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G. MORRIS HOMANS, State Forester

PHARMACAL PLANTS AND THEIR CULTURE

BY

ALBERT SCHNEIDER, M.D., Ph.D.,
COLLABORATOR

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MEDICINAL AND POISONOUS PLANTS.

CHAPTER I.

GENERAL CONSIDERATIONS.

1. Introduction.—The United States pays about eighteen million dollars annually for imported vegetable drugs. Some of these are from tropical countries and can not be grown within the bounds of our native country, but the majority of plants used in medicine, which have been imported heretofore, might readily be cultivated in the United States. Furthermore, there is a steadily increasing shortage of wild-growing, native, medicinal plants. Sooner or later these must be cultivated to prevent extermination or paucity. It is also a fact that the foreign supply of vegetable drugs is extremely uncertain and variable, both as to quality and quantity, conditions which can be corrected by growing drugs of first quality at home.

That medicinal plants may be grown profitably has been proven by the several isolated attempts in widely-separated areas of the United States. The following suggestions are intended to serve as stimulus, as well as a guide, to those interested in the cultivation of medicinal plants, primarily in California, also in other states.

Within recent years the pharmaceutic press has published reports on the scarcity of certain drugs, as belladonna, hyoseyamus, hydrastis, senega, and others. Some anxiety begins to arise concerning the future supply of cascara bark.

The present tendency in medical and pharmaceutical botany is toward greater simplification. The number and variety of plants now used medicinally is very small when compared with the number used in the past, and the process of "weeding out" is still going on, as is shown by the fact that in the eighth decennial revision of the United States Pharmacopœia about forty crude vegetable drugs were excluded, while only three or four new ones were admitted. This process of reducing the number of vegetable drugs does not, however, imply that the importance of studying new and old medicinal plants is correspondingly lessened. Rather the reverse is true. Botanists, chemists, physiologists, and pharmacologists must extend their investigations into fields still unknown or imperfectly understood. There is, for example, much uncertainty as to the identity, origin, and physiological action of many long-used vege-

table drugs, to say nothing of the vegetable drugs of such countries as China, India, Arabia, and Central America, which are awaiting our careful study and investigation in order to determine their possible therapeutic value.

Many of our native medicinal plants require further study, and some of the poisonous plants will no doubt prove very efficacious medicinally. The therapeutic use of drugs, vegetable and others, is based largely upon empiricism, and no one can state definitely what the future scientific progress in medicine may develop. Recent bacteriological research has completely revolutionized certain phases in the treatment of diseases, and it is highly probable that in the future the method of application and the therapeutic use of many drugs will be changed completely. It is an obligative duty to study vegetable drugs as thoroughly as possible, in order that the best results may follow their use in disease.

The study of known and unknown medicinal plants would be greatly advanced through experimental gardens, scientifically conducted. In Europe such gardens have been established for centuries, and effective efforts in this direction are now being made in various parts of the United States. The Department of Agriculture has established experimental gardens at Chico, Whittier, and Davis, in California, in which are to be grown economic plants, including medicinal plants. A garden of medicinal plants was established at Golden Gate Park, San Francisco, in which about five hundred species were under cultivation in 1904-05, but owing to lack of funds the work has recently been discontinued. Many medicinal plants are also grown in the University gardens at Berkeley, California. Many foreign medicinal plants have been introduced into California, and a number of private economic and pleasure gardens are still in existence in various parts of the State. Gardens, more or less pretentious, devoted to medicinal plants, are established at New York (New York Botanical Garden), Philadelphia, and at the Indiana State University. In addition, there are gardens of medicinal plants operated in connection with the following colleges of pharmacy: Seio College, Department of Pharmacy; University of Michigan, School of Pharmacy; Purdue University, School of Pharmacy; Brooklyn College of Pharmacy, and St. Louis College of Pharmacy. These beginnings, when more fully developed on a coöperative basis, will be important factors in perfecting our knowledge of the cultivation, constituents, properties, and uses of the medicinal plants, native and introduced, of the United States.

2. Flora and Climatic Conditions of California.—California is a large, mountainous state, with extensive valleys, and has a wide latitudinal and altitudinal range. Along the entire coast the temperature is kept quite uniformly mild by the Pacific currents, there being only

about 10° difference in the average temperature of the northern and southern limits of the state. Thunderstorms and cyclones are unknown. The coast winds blow in one direction for about eight months of the year. Snow is formed on top of the higher coast-range hills and mountains. There are sharply contrasted wet and dry seasons. In and about San Francisco there are about three months of heavy rains, namely January, February, and March, with a few rains in December and April. From about the first of May to the close of November there is no rainfall worthy of mention. Toward the north from San Francisco the amount of rainfall is increased; toward the south it is decreased. At Los Angeles and south the rainfall is much less, and irrigation is in many instances necessary to insure crops. Remarkable results have, however, been obtained by the Campbell method, or dry farming, without irrigation. The persistent "high fogs" of the coast region during the months of July and August are a peculiar feature. These fogs come in from the Pacific Ocean and cause the temperature to fall considerably, so that it is unpleasantly raw and chilly, demanding the use of a light overcoat for outdoor wear, and a fire in the grate to make the interior comfortable. Along the middle coast region the temperature rarely falls below 30° F., and the difference in mean average temperature between the northern and southern coast limits of the State does not vary more than 10° F.

The climate of the interior of the State is very variable, according to locality, differing from the immediate coast belt of approximately the same latitude and altitude in that the winters are colder and the summers hotter. The rainfall is variable. There may be snow in the winter, and in many localities there are thunderstorms and electrical displays during the summer months.

Local variations in meteorological conditions are remarkable, a distance of from ten to thirty miles showing great differences in temperature, number of foggy, cloudy and chilly days, annual rainfall, daily and nightly variations in temperature, etc. There may be a dense, cold fog in a given limited area, while in a locality a mile distant it may be comparatively warm with the brightest sunshine. This is but natural, because of the altitudinal variations, alternation of hill ranges and valleys, interrupted by higher peaks, river valleys, etc. The new arrival from the Eastern States is forcibly impressed by the browned hillsides during the summer months and the emerald verdure during the winter. Grasses and annuals generally die, excepting those under cultivation, as soon as the dry season sets in.

Even more impressive is the varied flora of the State, as might well be expected from such a peculiar climate. In the middle, and even in the northern, portions of the State, along the coast and in the interior

valleys of middle and southern California, the vegetation presents a tropical aspect, due to the palms, cycads, yuccas, aloes, century plants, magnolias, figs, banana plants, lemons, limes, oranges, carobs, olives, eucalypti, and other plants, which are not found in the open in the central, eastern, and northern United States. Wild oats, wild rye, and other grasses are common and cause the prompt green coloration of hill-sides within a few weeks after the first heavy rainfalls in the autumn. Among the native trees are the incomparable giant sequoias, the tall pines, and the enormous gnarled oaks. The multitude of varieties of introduced eucalypti and acacias form the striking feature of the California arboreal flora. Many remarkable foreign plants have become well established, as the ginkgos, casuarinas, tree ferns, araucarias, palms, cycads, pepper trees, and others. Plants which in the East are known only as small herbs here assume tree-like proportions, as the hydrangeas, fuchsias, geraniums, the lemon verbenas, and others. Ever-green trees predominate, though such deciduous trees as the cherry, apple, plum, poplar, maple, walnut, hickory, and many others do well and are extensively cultivated. Most of the subtropical plants are from Australia, southern Europe, and Mexico; many are now being introduced from China, Japan, and the Philippines. Some are from South America, the West Indies, Italy, and Spain, with stragglers from other tropical and subtrópic countries. Under cultivation, with suitable soil and drainage, the vegetation grows with remarkable rapidity and luxuriance. Some plants will not thrive well because of the prevailing cool nights, as Indian corn, cotton, and sugar cane, although these plants are grown quite successfully and profitably in certain localities. Cotton, for example, does well in the Imperial Valley region.

With a flora so remarkable and varied, it is reasonable to expect the presence of a comparatively large number of plants which have, or may have, medicinal value. This will be borne out by the list of medicinal plants reported from the State. Aromatic, fragrant, and spicy fruits, trees, grasses, and herbs are abundant. The medicinal uses of many have been ascertained through the Indians, early Spanish missionaries and settlers.

3. California Dealers in Vegetable Drugs.—In order to ascertain certain facts with regard to the commerce in California vegetable drugs, a letter was addressed to the leading wholesale drug houses in San Francisco, asking for a list of vegetable drugs which were obtained from the State. Prompt replies were received and with one exception the following are the drugs secured from the State which were offered for sale at regular market value: *Cascara sagrada*, *Yerba santa*, *Yerba buena*, *Berberis aquifolium*, *Grindelia robusta*, *Angelica root*, *Absinthium*,

Marrubium, and *Eucalyptus* leaves. The one exception was the F. A. Week Company, who gave a much longer list, as follows:

Berberis aquifolium root	Red clover flowers
Cascara sagrada bark	Peach leaves
California laurel leaves	Raspberry leaves
Damiana leaves	Strawberry vine
Eucalyptus globulus leaves	Garden lettuce
Eschscholtzia californica	Hops
Grindelia robusta	Orange flowers
Grindelia squarrosa	Orange peel
Kava kava root	Orange pits
Manzanita leaves	Apricot pits
Rhus toxicodendron	Red rose leaves (petals)
Yerba buena	Pale rose leaves (petals)
Yerba reuma	Pumpkin seeds
Yerba santa	Watermelon seeds
Wild potato root (man in the earth)	Mustard seed
Mullein leaves	Canary seed
Mullein flowers	Rape seed
Skunk cabbage root	Hemp seed
Skunk cabbage leaves	Flax seed
Wild cucumber root	Low mallow
Angelica root	Wild sage
May weed herb	Spikenard
Scouring rush	Burdock root
Pine buds	Buckeye bark
Pine needles	Buckeye leaves
Plantain leaves	Milk weed
Plantain root	Horseradish
Wormwood herb	Cherry stems
Horehound herb	Poppy heads
Linden flowers	Coriander
Sage	Fennel
Thyme	Caraway
Summer savory	And others.
Sweet marjoram	

The information gained was somewhat surprising, on the one hand because not more drugs were secured from the State, and secondly because the Week Company supplied comparatively such a large number from the State. From several interviews with Mr. F. A. Week it was ascertained that the maintenance of such a list was uncertain for several reasons. The principal one was high American labor *versus* cheap European labor. A crude vegetable drug can, as a rule, be imported at less cost than it can be gathered at home. Mr. Week is a very keen observer who has made a special study of the vegetable drug resources of the State, and has ascertained what vegetable drugs may be secured and collected with profit. His usual plan was first to find out what crude drug or drugs were wanted and then to find men who would sign a contract to collect, cure, and deliver to him the desired quantity of the drug at a stipulated price. In many instances these contracts were signed with parties living in the region where the drug-yielding plants

were abundant. Thus, carload lots of cascara bark have been supplied through him to Eastern and foreign manufacturing houses.

