the Navaho for indigestion (especially in gastric disturbances) and as an emetic and purge (16). Such a species is *G. attenuata* (A. Gray) A. Nels. (Sky Rocket), which is also a browse plant and a cultivated

ornamental flower. Some *Gilia* species have also been used to aid in delivery of the placenta (2). The Tewa used leaves and flowers of *G. longiflora* (Torr.) G. Don for headache, applied to sores, etc. (15) (23).

*Juniperus monosperma* Sarg. Cherry Stone Juniper. The galbuli are reported eaten and used for seasoning (12); the Navaho sometimes chew the inner bark (16), but the plant is important to these peoples mostly in their religious-medicinal ceremonial (16) (23). Numerous medicinal uses by the Tewa are reported by Robbins *et al.* (15).

*Lithospermum incisum* Lehm. (Boraginaceae). Gromwell. Puccoon. This genus has been of considerable interest in recent years following reports of use by some aborigines as an oral contraceptive. The Navaho chew the species *angustifolium* Michx. in coughs and colds. The cooked roots were reportedly used for food by the Thompson Indians (13).

*Mentzelia albicaulis* Dougl. ex Hook. (Loasaceae). White-stem Blazing Star. A parched meal is reported made from the seeds by the Navaho Indians (16); there are also Navaho medicinal uses (23).

*M. multiflora* (Nutt.) A. Gray. Stickleaf. Used by the Navaho as an emetic (2) and like the preceding as a food (16) (23).

*Mirabilis multiflora* A. Gray (*Quamoclidion multiflorum* Torr.) (Nyctaginaceae). Four O'Clock. The plant was used by the Navaho for various mouth disorders, and to treat rheumatism and "swellings" (23). The Hopi Indians were said to use the powdered root in gastralgia and to eat the root for its delirifacient effects (3).

*Muhlenbergia cuspidata* (Torr.) Rydb. (Gramineae). "Muhly." The Navaho use the stems and leaves to make hairbrushes and brooms (16).

*Opuntia* species (Cactaceae). Prickly Pear. As is well known, the ripe fruit are juicy and esculent (12), or they may be eaten after boiling (15) or sun-drying (16). The Navaho use some species for boils (2). Several other Navaho uses are reported by Wyman (16) and Vestal (23).

*Parthenocissus quinquefolia* (L.) Planchon (*Ampelopsis quinquefolia* Michx.) (Vitaceae). American Ivy. The stems and fruits have been reported eaten by the Amerindians. Wyman (16) reports a medicinal Navaho use.

*P. inserta* (Kerner) K. Fritsch. This is considered by some botanists identical with the preceding entity. In either instance, it is probably used like the preceding.

*Penstemon* species (Scrophulariaceae). Beard Tongue. Various species have been used by the Navaho as cathartics, diuretics (*P. torreyi* Benth.), in the treatment of childbirth, for burns, and in toothache (2) (16) (23). *P. torreyi* has been used by the Tewa as a dressing for sores (15). Species are occasionally browsed and used to prepare beverages.

*Phlox diffusa* Benth (P. *douglasii* Hook. var. *diffusa* A. Gray) (Polemoniaceae). No application has been found cited in the literature.

*P. douglasii* Hooker. This is used in Navaho medicine ceremonies (16).

*Phoradendron juniperinum* Engelm. (Loranthaceae). Mistletoe. This species is used by the Navaho for treating warts (2), and is also used in the Hopi (3) and Tewa (15) medicine. The Navaho eat the fruit and at least formerly drank a tea from the stems (16).

*P. ligatum* Trelease. This species, growing on juniper trees, is considered by some taxonomists identical with the preceding species. In any case, it is used like the preceding.

*Pinus edulis* Engelm. (Pinaceae). Nut Pine. The resin is used by the Navaho as an emetic (2), otherwise to waterproof containers, cement turquoise in jewelry, etc. The seeds provide food and represent a commercial crop, since large amounts are sold, especially in the eastern cities. Many uses are cited by Vestal (23).

*Populus wislizeni* (S. Wats.) Sarg. (*P. fremontii* S. Wats. var. *wislizeni* S. Wats.) (Salicaceae). Poplar. Wislizenius Cottonwood. Alamo. The catkins are reported eaten raw by some of the Pueblo Indians of New Mexico (12) or chewed like gum (16). The Tewa use the tree in a number of practical ways (15).