The general conclusions which are deduced from these conversations with Mr. Weck are as follows:

The wholesale dealers, as well as wholesale manufacturers, give little heed to the commercial source of the drug, manner of collecting, drying, etc. They desire a clean, neat-looking article at the very lowest figure. If an English house can supply digitalis leaves, horehound, and mint more cheaply than a California house, then these articles will be imported, even though they may have been rendered comparatively inert through careless packing, storing, age, etc. A San Francisco house will import horehound from England, though that commodity is a common weed throughout the State. It appears that in order that a drug may be profitably procured in the United States, there must first be a large and reliably constant demand, and the drug must be collected on a large scale with the aid of suitable mechanical appliances and machinery. Collecting on a small scale is not profitable. Drying must be done in the open and the drug shipped in bulk, in boxes, barrels, in sacks or wrapped in burlap. Large shipments of herbs may also be baled like hay and wrapped in burlap. Ounce, pound, and larger retail amounts of herbs and leaves may be pressed in paper packages.

4. What Drugs May Be Collected Profitably.—From what has been said it is evident that even though a medicinal plant is very common in the United States, marketing the drug may not be profitable because of the high cost of labor and of other conditions. This is made clear in a bulletin issued by the United States Department of Agriculture on the common medicinal weeds of the United States. (Alice Henkel: Weeds Used in Medicine, Farmers' Bulletin No. 188, U. S. Dept. Agr., 1904). In this report the suggestion is made that the medicinal weeds mentioned might be collected and marketed by the farmer. To this end certain directions are given as to time of collecting, part of plant used, curing, garbling, etc. This plan, it was hoped, would not only rid the farm of the objectionable weeds, but would at the same time be a source of revenue, slight though it might be. It does not seem wise to give these suggestions, for several reasons: The farmer is chiefly interested in his crops and other farm products, knows little or nothing about drugs, can not always take the time to collect the drug at the right time, and can not take the time to collect, garble and cure it properly. The attempt would simply result in a poor quality of drug being placed on the market. Drug-marketing should be done by those who understand it and are ready to make a business of it. On studying the market value of the medicinal weeds mentioned, it will be found that the average price per pound of roots and leaves is from five to seven cents, a sum

entirely too small to make it worth while to collect comparatively small quantities, which would certainly be all that could be found on well-eared-for farms. No farmer would care to permit his farm to go to weeds in order that he might sell these to a druggist. The following is the list of medicinal weeds as given by Miss Henkel: *Achillea millefolium* L., *Agropyron repens* (L.) Beauv., *Arctium lappa* L., *Brassica nigra* (L.) Koeh., *Chenopodium ambrosioides* L., *Chenopodium anthelminticum* L., *Cnicus benedictus* L., *Conium maculatum* L., *Datura stramonium* L., *Digitalis purpurea* L., *Eupatorium perfoliata* L., *Grindelia robusta* Nutt., *Grindelia squarrosa* (Pursh.) Dunal, *Leptilon canadense* (L.) Brit., *Erigeron canadense* L., *Lobelia inflata* L., *Marrubium vulgare* L., *Nepeta cataria* L., *Phytolacca americana* L., *P. decandra*, *Rumex brittanica* L., *Rumex crispus* L., *Rumex obtusifolius* L., *Tanaetum vulgare* L., *Taraxeum taraxacum* (L.) Karst., *Sinapis alba* L., *Verbascum thapsus* L., all of which are more or less common in California.

A large number of drug-yielding plants can no doubt be grown profitably in the United States, but as indicated, this, in the majority of cases, is possible only when done on a large scale. The climate of California is peculiarly adapted to the cultivation of many different kinds of medicinal plants, as has been proven experimentally, and it is to be hoped that some enterprising individuals may make a beginning in establishing plantations of medicinal plants like those of England, Germany, France, Italy, and other European countries. Experiments have been made with the poppy, and it was found that the opium obtained was of excellent quality, but on account of high-priced labor it was impossible to compete with the Oriental market. It may be possible to find some other method of securing the opium. One method, which has been tried, was to cut the plants at the proper time, express the juice from the entire plant, and evaporate it to the proper consistency. It was, however, found that the alkaloidal yield of the gum opium was very low. The statements made in regard to poppy cultivation apply also in a general way to the cultivation of the camphor tree in California. Certain cultural attempts can be undertaken successfully only by those who have ample funds and are willing to do the necessary preliminary experimenting. In fact, such work should have government (State and Federal) support. At a cost of many millions of dollars, the English Government has successfully introduced cinchona culture into India.

5. General Suggestions on the Cultivation of Medicinal Plants in the State of California.—The plants cited in this report are, with few exceptions, found growing within the boundaries of the State. Many more may readily be introduced. It is not, however, intended to imply that all, even, of this limited number of medicinal plant are of unques-

tioned therapeutic value, or that they may be grown profitably. Some of the difficulties in the way of profitable culture have already been referred to, the chief one being high-priced American labor *versus* the cheaper foreign labor. We can no doubt put into operation ways and means which will in a measure overcome this difference in the cost of labor, as the use of time- and labor-saving machinery, improvement in cultural operations, etc. First of all it will be necessary to create an interest in that kind of plant-culture. Such an interest has been created in other countries, notably in England and Germany, where certain medicinal plants are grown on an enormous scale, sufficient to supply the home market at least. Just as we compete successfully or excel in certain branches of horticulture, agriculture, arboriculture, etc., just so may we compete successfully or excel in the growing of medicinal plants. All that is necessary is for enterprising and intelligent individuals to establish plantations of desirable medicinal plants, in suitable localities, growing them on a sufficiently large scale, and putting into operation the appropriate methods of cultivating, collecting, drying, marketing, etc. Beginnings should be made with those drugs which will find a ready market. It must be borne in mind that it is necessary to compete with the foreign market, and that the enterprise should yield a profit equal to that from other soil-cultural pursuits. There is no plausibly apparent reason why this should not be done. If, as the Department of Agriculture suggests, the farmer of the United States may hope to collect medicinal weeds profitably, he will find it certainly even more profitable to devote his entire time and energy to the intelligent culture of medicinal plants, whether weeds or not. A few medicinal plants are being cultivated on a large scale in the United States, as the mints in Michigan and Wisconsin, and crocus in Pennsylvania. It is affirmed that African senna (*Cassia acutifolia*) has been successfully grown at Corpus Christi, Texas, and at Washington, D. C.

As has been indicated elsewhere, most medicinal plants may be grown in the State. The familiar garden herbs and pot herbs used medicinally and for culinary purposes can certainly be grown successfully, if not profitably. We may also include the mints, pennyroyal, sage, lettuce, yerba santa, thyme, caraway, fennel, coriander, camomile, and many others. There are numerous introduced trees, shrubs, and herbs, in cultivation and escaped from cultivation, which might, no doubt, be grown profitably for medicinal purposes, as the camphor tree, broom, blue gum, and carob. It would, however, seem desirable to begin with a few of the more important, less common, herbaceous drug plants, as aconite, digitalis, rhubarb, belladonna, scopolia, hyoseyamus, valerian, veratrum, and others, although there is no plausible reason why such common but nevertheless very desirable drugs, as taraxacum, chicory, mallow, burdock, horehound, milk weed, sambucus, stramonium, absin-

thium, rosemary, and many others, should not be very profitably cultivated on a large scale. Insect flowers (*Pyrethrum*), lavendula, hops, and others are now being grown very successfully in the State.

Inasmuch as the work is very largely in the experimental stage, it is desirable to begin with perhaps five or six different species of medicinal plants. In the course of a few years it will be found which plants are best suited to the particular soil, climatic condition, and temperature, and finally the grower will, in all probability, limit himself to those species giving the best promise as to net earnings or gain, per acre. It will be necessary to develop the most suitable methods of cultivation, fertilization of soil, rotation of crops, collecting, garbling, drying, and marketing. Each species of medicinal plant will require its special care and attention, just as with the different field, orchard, and garden plants. For detailed and specific instructions the available literature should be consulted, and, for the rest, experience must be the guide.

6. General Suggestions on the Cultural Methods.—On looking over the existing agricultural, horticultural, and arboricultural resources of the State, one is astonished at the variety of crops grown successfully. With few exceptions the plant-cultural enterprises are conducted on an enormous scale as compared with similar European efforts, or even with those of the Eastern and Southern States. This brief statement should serve as a significant hint to those who have the ambition and courage to begin the cultivation of medicinal plants in California.

Random, unintelligent, illy-considered attempts are to be discouraged, as they lead to mistaken conclusions and to failures. Excepting perhaps in a few instances, it is not advised to grow medicinal plants as a side line or "small crop," nor is it advised that those unfamiliar with field cultural operations, chemistry of soil, the chemistry, constituents, and physiological action of vegetable drugs, should initiate or superintend such cultural efforts.

In order to avoid the unprofitable preliminary experimenting above hinted at, it is very strongly urged that beginnings be made with well-known and highly important medicinal plants, as digitalis, aconite, belladonna, seopola, rheum, golden seal, and others. While it is possible to get valuable information from books, correspondence, and hearsay, with regard to the desirable cultural methods, and, accordingly, to make fairly successful beginnings, it would nevertheless be very desirable to send qualified men to countries where these various plants are being grown successfully, with instructions to remain at least several months, to work in the fields and to collect concise and reliable data with regard to the most successful and most profitable methods employed. On returning, these observers should be placed in charge of the field work, with specific instructions to adopt, to the best of their ability, the foreign methods to American (Californian) conditions and require-

ments. For example, if it is desired to begin the culture of digitalis, a competent man should be sent to the digitalis fields of England, secure employment as a laborer, and carefully record the cultural methods, methods of curing, garbling, packing, shipping, marketing, etc. In the course of a few months, or perhaps one season, he should be in a position to give reliable and exact advice as to how to begin the successful culture of English digitalis in California, and should be in position to take charge of, and superintend, the field work, etc. As to what additional or new may be desirable in the way of methods, machinery, devices, etc., must be determined by experience and inventive genius. Similarly, the culture of camomile, chicory, and bittersweet should be studied in Germany; licorice, saffron, squill, and belladonna culture in Spain; licorice and rheum culture in Turkey and Asia, etc.

Following these suggestions would in the end prove most profitable. Much may, of course, be learned from the several attempts that have already been made in this country, particularly in California. For example, hops, insect flower, chicory, canaigre, English mustard, calendula, lavendula, tak oak, eucalyptus, rose (American Beauty), poppy, cardamom, ginger, have been grown and marketed with more or less success, to say nothing of the staple crops as onions, sugar-beets, oranges, lemons, limes, olives, carob, asparagus, celery, Indian hemp (for fiber), etc., and the native medicinal plants as cascara, yerba santa, yerba buena, yerba mansa, berberis, manzanita, and others. Numerous ginseng gardens have been established within recent years in different parts of the United States.

Most of the medicinal plants, like most other economic plants, require rich, well-tilled soil. Some thrive best in a moist, rich soil, as rhubarb, belladonna, aconite, luffa, and colocynth, while others thrive better in a rich, sandy, comparatively dry soil, as cacti, aloes, digitalis, and mustard. Some require shade, as hydrastis, ginseng, May apple, wild ginger, etc. Some require rich, somewhat marshy, soil, as the mints, wild ginger, calamus, and iris. These are all data which must be carefully considered by those who are about to enter upon drug culture.

It will be found that most of the plants recommended for cultivation are herbs or herbaceous, either annuals, biennials, or perennials. In the case of biennials it is, of course, necessary to wait two seasons for a marketable crop, as with digitalis, whereas some perennials, as rhubarb and ginseng, require a wait of three or four years before a crop can be marketed.

In conclusion, it is desired to call attention to the possibilities in extending the range of successful plant culture, in many instances. We need only recall the extension northward of the orange and lemon culture in California. There is no doubt that many drug-yielding and other plants of the tropics and sub-tropics, which are now considered

as unlikely of successful culture in California, may on careful and more extended trial do well, as ginger, cardamoms, cinchona, pilocarpus, ipecac, and others.

7. Preparing Vegetable Drugs for the Market.—The following remarks are intended as mere suggestions which it is hoped will be found helpful in working out the most suitable methods applicable in California.

The exact chemical constituency of many medical plants is as yet not fully understood and much research work along these lines is still to be done. This applies especially to plants bearing medicinally valuable alkaloids, glucosides, and other active constituents. It is also known that the amount of active constituents varies greatly during the vegetative period and in plants from different localities, and it would be very desirable for the drug growers to make chemical analyses of the plants grown at intervals of about one or several months, in order to determine the exact period when the active constituents are most abundant and what plant parts are most active. Such work should, of course, be supplemented by a reference to the literature on analyses made of plants growing in other localities.

The manner in which the drug is prepared also modifies the active constituents, quantitatively as well as qualitatively, for which reason the following suggestions are offered :

Time of Collecting.—Drugs should be collected at the time when the active principle or constituent is present in maximum quantity. Unfortunately, this period is as yet not accurately determined for many plants. The chemical analyses above referred to should be applied in order to clear up the uncertainties.

Naturally, the time of collecting depends upon the part of the plant to be used. In a general way it may be stated that the drug is collected when the plant organ or part to be used medicinally has reached its full development. Flowers, floral parts, fruits and seeds are collected at the time of maturity; not before or after maturity. There are, however, numerous exceptions. The flowers of pale rose, *lavendula*, orange, *santonica*, the fruits of the poppy, *elaterium*, vanilla, pepper, allspice and cubeb, are collected before maturity. Most leaves and leafy herbs are collected at the time of flowering or shortly before that period. Generally leaves and herbs not having a strong odor, as *aconite*, *bella-donna*, *verbascum*, *stramonium*, *digitalis*, *hyoscyamus* and others, are to be gathered shortly before blossoming, while aromatic leaves and herbs, as *absinthium*, tansy, the mints, pennyroyal and rosemary should be collected at the time of blossoming.

With drugs represented by subterranean organs, as roots, rhizomes, tubers and bulbs, also the bark of trees and shrubs, the time of collecting is quite variable. The most suitable time for collecting such drugs is

just prior to or at the time of the cessation of active seasonal growth, and, as is known to the plant grower, this period varies considerably. There are, however, some very notable exceptions to this general rule. Belladonna roots gathered from the blossoming and fruit-bearing plants (July, in the Eastern States and in Europe) are twice as valuable as those collected in March or in October. The roots of taraxacum, valerian, gentian, angelica, tormentilla and others, should be collected in the spring, although there is some difference of opinion with regard to taraxacum and valerian, some authorities stating that these roots should be collected in the fall. Aconite roots should be collected from the flowering plants. Roots and rhizomes of perennial herbaceous plants, as calamus, asarum, inula, licorice, hydrastis, ginseng should, as a rule, not be collected before the close of the third year or season. Roots of biennial plants should be collected in the fall of the second year. Barks should, as a rule, be collected in the fall, at the time of the cessation of the active seasonal growth.

Leaves are generally collected at maturity, without any special reference to the age of the plant from which they are obtained. However, there are notable exceptions. The best tea is made from the exceedingly young leaves and terminal branches. The best coca leaves are picked from the shrubs three to five years old. The first-year leaves of digitalis and hyoscyamus are not to be used, nor the young (dorsiventral) leaves of eucalyptus.

Collecting the Drug.—It is practically useless to attempt giving suggestions which will be of real value to the large grower of medicinal plants. It is very important that detailed information should be obtained from those who have been engaged for years in enterprises of a similar kind. The following are mere hints which may prove useful: Roots, rhizomes and other subterranean organs may be turned up by means of a plow, like potatoes. Picking and removing dirt must no doubt be done by hand, although various mechanical devices, as rake, hooks, etc., may be found very useful. It would be very desirable to invent a device for picking leaves and flowers. In some instances the entire plant may be cut and dried and the leaves removed by flailing, as is done in the case of *Eriodictyon californicum* (mountain balm). This method could no doubt be employed with other herbaceous and shrubby plants having rather thick leaves which become very brittle on drying. Herbs can, of course, be cut by means of mowing machines. Flowers, fruits, and barks must be collected by hand. Seeds, like mustard, are collected by mowing the plants and threshing, as is done in the mustard fields of the Lompoc Valley, California. This method can also be used with umbelliferous fruits, as anise, conium, caraway, fennel, etc. Some seeds and fruits can be removed from the plants by shaking and afterwards raked together or picked up by hand.

Cleaning and Garbling.—All drugs should be freed from foreign matter which may cling to them. This applies particularly to subterranean organs, which must be freed from soil, sand, foreign roots and rootlets and other foreign particles. Most of the dirt may be removed by brisk shaking, especially if the soil, in which the plants have been growing, is quite dry and sandy. Wet adobe soil clings quite tenaciously and after drying it bakes and clings very firmly. Soil which can not be removed by shaking must be removed by washing in clean water. Leaves, herbs, barks, fruits and seeds should never be washed.

Washing should only be employed when necessary and should not be prolonged more than is required. Prolonged soaking and washing in water removes much of the active principle and reduces the value of the drug accordingly.

Garbling consists in removing by picking, sifting or winnowing all undesirable parts or particles. Careful cleaning and garbling gives the drug a wholesome appearance and adds greatly to its commercial as well as medicinal value. Machinery and various mechanical devices are desirable or necessary in cleaning and garbling.

Sorting into grades is not permissible with drugs. That is, separating the crop yield into grades of different qualities, as is generally done with fruits and grains, for only first grades or qualities are wanted. Wholesale as well as retail dealers always call for the best quality drugs. The grower who would place on the market a sorted, inferior article would be guilty of a gross misdemeanor.

Peeling, Cutting and Slicing.—These processes hasten drying by increasing surface exposure and increasing the rate of evaporation of moisture. The special function of the epidermis and cork tissue is to reduce the evaporation of moisture from the interior of plant organs. Removing these tissues therefore permits the more rapid escape of moisture; as a result the drug dries more quickly, which is not only time saving, but also lessens the decomposition of active principles and reduces the tendency toward the development of microbes, molds, mildews and other animal parasites.

Occasionally peeling is for the purpose of removing the outer inert portions, as with many barks (cinnamon, chin, soap bark, butternut, etc.) and the fruit of colocynth. In some instances peeling is practiced when it is unnecessary or undesirable, as in the case of ginger and calamus.

As a rule drugs which are cut or sliced are not peeled or decorticated for reasons which are perhaps self-evident, though there are exceptions, as for example, rhubarb roots, which are both peeled and cut. The manner of cutting and slicing drugs varies in different countries and with different drug collectors. These operations are performed on fleshy roots, rhizomes, tubers and bulbs. Some are sliced or cut trans-

versely, as bryonia, calumba, colehicum, chicory, bittersweet, and couch grass; some longitudinally, as gentian, calamus, belladonna, and some are generally cut in any direction, as inula, rhubarb, and zedoary.

It should be remembered that peeling, cutting and slicing exposes the tissues containing the active constituents to the climatic influences which hasten their evaporation, dissipation and chemical decomposition, therefore, these operations should be reduced as much as is practicable with a reasonably rapid and uniform method of drying or curing. In other words, the pieces should be left as large as possible.

Peeling is done by hand, likewise rossing (removing the outer bark) of barks, but cutting and slicing may be done by suitable mechanical devices.

Scalding.—Certain drugs, as ginger, sarsaparillas, curcuma, salep and a few others, are placed in boiling water before drying. This kills the cells and prevents sprouting, it destroys parasites which may be present and hastens drying because moisture escapes much more rapidly from dead cells than from living cells.

Lining and Bleaching.—It has become customary to bleach and lime certain drugs, as ginger, calamus, orris root and nutmegs. These processes are not necessary or desirable, excepting perhaps in rare instances, and will be passed over without further comment. Here we may also mention the pernicious custom of coloring certain substances, as tea and coffee.