*Rhus trilobata* Nutt. (*R. canadensis* Marsh var. *trilobata* Gray; *Schmaltzia* [*Schmalzia*] *trilobata* [Nutt.] Small) (Anacardiaceae). Sumac. Berries are reported eaten by the Indians, the juice used as a beverage, and the extract as a dye mordant (12); several other uses are known among the Navaho (16) (23).

*Ribes inebrians* Lindl. (*R. pumilum* Nutt.). Currant. It is said that although they may be made sick, the Hopi (3) and Navaho (16)

eat the fruits (3); the leaves are also eaten with fat (12). The wood is used for bows by the Tewa (15) and for arrows by the Navaho (16) (23).

*Rumex hymenosepalus* Torr. Sorrel. The leaves, stems, and roots are used as food in New Mexico and elsewhere (12) (16), and the Navaho employ the root to produce several shades of dye (16) and for medical purposes (23).

*Sisymbrium officinale* (L.) Scop. (*Erysimum officinale* L.) and var. *leiocarpum* DC. (Cruciferae). Hedge Mustard. A weed introduced from Europe; the parched seeds are used to make soups, stews, etc. (12) (16), and the plant is foraged (16).

*Solanum fendleri* A. Gray (*S. tuberosum* L. var. *boreale* A. Gray) (Solanaceae). Nightshade. Wild Potato. This plant is very similar to "Irish" potato. The tubers are eaten raw with clay, it is said (12), the latter probably to relieve gastric distress from hyperacidity.

*Sphaeralcea angustifolia* (Cav.) G. Don var. *lobata* (Wooton) Kearney (*S. lobata* Wooton) (Malvaceae). Globe Mallow. The Tewa apply the powdered roots to snakebite wounds and sores (15). Related species were used by the Navaho for colds, coughs, influenza, etc. (2). The Hopi use some species for gastrointestinal disorders; the mucilaginous stems are chewed (12); a preparation is used in eye diseases (3).

*Sporobolus cryptandrus* (Torr.) A. Gray (Gramineae).—Poverty Grass. Sand Dropseed. This grass, widely distributed over the western states from Canada to Mexico, is foraged. The seeds of some species are used by the Navaho for food (15), as in tortillas and dumplings, and for medicine (23).

*Tamarix gallica* L. (Tamaricaceae). (French) Tamarisk. Salt Cedar. This Eurasiatic tree has been planted out in recent years by the Soil Erosion Survey; it furnishes shade and nectar. It is perhaps still too early for the plant to have received much empirical trial and usage by the native peoples, especially in these modern days.

*Tribulus terrestris* L. (Zygophyllaceae). Caltrop. Puncture Vine. This plant naturalized from Europe and Asia has sometimes been used in Indian domestic medicine. It serves in the traditional ceremonial medicine of the Navaho (16).

*Xanthium canadense* Mill. (*X. strumarium* L. var. *canadense* T. & G.) (Compositae). Bur Dock. The bur or fruit of *X. canadense* is used by the Navaho in local applications to decrease perspiration (16). The bur of *X. italicum* Moretti has been used in New Mexico as a food (12) and in ceremonial (23). The seeds of some species are applied as styptic (3) and otherwise medicinally (15).

*Yucca glauca* Nutt. (*Y. angustifolia* Pursh) (Liliaceae). Great Plains Yucca. Pamilla. Species of the genus including this one have been widely used by the Indians—as a source of food (stems, buds, flowers, peduncles, fruits [seed pods], seeds) (12); as medicine (roots as delirifacient and laxative); as detergent; as fiber (stem and leaves); and otherwise (3) (23). The Navaho use *Y. glauca* roots in a hair shampoo (16). Several Tewa uses are noted by Robbins and co-authors (15).

### Summary

1. From a study of a collection of forty-seven specimens made in the Chaco Canyon area of New Mexico, plant usages for thirty-seven species are reported which apparently have not previously been entered in the record. Usage statements for the other ten species confirm the findings of others. Some of the plants represent well known economic species, others apparently have been considered as of no direct utility. A few newly recorded common names and other new data also appear.

2. A compilation from the literature has been prepared of comparative data on the ethnobotany of an additional forty-eight plant genera and species reported found and used in the Chaco Canyon area.

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