Drying.—After the drug has been collected, cleaned, garbled and otherwise prepared, it is ready to be cured or dried. This is an exceedingly important process to which careful attention must be given. The object to be attained is the removal of moisture in order to prevent the development of microbes, higher fungi and other organisms which feed upon the cell contents including more or less of the active constituents. It is desirable to dry drugs as quickly as possible. Exposing the drugs to direct sunlight is as a rule not preferable. Drying of leaves and herbs should be done under a shed with open sides and ends to insure free circulation of air. Fortunately, the work of drying becomes easy as well as simple in California, as most drug-yielding plants mature during the dry season, so that provision for protection from rains need not be made. However, the dews and fogs of the nights, in many localities, especially near the coast, demand special consideration. Large sheds as above suggested should be built with tables or hurdles on which the drug may be spread. These sheds should be long and narrow and the roof should be quite high above the hurdles. The drug should be spread evenly and turned several times daily. The tops of the hurdles or tables should be perforated to permit ready circulation of air from below. As soon as the air becomes very damp in the

evening the drug should be heaped and covered with canvas to prevent the reabsorption of moisture from the atmosphere. Fleshy drugs (roots, rhizomes, tubers) may be left uncovered for the first few nights. Some drugs can no doubt be dried in the field on the ground, as most herbs, mustard, fennel, caraway, mountain balm and some others.

Whether artificial heat is necessary or desirable must be ascertained experimentally. Suitable arrangements for artificial drying will generally give the best results. Kilns like those used in the hop-growing areas of California will serve for drying leaves, herbs, flowers, etc. Such drugs as jalap, rheum, eucuma, ginger, saleg, sarsaparilla, and a few others are often dried in ovens, in houses over an open flame, and in other artificial ways, but that is done only in countries where the sun and natural dry air is not available.

Packing and Shipping.—As soon as the drug is thoroughly dried, it is ready for packing and shipping. No drug should be packed, either in small or large packages, unless thoroughly dry throughout. Containers, for shipment, whether large or small, should be porous so as to permit the escape of atmospheric moisture and the escape of moisture, slight though it may be, from the drug itself. Gunnybags, grain sacks, barrels, wooden boxes, paper bags, pasteboard boxes, etc., will be found useful. The problem of size and nature of containers, modes of shipment, will solve itself with experience. The important facts to be kept in mind are that the drug should be thoroughly dry when packed, should be put into dry, clean, porous containers, should be stored in a dry place, and should be kept dry in shipment.

Marketing Drugs.—It may be assumed that no one will attempt the cultivation of any drug unless there is a market for it. Nor is it reasonable to suppose that growers will so glut the market as to reduce the market value very considerably within, say, several years. No doubt the numerous ginseng plantations which have sprung up all over the United States within recent years will sooner or later reduce the market value of this drug, but such effect is not yet appreciable. The grower can easily ascertain by inquiry where he can dispose of his product. Whether he deals with the wholesale houses or with the retail druggist will depend upon his personal inclinations, desires, and ideas of business.

Drug Culture and Manufacture.—In many instances it would be most desirable, or even necessary, for the grower to become manufacturer. The grower of lavender, for example, should manufacture and market the oil of lavender. The California growers of insect flowers manufacture and also market the insect powder (buhach). The manufacturer of belladonna plasters should cultivate the belladonna required in his business. The grower of mints should also manufacture the oil and menthol. This applies especially to the growers of those drugs which

are used in the fresh or undried state, for example such as yield stearoptens, oils, gums, etc.

The mere suggestion must suffice, as it would be impossible, within the scope of this report, to enter into a discussion or fuller explanation. It is reasonable to suppose that a maximum profit accrues from an enterprise when the resources are developed in all possible directions. If it is profitable, for example, to cultivate mustard, it would no doubt also be profitable to manufacture and market mustard oil.

8. Summarizing Suggestions.—The foregoing shows, in a general way, the desirability of growing medicinal plants. The subject is treated suggestively, serving as an introduction, not as a citation, of detailed facts which may be put into operation without further investigation. The suggestions given, it is hoped, will lead to more rational attempts at drug-plant culture. The proposed enterprise should be most carefully considered from every viewpoint. Does it appear practical in its results? If so, then enter into the work with the intention of making it a success. Half-hearted attempts quite generally result in total failure and serve, furthermore, to discourage others. The following are the more important factors which must be carefully considered:

1. Is there an adequate market demand (wholesale and retail) for the drug? Is the market demand quite constant or does it fluctuate greatly?

2. Has it been demonstrated that the particular drug plant in which you are interested will thrive in the locality in which you desire to grow it?

3. Are climate (temperature, air, moisture, fog, rainfall) and soil suitable?

4. Is the necessary labor (skilled and unskilled) available?

5. Are the necessary machinery, tools, etc., available?

6. On how large a scale must the enterprise be undertaken in order to assure a reasonable profit under average conditions?

7. How much capital is required to undertake the venture properly and profitably?

8. Is there, or will there be, strong competition, and what influence will this have upon launching the enterprise and upon the net results?

9. Are you familiar with the market, and do you know how to reach the market? This is of great importance.

10. Will it be necessary or desirable to use artificial heat in drying?

11. Is it advisable, also, to become manufacturer? For example, do you intend to grow mint for dealers and for manufacturers only, or do you intend to grow the plants and to manufacture the oil also?

12. Do you intend to supply the retail market or the wholesale market, or both?

In most instances, a certain amount of garden plot and more extensive field experimenting is necessary to determine the best commercially operative methods of procedure, even after being fully informed as to the experimental and commercial operations which may have been carried out successfully in other states or in foreign countries. It is, indeed, important to know how belladonna is grown in Germany, in England, and in the eastern United States, but the methods as employed in those countries do not apply in detail to Californian conditions.

The purely experimental work should be done in botanical gardens created for that purpose. The experimental work in such gardens should be dominated by an economical, practical method. All of the other features should be made subsidiary. In other words, the botanical garden should have an economically commercial significance. Its chief function should be to develop the economic botanical resources of the country. To this end, the garden should be divided into two distinct parts. In one should be carried on the purely experimental work—that is, experimental work having a practical significance. In the second part should be carried on test plantings on a practically economic commercial basis. Such gardens need not be large nor expensive, and they should be distributed geographically and climatologically, in order that the greatest good might be accomplished with a minimum of expenditure. The idea is in the main carried out by Kew with its substations and by the experimental stations of the United States Department of Agriculture, excepting that the mistake is made of controlling substations from one central point. In fact, as far as the United States are concerned, each State should support, direct, and control its own experimental work, with, of course, a coöperative relationship with the experimental gardens or stations of other states. A very efficient state garden of this kind does not require more than ten acres of ground, a propagating house, a tool shed, an office with store rooms, a competent director, one technical assistant, two or three skilled gardeners, and the necessary additional equipment. The annual cost of maintaining such a garden in high operative efficiency need not exceed \$10,000. The financial gain to the State to be derived from such a garden would soon amount to millions of dollars annually. From five to twenty-five practical tests should be carried on at one time, and perhaps two or three tests would be concluded each year. No time and effort should be wasted on useless things, as botanical freaks, botanical curios, purely technical research without practical significance, theoretical research and experiments, etc. Neither should time and effort be wasted on simple experiments which can be done by any agriculturist in any field or garden. Also, such gardens must be in charge of competent directors, men who by technical training and practical experience are qualified to direct such experiments as will bring practical net results in the shortest possible time.

CHAPTER II.

LITERATURE ON DRUG PLANTS AND DRUG PLANT CULTURE.

In lieu of records and data from California experimental gardens devoted to medicinal plants, we hereby submit the more important citations to the literature treating of the occurrence, distribution, use and cultivation of medicinal plants, especially those found in the State of California. While some citations to the chemical investigations of drug plants are given, no attempt has been made toward completeness in that direction. Such citations would be of inestimable value to investigators and it is hoped that some one may have the time and the opportunity to complete such a task.

It was thought desirable to include a few citations, which do not refer to medicinal plant culture directly. There is, for example, an extensive literature on fertility of soil, chemistry of soil, seed testing and selecting, plant physiology, tilling of soil, etc., which is of more or less importance to those who desire to enter upon the more intelligent consideration of drug-plant culture. In some instances the publications are abstracted very briefly: others are not abstracted, as the title is sufficient to indicate the nature of the subject-matter. After consulting the literature here cited, those interested will no doubt be able to obtain additional literature and to secure, through other sources, additional desirable and necessary information. The Department of Agriculture at Washington, the California State Horticultural Society, the College of Agriculture of the University of California, the various California state, county and local promotion and development committees, and the boards of trade of towns and cities are willing and ready to give information in so far as it is possible.

Most of the special information, such as range and distribution, morphology, etc., regarding California medicinal plants, will be found in the special California publications, as *PACIFIC PHARMACIST*, *ZOE*, *ERYTHRAEA*, *PITTONIA*, the *PROCEEDINGS OF THE ACADEMY OF SCIENCES*, the *GEOLOGICAL AND RAILWAY EXPLORATION REPORTS*, the *ETHNOLOGICAL REPORTS AND GOVERNMENT EXPEDITION REPORTS*. These may be consulted in the various libraries of the State, as at Sacramento, State University of California, Leland Stanford University, and at the California Academy of Sciences. There are also various California floras, written by well-known botanists, as Jepson, Coulter, Behr, Watson and others, which may be consulted by those interested. It will also be found that the literature on the introduced medicinal plants of Cali-

fornia soon merges into that of the neighboring states and territories, Mexico, Australia, Japan, and other countries.

Those desiring further limited information on the morphology, chemistry, physiological action, uses, etc., of many of the plants mentioned, are advised to obtain a copy of some Dispensatory (National or King's) or some standard text-book on pharmacognosy, always specifying the latest edition. The National Dispensatory is allopathic while King's Dispensatory is eclectic. Of the text-books on pharmacognosy, Culbreth's and Sayre's are perhaps the most complete in many ways, and the former is quite up to date on nomenclature.

The subject index to the literature will make it possible to collect quickly a nucleus to the literature on the history, range and distribution, chemistry, properties, cultivation, etc., of the plants mentioned. Two almost indispensable publications treating of medicinal plants are THE PROCEEDINGS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION and the AMERICAN JOURNAL OF PHARMACY. Most of the references are made to these publications. There are complete sets in the library of the California College of Pharmacy, San Francisco, and in other college of pharmacy libraries.

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(The numbers refer to the serial numbering of the author citations.)

Abietine -----	403	Broomcorn -----	141, 389
Aconite -----	312	Buckthorns -----	297
Agave Americana -----	170, 175, 251, 252	Buckthorn, structure of -----	116
Agaves -----	232, 254	Buhach -----	246
Agaves, culture -----	207	Bulgarian roses -----	294
Ailanthus glandulosa -----	201	Bulletins, California -----	44
Algae, marine -----	1, 168	Bulletin, Farmers' -----	42
Algarobia glandulosa -----	52	Burdock -----	256
Alkaloids, vegetable -----	178	"Burns" vegetation -----	25
Almonds -----	250	Cactus graudiflorus -----	319
Aloe, American -----	170, 175	California Bay laurel -----	154
Alpiuia officinarum -----	20	Calif. cinchona culture -----	398
Alstonia constricta -----	224	Calif. flora -----	38, 137
American agave -----	251, 252	Calif. herb lore -----	22
American drugs -----	220	Calif. Islands flora -----	26
American ginseng -----	253	Calif. manna -----	212
American med. plants -----	241	Calif. med. plants -----	9, 118, 312
American opium -----	122	Calif. oaks -----	335
Amygdalis -----	250	Calif. opium -----	226
Ananas -----	291	Calif. pharmacy -----	405
Anemopsis Californica -----	211	Calif. pines -----	333
Anatto -----	126	Calif. plants -----	77, 262-265
Apium graveolens -----	8	Calif. poisonous plants -----	18
Apple, balsam -----	182	Calif. survey -----	38
Areca catechu -----	172	Calif. wild flowers -----	267
Areca nuts -----	2	Camphor -----	292
Argentine med. plants -----	238	Camphor, Ngai -----	135
Asparagus culture -----	137, 370	Canadian med. plants -----	301
Asplenium Felix femina -----	30	Cauutillo -----	55
Assay of Cinchonas -----	15	Cape St. Lucas flora -----	24
Astragali, poisonous -----	119	Carica papaya -----	177, 189, 296
Attar of rose -----	294, 305	Cascara sagrada -----	297
Australian fever bark -----	244	Cassava -----	344, 388
Australian plants -----	218	Castanea leaves -----	53
Balsam, apple -----	182	Celery culture -----	14, 378, 380
Bark, Cinchona -----	39	Century plants -----	232
Bay laurel -----	145	Cephalanthus occidentalis -----	142
Beet, sugar -----	368	Cereus -----	62
Belladonna -----	312	Cheap drugs -----	197
Benne culture -----	266	Chenopodium California -----	255
Benzoiu -----	120	Cherokee med. plants -----	97
Berberis aquifolium -----	5	Cherry barks -----	11, 12
Birch oil -----	184	Chia -----	260
Bixa orellana -----	126	Chinese pharmacy -----	233, 350
Bot. gardens -----	310, 311	Cinchona -----	309
Bouldin Island -----	36	Cinchona alkaloids -----	15, 317
Brassica rapa -----	157	Cinchona barks -----	150
Brazilian drugs -----	163	Cinchona bark assay -----	15
Brazilian plants -----	270	Cinchona bark, false -----	39

Cinchona cultivation, 41, 79, 80, 138, 229, 230, 231	413	Ferments, in soil	268
Cinchona cult. in California 258, 313, 398	283	Ferns	160
Cinchona, Jamaican	329	Ferula sumbul	339
Cinchona preparations	204	Fever bark	244
Citrus culture	169	Fever bark, Australian	84
Climate	275	Fiber, of flax	85
Clover, red	10	Fiber plants	364
Coahuilla Indians	277	Flax culture	84
Colorado flora	70	Flax seed	38, 173
Colorado weeds	13	Flora, California	26
Coniferae	130	Flora, California Islands	28
Convallaria majalis	23	Flora, Catalina Islands	3
Cottonwood	374	Flora, of parks	35
Cowpea	115	Flora, of San Francisco	16, 34, 35
Creating new fruits	107, 159	Flora, St. Lucas	24
Cree Indians	146, 205	Flora, western	167
Crocus sativus	54	Flora, Yosemite	33
Croton procumbens	143	Flowering plants	60
Cultivation of Cinehonas, 41, 79, 80, 138, 313	61	Food plants, Australian	219
Cultivation, med. plants, 73, 75, 158, 161, 162, 313, 353, 354	386	Food plants, Indian	143
Culture of jalap	92	Fruit garden	61
Cusso	109	Fruit growing	371
Cypripedium poison	6, 236	Fruit hybrids	271
Dammara australis	247	Fruit tree irrigation	411
Damar gum	247	Fruits	352, 371
Date palm	351	Fruits, new	115
Death Valley	65	Fumigation	378
Deer's tongue	239	Fungicides	382
Desert laboratory	63	Galls, willow	174
Dietary, vegetable	66	Garden	61
Digitalin	186	Gardening	375, 381, 393
Digitalis	312	Garrya fremontii	295
Drainage	360	Gelsemium sempervirens	93
Drainage of soil	391	Germination of seeds	303
Drugs	72, 83, 306, 396	Ginger culture	188
Drugs, American	220 to 229	Ginger, Jamaica	99, 100
Drugs, Brazilian	163	Ginseng	269, 312
Drugs, cheap	197	Ginseng, American	253, 312
Drug culture	147, 187, 190, 196, 198, 312, 341, 353, 354	Glaucium flavum	102
Drug export	132	Glycyrrhiza culture	289
Drug history	112	Golden Seal	312, 362
Drugs, Japanese	164, 165, 308	Grapes, diseases of	272
Drugs and medicines	87, 241	Grindelia robusta	334
Drug pests	366	Gum, mezquit	240, 290
Drug plants	87, 192, 222, 223, 241	Gum, sweet	282
Drugs of San Francisco	336	Gums	208
Drug vendors	200, 395	Hagenia abyssinica	109
Echinacea angustifolia	210	Hedera helix	140
Echinocactus	62	Hemp culture	86
Economic plants	134, 153, 154	Herbs, English	147
Edible kelps	168	Herb lore	22
English drugs	147	Herb vendors	395
Eschscholtzia	37	Heteromelas arbutifolia	214
Eschscholtzia alkaloids	103	History of drugs	112
Essential oils	110	History of horticulture	156
Euphorbia eremocarpus	409	Hoarhound	290
Euphorbia ocellata	202	Home plants	77
Experimental plant culture	121	Honey, poisonous	179
Export of drugs	132	Hop culture	284
False Cinchona bark	39	Hops	104, 108
Farmers' bulletins	42	Hopi Indians	101, 166
		Humulus lupulus	104, 108
		Hydrastis	362
		Hypogæa	136, 363
		Indian food plants	143, 345

Indian medicinal plants, 50, 98, 159, 259, 261, 315, 330, 337	Medicinal weeds -----	149, 392
Indians -----	Megarrhiza -----	144, 416
Indians, Coahuilla -----	Mezquit -----	90
Indians, Hopi -----	Mezquit gum -----	240, 280
Indians, Panamint -----	Middle California plants -----	129
Indians, Swampy Cree -----	Mexican med. plants -----	293
Indigenous plants -----	Mexican plants -----	131
Insect flowers -----	Michigan med. plants -----	332
Insect powder -----	Micromeria douglasii -----	105
Irrigation -----	Migration of weeds -----	82
Irrigation of fruit trees -----	Milkweed rubber -----	302
Island of California -----	Mimulus glutinosus -----	355
Islands, tropical -----	Minnesota med. plants -----	267, 406
Jalap culture -----	Mint -----	342
Jamaica cinchona -----	Mint culture -----	74, 242, 331
Jamaica ginger -----	Mushroom culture -----	369
Japanese drugs -----	Mushrooms -----	249
Kalmia latifolia -----	Myrtles -----	224
Kansas med. plants -----	New fruits -----	115
Kelps -----	New York med. plants -----	203
Kelps, edible -----	North Carolina med. plants -----	326
King's Dispensatory -----	Nutrition of plants -----	415
Klamath Indians -----	Ngai camphor -----	135
Laboratory, desert -----	Oaks -----	335, 359
Laurel, California -----	Oil of birch bark -----	184
Lavender culture -----	Oil of wintergreen -----	184
Leaf hairs -----	Olea -----	4
Leaves, medicinal -----	Olea bark -----	339
Liatris odoratissima -----	Olive -----	4, 399
Licorice culture -----	Olive culture -----	273
Lily of the Valley -----	Olive oil -----	356
Lobeliaceæ -----	Onion culture -----	365
Liquidambar -----	Opium, American -----	122
Lolium -----	Opium, California -----	226
Loco weeds -----	Opium, Persian -----	235
Los Angeles plants -----	Opuntia -----	62
Lycopodium clavatum -----	Orchard trees -----	193
Macaroni wheat -----	Oreodaphne Californica -----	145
Manihot aipi -----	Panamint Indians -----	64
Marah muricatus -----	Parasites, plant -----	382
Marine algæ -----	Park flora -----	3
Mariposa County -----	Parks, San Francisco -----	3
Marrubium -----	Pawpaw -----	177
Materia medica -----	Pawpaw culture -----	189
Medicinal leaves -----	Peanuts -----	136, 363
Medicines -----	Pennsylvania med. plants -----	338
Medical plants, 71, 73, 75, 121, 221, 298, 299, 300	Peppermint culture -----	331
Med. plants of Argentine -----	Pepper tree -----	209
Med. plants of California -----	Perfume plants -----	316
Med. plants of Canada -----	Perfumes -----	110, 304
Med. plants, Cherokees -----	Persian opium -----	235
Med. plant culture -----	Pests, of drugs -----	336
Med. plants of Indians, 50, 98, 259, 261, 315, 330, 337	Pharmacy, in California -----	405
Med. plants of Kansas -----	Pharmacy, Chinese -----	350
Med. plants of Mexico -----	Philippine med. plants -----	340
Med. plants of Minnesota -----	Pineapple -----	291, 379
Med. plants of Michigan -----	Pines -----	13
Med. plants of New York -----	Pines of California -----	333
Med. plants of North Carolina -----	Plant breeding -----	400, 401
Med. plants of Pennsylvania -----	Plant culture -----	360
Med. plants of Philadelphia -----	Plant dietary -----	66
	Plant lore -----	22
	Plant parasites -----	382
	Plant products -----	412
	Plant propagation -----	384

Plant variation	401	Soil ferments	413
Plants, Australian	218	Soil fertility	373
Plants, Death Valley	65	Soil preparation	360
Plants, economic	134	Soil sterilization	390
Plants, edible	66	Sonora gum	125
Plants, flowering	60	Sorghum culture	367
Plants, indigenous	91	Southern vanilla	239
Plants, Mariposa County	57	Spraying	386
Plants, medicinal	71	Sterilization of soil	390
Plants, of Mexico	131	Strawberries	394
Plants, poisonous	46, 47, 48, 49, 51	Sugar	358
Plants, products of	245	Sugar beet	369
Plants of Santa Barbara	113	Sugar industry	321
Platystemon	37	Sumbul culture	160
Poisonous Astragali	119	Survey of California	38
Poisonous honey	179	Survey of Mexico	94
Poisonous plants	46, 47, 48, 49, 51	Swampy Cree Indians	107
Poisonous plants, California	18	Sweet gum	282
Polygonum	327	Symbiosis	114
Pomegranate	43	Sweet potato	377
Propagation, plant	384	Synonymy	215
Punica granatum	43	Tannin plants	216
Pyrethrum	246	Taraxacum culture	390
Quinine sulphate	185	Tea	206
Rape	157, 220	Thea viridis	206
Rape culture	387	Tobacco culture	408
Red clover	124, 275	Tobacco curing	410
Resins	208	Trees	181
Rhamni, structure of	116	Trichome structure	21
Rhamnus	297	Trifolium	124
Rhamnus Californica	29	Tropical islands	58
Rhamnus species	116	U. S. Dispensatory	83
Rhododendron occidentale	349	Vanilla	155
Rhubarb, cultivation	56, 312	Vanilla culture	171
Rice culture	294	Vanilla, southern	239
Rose culture	376	Vanillas	19
Rose oil	294	Variation, in plants	401
Roses	305	Vegetable alkaloids	178
Rubber, milkweed	302	Vegetable fiber	85
Rubber plants	314	Vendors of drugs	200
Rubber tree	361	Veratrum, constituents	343
Rumex hymenosepalus	257	Viburnum species	227
Sabal serrulata	285, 322	Vigna sinensis	374
Saffron culture	146, 205, 248	Viola tricolor	195
Sage culture	74, 242	Weeds	81, 82
Salix galls	174	Weeds of Colorado	70
San Francisco Bay plants	128	Weeds, extermination	81
San Francisco drugs	336	Weeds, loco	89
San Francisco flora	35	Weeds, medicinal	149, 392
San Jacinto Mts.	133	Weeds, migration	82
Sassafras	281	West American flora	27, 32
Santa Barbara flora	113	Western flora	167, 176
Santa Catalina islands	28	Wheat, macaroni	390
Saw palmetto	322	Whooping cough	53
Schinus molle	209	Wild flowers, California	267
Seasons, wet and dry	234	Willow galls	174
Seed of flax	84	Wintergreen oil	184
Seed germination	303	Yerba buena	105
Seeds	274	Yerba mansa	211
Seeds, oil producing	152	Yerba santa	402
Shrubs	181	Yosemite flora	33
Sneezeweed	225	Zingiber	99, 100
Soap plant	348	Zingiber culture	188
Soil	169	Zygadenus fremontii	324
Soil drainage	391		

CHAPTER III.

**SOME DRUG PLANTS WHICH MAY BE CULTIVATED
PROFITABLY IN CALIFORNIA.**

Drug plant culture can be considered from the purely theoretical standpoint as well as from the wholly practical standpoint. The former offers roseate promises and hopes, the latter generally starts in with a long series of disappointments. The two are to each other as day and night, and yet it would appear that they go hand in hand, with the latter as an outgrowth of the former. Theoretical drug culture gradually gives way to the purely field culture. Finally, as success looms up big, after many failures, all theorization is cast to the four winds, and the main reliance is placed upon the hoe and the plow, using the theoretical merely as a bit of background.

The man without some means is not advised to go into drug culture. He should put what little money he has into a bank, or invest it in something better established and more promising than drug plant culture. Furthermore, the enterprise must be undertaken on a fairly large scale, otherwise the net profits will not make it worth while. The all-important advice is, don't dabble; go into the enterprise in a whole-souled way and stick to it. This requires some money, good judgment or brains, and patience.

In any new field of enterprise a certain amount of purely experimental work is absolutely unavoidable. This experimental work is always conducted at a financial loss; however, the loss can be reduced to a minimum through wise and careful forethought. The following suggestions, with those already given, must suffice:

1. *Experimental Phase.*—Having decided upon the preliminaries, as to what drug plant or plants can in all probability be grown successfully and profitably in your territory, the possible market, available finances, etc., set aside an area or plat of good arable land in which to carry on what is commonly called a field experiment. Prepare this plat properly and plant it to the particular plant or plants that you intend to grow on a large scale. The details can not be gone into. Each plant tried requires special conditions. The area set aside may be only a few feet square, or it may comprise from two to ten acres. The experimenting may continue for one, two, or even three seasons. In this time the details of cultural and other operations must be worked out, as depth of plowing the soil, time of seeding, transplanting, cultivating, hoeing, irrigating, harvesting, drying, marketing, etc. It is advised to proceed cautiously. Consult all available literature on the subject, some of which is given in the publications cited. This will

serve as a foundation regarding the particular drug plant you may desire to cultivate.

Don't begin on a large or commercial scale until the preliminary details have been worked out to a satisfactory conclusion. Of course, opportunities for further experimenting will always exist, as the absolutely perfect will never be reached. During this experimental period surprises and disappointments will come thick and fast. The disappointments will appertain very largely to the great alterations required in the theoretical drug plant culture. Where you hoped to realize some \$2,000 or more at the end of the first or second year, you will, in all probability, find that you lost that amount instead, but you will have gained wonderfully in experience, and this experience is a personal asset which can not be taken from you by any one.

2. *Commercial Phase*.—Based upon the purely experimental phase, you are now ready to enter upon the commercial phase. That is the work (still of an experimental nature) now carried on on a scale sufficiently large to prevent a financial loss, even if there may be no marked gain. It would be useless to enter upon details, as these will be fully known by the time you have completed the experiments.

Certain cultural enterprises can not be undertaken successfully by individuals, because of the necessary financial outlay which they entail. These should be undertaken by the State or by the Federal Government, or perhaps by wealthy individuals or corporations. The introduction of cinchonas into India by the British Government, and into Java by the Dutch Government, cost these nations large sums of money. There is little doubt that cinchonas could be grown in portions of California, as, for example, in the immediate coast region, from Santa Barbara southward. Irrigation would be necessary. A half-hearted attempt was made by the Department of Agriculture of the University of California in 1887.¹ The matter was again urged by the writer in 1905,² but thus far no one has appeared who is willing to invest the money necessary to properly attempt the introduction of cinchonas into California.

Camphor trees thrive exceedingly well in California, having escaped from cultivation in places. To grow a camphor tree forest, suitable for the production of camphor on a profitable commercial scale, would no doubt require an outlay of money far beyond the pocketbook of the average individual.

Pilocarpus apparently thrives in the southern coast regions of the State. Attempts to introduce this plant should be carried out much as for cinchona.

¹Univ. Calif., Coll. Agr. Reports for 1887.

²The cultivation of Cinchonas on the Pacific Coast, Druggists' Circular, 40; pp. 426-430 (December, 1905).

Cascara culture could be carried out very successfully in the northern portions of the State, but only by an owner of large holdings and who was in possession of considerable wealth. To start a forest which would, in time, yield profitable quantities of cascara bark requires a vast amount of money.

Attar roses could no doubt be grown successfully in the southern portions of the State, with sufficient capital and intelligent and experienced energy. The necessary preliminary experience must be obtained in Turkey, Bulgaria, France, and other countries yielding attar of rose.

Laurel and cinnamons thrive in the State, but whether they could be cultivated profitably is doubtful. Ginger, cardamoms, aloes, etc., thrive in southern California.

Some persons appear to be greatly disappointed on being informed that the stories about there being big money in cultivating drug plants are not all reliable. However, what has been done in Austria, Germany, Spain, France, and England can be done in the United States, particularly in California.

We shall now cite a few of those drug plants which can be grown successfully and profitably within the State of California. This assumption is based upon experimental evidence and numerous other data which has been gathered from time to time.

1. **Absinthium.**—This and related plants thrive exceedingly well. It is a rank-growing herbaceous plant, which can be cultivated with comparatively little care. Requires rich, moist soil. Any of the lowlands along the coast or of any of the interior valleys would do. Must be grown on a large scale to secure any profits. The grower should also be manufacturer of the oil. The market for oil and herb should be carefully looked into before beginning culture on a commercial scale.

2. **Aconitum.**—Aconite appears to be scarce, and much that is now on the market is adulterated. Several species are substituted for the true medicinal aconite (*A. napellus*). The herb is quite common in California as an ornamental flowering plant. It is extensively cultivated in England and other European countries, where it has become naturalized.

It will no doubt thrive in any of the valley lands of California, requiring rather light, rich soil, with ample soil moisture. In the southern portions of the State, irrigation would no doubt be necessary. In fact, more or less irrigation is desirable in all parts of California, excepting, perhaps, in the extreme northern sections. Plant in rows three to three and one half feet apart. Cultivate like ordinary field crops. We would strongly advise cultivating the officinal aconite for

medicinal use, as the genuine drug is rather scarce. The market, though limited, is constant.

3. **Anise.**—This rank-growing herb thrives exceedingly well in California. Has escaped from cultivation, and is a troublesome weed in places. The grower should also manufacture the oil.

4. **Belladonna.**—This plant requires rich, moist soil, with ample atmospheric moisture in the form of low fogs. The immediate coast region of California is suitable, particularly from Santa Barbara northward. It has been grown experimentally in Los Angeles (Mr. Geo. Hill), in Golden Gate Park (Garden of Medicinal Plants), Berkeley (University Experimental Gardens, and at the writer's home), at Salinas, Fruitvale (Chas. Bixby), and on a commercial scale at Castro Valley.

The seeds are started in cold frames in October, the seedlings are cared for in the cold frames that winter, and the spring and summer of the season following, and transplanted in the following winter. Two and three crops can be gathered in one season, with or without irrigation. The roots are taken up at the end of the third or fourth season.

The alkaloidal content of the California-grown belladonna is remarkably high, in both stems and leaves (0.35 to 0.82 per cent). The entire herb is marketed. For further details as to culture in California, etc., see *Proc. A. PH. A.*, v. 57, pp. 833-843. 1909.

5. **Calamus.**—A marsh or bog plant which could no doubt be grown profitably in the wet, marshy soils of California, along with mints. Like the mints, it has perennial runners or rhizomes, and, after once being started, takes care of itself. The rhizomes can be secured from the northeastern United States, where it is native.

6. **Cannabis.**—This tall, rank, fiber plant thrives exceedingly well in California. It may be grown as a fiber plant or for medicinal purposes, or for both purposes. It thrives best in rich, moist, sandy loam. It should be culturally tried out in the irrigated desert lands of southeastern California, as the probable ideal country for its culture (near Yuma, Imperial Valley, Chucawalla Valley). The cultural possibilities of the plant are unlimited, because of the value of its fiber. Only the dried flowering tops of the pistillate plants are used medicinally. The prospective grower must decide whether culture is for medicinal purposes, for manufacturing purposes as a fiber plant, or both. (*See DISPENSATORIES and standard works on MATERIA MEDICA, Proc. A. PH. A.*, v. 57, pp. 843-845. 1909. *STATE AND U. S. Gov't. Reports on HEMP CULTURE*, etc.)

7. **Camomile.**—The several recognized medicinal species thrive exceedingly well. A native camomile (*matricaria discoidea* D. C.) is

much used as a domestic remedy, as a tonic diaphoretic and to check diarrhœa; particularly useful in bowel and stomach complaints of children. It has a very pleasant odor, recalling apple blossoms. There is no reason why this should not displace the German camomile. Easily cultivated, in quite dry, sandy, and loamy soil. No irrigation required.

8. **Crocus.**—This liliaceous plant requires rich, moist soil. The chief difficulty in its profitable culture is the cost of labor. A carefully watched commercial experiment carried on for one or two years would make it possible to determine whether or not the culture of this plant could be carried on profitably. Is successfully grown in Pennsylvania. It could no doubt be cultivated in association with colehicum. and perhaps connallaria, which require similar soil conditions.

9. **Dandelion.**—This plant grows in every country. A common lawn weed. The profit in dandelion culture is doubtful, because of the low price for the drug and because of high-priced American labor. Gathering the roots will prove costly.

10. **Dill and Related Plants.**—Thrive exceedingly well in California. Ordinary soil will serve. Conium, caraway, fennel, and celery are closely related to dill, similar in appearance and may be similarly cultivated. Cultivation is quite simple. Sow broadcast on good soil kept free from weeds.

11. **Eriodictyon.**—This popular native drug plant could no doubt be grown profitably on waste hillside lands. Quite common on the coast hills of middle and northern California. Seed can be obtained from the wild-growing plants. Clear the hillside land and sow the seed broadcast.

12. **Foxglove.**—Very common as an ornamental plant (both the English and the German). It requires fairly rich soil with ample moisture. Plant in rows three feet apart, eight inches apart in the row. Leaves can easily be removed by stripping from the stalks. Has escaped from cultivation and occurs spontaneously along the coast region of California and as far north as Vancouver Island. According to reports (G. H. P. Lichthardt of Sacramento and H. K. Mulford Co. of Philadelphia), the California-grown digitalis is rich in active principles.

13. **Ginseng.**—This plant (*Aralia quinquefolia*) has been grown at Sunnyvale and several other places in California. It requires artificial shading and very rich, moist soil. The successful cultivation of this plant requires special knowledge, a long wait for the first crop (four to six years), special cultural methods and careful collecting and drying.

Most of the wild-growing ginseng in the United States has been exterminated by collectors, though it may still be found from Canada south-

ward to Tennessee, in the eastern half of the United States. The true Chinese ginseng is perhaps a different species. Living roots should be imported for experimental purposes. There are numerous private and government reports on ginseng culture, which should be consulted before actual cultural work is begun. See, also, DISPENSATORIES. We would strongly advise a visit to several ginseng plantations in the United States, for the purpose of studying cultural methods, before beginning operations. On this occasion arrangements can also be made to secure seeds and roots for starting the cultural work. Seeds cost about one cent apiece and require eighteen months to germinate. One year roots sell for 10 cents each.

14. **Hemlock.**—A highly poisonous weed which will thrive anywhere. Grown much like dill, caraway, anise and related plants. Has escaped from cultivation.

The market demand is quite limited. Might be grown in conjunction with other medicinal plants, especially those which are closely related, as anise, fennel, etc. Caution must be observed to avoid mixing of plants in the field.

15. **Henbane.**—A biennial narcotic weed, which can be grown in any fairly good soil. Culturally it could be associated with stramonium, Indian hemp (*Cannabis indica*), tobacco and belladonna.

Considerable experimental work is required in establishing the culture of this plant in California and elsewhere in the United States, in order to determine what effect cultivation will have on the yield of active constituents. In order to make culture profitable, the herb (flowering) must be used.

Two forms of henbane are known, the annual and the biennial. The former is not desirable medicinally. It would appear that the biennial form, which is official in the United States Pharmacopœia, tends to flower even during the first year in California. We would advise experimental cultivation for a period of from three to five years, in order to determine the alkaloidal yield of first-year leaves (of flowering, as well as of non-flowering, plants) and second-year leaves, of upper stems, lower stems, influence of sun, fog, irrigation, etc. It thrives exceedingly well in the coast region of California.

16. **Hydrastis.**—This is grown something like ginseng, though some declare that artificial shading is not necessary.

Hydrastis could be cultivated in conjunction with ginseng. A patch of rich soil, with lath shading, 200 by 200 feet, devoted to ginseng and hydrastis would probably keep one man busy most of the time. So far, no one has attempted the commercial culture of hydrastis in California, although the few experimental attempts have shown that it thrives exceedingly well.

17. **Lavender.**—Thrives well throughout the State. The grower should also manufacture the oil.

No doubt, excellent oil lavender could be grown on the hillsides along the coast region of middle and southern California.

18. **Licorice.**—It would appear that in certain parts of the State the conditions for growing licorice are ideal. It thrives best in fine soil in bottom lands, where there is abundant moisture during the growing season, but where the ground bakes hard during the late summer months, which is favorable to the formation of the sweet constituents. The plants would have to be started from seed, but subsequent propagation is from cuttings (waste) left from the harvesting process. Planted in rows four feet apart, four inches apart in the rows. Growth is slight the first and second year. Harvesting begins in the fall of the third or fourth year, after the first transplanting, and continues every year after that. A trench is dug between the rows, two to three feet deep, and all roots found removed. The dirt from the next trench is thrown into the first, and so on. This drug plant is well worthy of a trial.

The California orange lands would no doubt prove ideal for licorice culture. We would also suggest the irrigated, alluvial, desert lands of southeastern California. Cultivation in a dry, hot atmosphere is said to increase the active constituents. The native species (*Glycyrrhiza lepidota glutinosa* Pursh.) is a troublesome weed in places. It resembles the official species (*G. glabra* L.).

19. **Mints.**—Peppermint is very extensively grown in Michigan, to a lesser extent in northern Indiana, in New York, and more recently also in Louisiana and California. Since the mint requires considerable moisture, we would suggest growing it in the drained marsh lands of the State. It would, no doubt, also do remarkably well in heavily-irrigated, desert, loam lands, where it could be grown much like alfalfa, cutting, perhaps, three or four crops each season. We would advise the prospective grower to visit the mint fields of Michigan, make the necessary observations, and secure the necessary rhizomes for starting the cultural operation in California. The grower must also be manufacturer, as the oil is the marketable product. Data for setting up a still, etc., is obtained by inspecting factories in operation. This can without doubt be made a most profitable enterprise in California. The climatic conditions are ideal.

20. **Marjoram.**—We would suggest that some one grow this plant to supply the American spice market. Most of the marjoram of the market is adulterated. It requires fairly rich, moist soil. Could no doubt be grown more profitably in association with other labiates, as peppermint, spearmint, pennyroyal, marrubium, etc.

21. **Marrubium**.—A very common California weed. Can be grown anywhere. Cultural methods much as for mints. Market limited and price per pound low.

22. **Poppy**.—The opium poppy thrives exceedingly well. Grow directly from the seed, as it can not be transplanted with success. The petals and heads are marketable. The opium can not be obtained profitably, by the Oriental method, on account of the cost of labor. Some years ago it was suggested that the juice be expressed from the entire plant and then evaporated. Such opium contains from one to four per cent of alkaloids, as determined in the laboratories of the California College of Pharmacy. Others declare that the alkaloidal yield of such opium is practically *nil*. Further experimenting is necessary. There is apparently no reason why opium should not be manufactured in this new way. It would, of course, be necessary to change (lower) the alkaloidal standard.

The poppy must be grown from seed, as the seedlings are transplanted with great difficulty. Sow the seed (drill) in rows about two feet apart, and thin out to suit when seedlings are well established. Cultivation is simple and easy.

23. **Medicinal Rhubarbs**.—Do well in the State. Can be grown much like the culinary rhubarbs, which are very extensively cultivated in the San Francisco Bay region. The start must be made from seed, after which the lateral shoots are used for transplanting. Three- to six-year-old roots are gathered, peeled, cut, dried, and marketed.

The medicinal rhubarb could no doubt be grown very profitably on the shaded or northern moist slopes of the coast hills. Forced cultivation is not desirable, as it deteriorates the drug. (*See DISPENSATORIES and English cultural reports.*)

24. **Rosemary**.—Thrives well and is easily cultivated. The grower should also manufacture the oil. Can be grown with such labiates as marrubium and other herbs which do not require very moist soil.

25. **Sage**.—Easily cultivated, common everywhere. Can be grown with other garden herbs.

26. **Scopola**.—Used as a substitute for belladonna, having closely similar properties and uses. The market demand for the drug is, however, uncertain, belladonna having the decided preference. As far as known, this plant has not yet been grown in this State, but there is no reason why it should not do well in the same localities as belladonna, under the same methods of culture.

27. **Squill**.—Thrives exceedingly well in the immediate coast region, in moist, sandy soil. The bulbs grow to large size. Well known to Californians.

28. **Stramonium**.—Grows anywhere. Common in waste places. Culture can only be made profitable when the entire herb is used, excepting, perhaps, the coarse main stems. May be grown with *Hyoscyamus* (henbane) and belladonna. Cultivated in England and other European countries.

29. **Valerian**.—Thrives exceedingly well in fairly moist, somewhat sandy soil mixed with clay. Can be grown in association with stramonium, veratrums, and henbane. Easily cultivated.

30. **Veratrum**.—The veratrums are marsh plants and could no doubt be introduced in some of the California marsh lands.

CHAPTER IV.

**THE NATIVE AND INTRODUCED MEDICINAL AND POISONOUS
PLANTS OF CALIFORNIA, WITH INDEX TO
COMMON NAMES.**

The list of medicinal and poisonous plants of California herein reported includes both native and introduced species and varieties. The list is not complete, as many of the more common introduced fruit trees, shrubs, weeds, garden- and pot-herbs having more or less medicinal use are not cited, for the reason that they are almost universally known.

Details regarding description of species are omitted, as this information can be found in any handbook on California flora. A fuller discussion of the therapeutic use of well-known medicinal plants is also omitted, as that information can be obtained from any standard work on vegetable drugs, such as the United States, National, and other dispensatories, text-books on materia medica, such as Maisch's, Wall's, Sayre's, Culbreth's, and others. An effort has been made to cite the popular medicinal uses of plants by Indians, early settlers, and the laity generally. With many of the plants mentioned, this is the only use known. A further careful study may put some of these to the use of medical practice.

The literature cited with the plants mentioned will serve to readily obtain further information regarding range, properties, and use. Unless otherwise stated, the plant cited is a native of the State. Some of the plants cited are of no practical value, but they are given in order to meet the request for information pertaining to them, which has come in from time to time. It may again be repeated that our knowledge of the properties of most of the native medicinal plants of California is very limited indeed. Some of them enjoy such a wide, popular use that they should be more thoroughly investigated chemically and therapeutically, in order that it may be ascertained upon what these reputed virtues depend.

As will be observed, the plants are cited in alphabetical order, according to botanical names. In most instances, a mere mention of properties and use must suffice. In fact, that is all the information that is necessary to give, as the fuller discussion can be found in the Dispensatories and Text-books on Materia Medica, to which reference is made.

The list of common names will be found convenient for reference.

The numerals given refer to the numbers of the plants cited in alphabetical sequence by scientific names.

It is highly probable that some of the purely poisonous plants cited may finally prove of value medicinally. Within recent years, considerable work has been done with regard to plants poisonous to cattle. Dr. Chesnut, of the Department of Agriculture, has made a careful study of the action of permanganate of potassium in counteracting the effects of the alkaloids of many of the poisonous plants of Montana and Colorado. His conclusions are that this substance, owing to its oxidizing powers, is a very effectual antidote if given before the alkaloid has been absorbed into the system.

An opinion prevails among ranchers that cattle avoid poisonous plants instinctively. This is not exactly in accord with facts. It is true that most poisonous plants emit noxious odors, or are disagreeable to the sense of taste, and are therefore shunned and not relished as food; yet it would appear that cattle, under unusual conditions, will actually develop a taste for certain poisonous plants, and, if the opportunity presents itself, will eat such plants in sufficient quantity to produce fatal results, even in the presence of abundance of good forage or grazing. However, the preponderance of range-cattle poisoning is due to a scarcity of food, thus compelling the half-starved animals to feed upon poisonous plants which may be present. Again, herd conditions are, in many instances, responsible for the poisoning, the weaker members being forced to take the leavings, which often include poisonous plants.

The literature on Indian medicine is fragmentary, and the information thus far attainable touching upon the subject is very inaccurate. Indian medicine, in the broad sense of the term, includes various largely ceremonial exercises and dances, superstitious beliefs, social customs and duties, etc. It is the scope of this paper to treat the subject in a more limited sense, briefly explaining internal medication as it is comprehended by the savage intellect, and citing the use of the more important plants employed by the Indians of California in the treatment of disease.

It is evident that the aborigines of California, in common with savages generally, believed in the demoniacal origin of disease. That is, disease was simple the manifestation, in the body, of some evil or undesirable spirit which had taken possession of the body, driving out the normal or rightful spiritual inhabitant. The methods of exorcising the demon of disease, though differing in certain details, resemble each other quite closely. In spite of the admittedly noxious and evil character of the disease demon, he may be presumably cowed, subdued, and driven out by threats, loud, discordant noises, nauseous odors, disagreeably-tasting substances, and other factors which any well-disposed

individual in the normal state or condition might dislike or abhor, as is clearly indicated by the practices of the Indian doctors. The actions and contortions of the dancing doctor are primarily for the purpose of frightening away the cause of the disease. The so-called sucking doctors are somewhat more scientific, as benefit often results from their practices, but after sucking the affected part with great force, acquired through experience, the doctor vomits, which is said to bring up and out the pain-producing matter, in which notion the patient may have full confidence, but it is likely that the doctor is more than half convinced that he is practicing deception. The medicine makers, both male and female, not only treat actual disease, but make medicines for a great variety of purposes, as for childbirth, for hunting, fishing, to subdue the enemy, to ward off evil, to bless, to find lost articles, etc. Their field of action is well-nigh limitless. It is needless to state that their pretensions are the merest absurdities, and are to be compared with the deeds of our modern faith healers, soothsayers, and other fakirs.

Our most reliable information regarding Indian medicine is traceable to the few intelligent, well-educated observers who have lived among the aborigines for some years; as, for example, missionaries and teachers who have worked among them long enough to learn their language, thus enabling them to ascertain the true inwardness of their habits and customs. Unfortunately, excessive sentimentalism too frequently tints the reports of otherwise keen and accurate observers, resulting in a misinterpretation of ulterior motives.

Army officers, with the exception of a few post physicians with a keen thirst for facts, are too much taken up with routine duties, and hence do not make extensive or reliable records. There are many keen observers who make accurate and reliable observations, but fail to make records which can be preserved for future reference. Prospectors and miners, as a rule, give little attention to Indian practices, excepting such as concern them directly in their dealings with Indians. The information given out by them is, as a rule, very fragmentary and very inaccurate. Explorers, collectors, and travelers are generally excellent and accurate observers, and, as a rule, take notes on the spot, but the information thus gained loses in value because of the brevity of the time of the observation. Opportunity for verification is very often wholly lacking, and too frequently single erroneous observations are recorded as being established facts. The most accurate information of all is no doubt that given out by intelligent, well-educated members of the tribes, but since these are few in number, and as a rule difficult of access, it is not an easy matter to secure the desired information. Furthermore, the language of the educated, civilized savage is superlatively

figurative and highly exaggerated, so that, after all, it is quite difficult to deduce the cold facts.

The Indian tribes of the United States differ in intelligence and amenability to the civilizing influence. In such a comparison the tribes of California¹ do not shine forth favorably. They do not have the dignified mien and fair intelligence of the Choctaws and Chickasaws, for example, nor the savage aggressiveness of the Mohawks, Apaches, and other tribes. As near as can be ascertained, they are very filthy, not warlike, though vindictive, ignorant, and resourceless, though capable of subsisting where no other tribe would care to live. The desert tribes are the very lowest in the scale of savagery; only occasionally do they engage in the hunt and in fishing. Their language is very crude, and their vocabulary very limited. The women of some tribes have acquired much skill in basket-making. Their clothing and dwellings are of the crudest. Tribal conditions and social and family relationships are very indefinite and loose. This is approximately the summing up of the California Indians by the historian H. H. Bancroft in his "Native Races of the Pacific Coast."

The most common diseases and pathologic affections of the California Indians (this applies to American Indians generally) are consumption, rheumatism, aches and pains, scrofulous affections, sore eyes, chronic ulcer, and itch. It is generally asserted that smallpox and syphilis were introduced by the whites. Contagious diseases among Indians are generally laid to the doors of the whites. This is affirmed by no less an authority than Dr. Carlos Montezuma, of the Apache tribe. It is very evident that the attempts to civilize and segregate the Indians is conducive to consumption (pneumonitis). This is fully demonstrated in the case of the tribes of Indian Territory. Several prominent members of the Choctaw and Chickasaw Indian Council informed the writer that it was only a question of time when pneumonia would cause the complete extermination of the Indian Territory tribes. The blame is laid to the removal from the more congenial climate of Florida and Alabama, their former homes, to the colder, malarial climate of Indian Territory.

Naturally, medical practice among the tribes of California aborigines was not, and is not, of a high order. General ailments were treated by the incantations and mummeries of the medicine men, who apparently did not have a very high standing, even in their own tribe. If a medicine man failed to effect a cure, or the patient died under his treatment,

¹There is apparently a close relationship between the various tribes along the entire Pacific coast. For example, the burial customs and certain social customs of the Hupas, as recorded by P. E. Goddard, are almost identical with those of the Nitinats and Clallams on the west coast of Vancouver Island. These latter tribes were once prosperous and independent, but in consequence of the ravages of warfare, smallpox, and syphilis, they began to dwindle rapidly in number, and a more rapid total extinction was prevented by a union of the two tribes. There now remain, all told, about forty members (men, women, and children) living in a village of frame buildings on a low island in San Juan bayou, Vancouver Island, just opposite Cape Flattery. They are squat in figure, semi-aquatic in habit, and are extremely filthy, being infested with body lice and other parasites. Their present tribal organization is very loose.

he was likely to be put to death by the relatives and friends of the deceased. However, if, on the other hand, luck was with him, and the majority of patients recovered, he was in time looked upon as a powerful man, and ranked in importance with a chief.

Sucking an affected part was a common practice, which owed its undoubted efficacy, in many instances, to its counter-irritating effects. Bleeding was practiced for its congestion-relieving properties. However, by far the most important and most scientific institution of the California Indian is the temescal, or sweat bath or sweat house. This is used by the men of most tribes, though it is affirmed that some tribes, as, for example, the Shoshones, were not familiar with it. The sweat house is generally made of arched willow frames, about four feet high in the center and four or five feet across at the base. A hole is dug near one side, about eighteen inches across and one foot deep. The frame of willow is covered with mats and sacking. When a patient is about to receive treatment, stones are heated to a red heat, placed in the hole of the temescal; the patient enters and sits on a mat. By means of branches of *Juniperus occidentalis* Hook. the patient sprinkles water upon the hot stones, which is immediately converted into steam, which fills the space within the temescal and causes the very active perspiration of the patient. In about half an hour the patient rushes forth and takes an immediate plunge bath in a nearby stream. Mrs. Manning, who has taught for years among the Piute Indians of Surprise Valley, Modoc County, Cal., states that the Piutes omit the plunge bath, apparently substituting therefor a rub-down; nor are the juniper twigs always used.

The sweat house is generally a family or individual affair, though in some instances one house is large enough to be used by all of the sick members of an entire camp, and is generally presided over by a female doctor. It is usually built near a stream, for reasons already given. In many instances the fire for heating the stones is started in the fall and kept alive until the following spring. Some patients sleep in the temescal all winter. The frame is covered over almost airtight, and is opened only long enough to permit the entrance or exit of a patient.

The value of the sweat bath in the treatment of rheumatism, and to promote the action of the skin, was fully appreciated. In some localities the sweat house is not necessary, on account of the accessibility of natural hot springs, the curative powers of which are known even to animals, as bears.

With regard to medicinal herbs, many are used, though only a comparatively small number are credited with having marked curative properties. Reliable information regarding the properties ascribed to them, and the exact manner in which they are used, is very difficult to

obtain. In many instances repeated inquiries elicited the mere statement that it is "a very good medicine," or a suggestive motion of the hands upward indicates that it is used as an emetic, while a motion downward implies that it has laxative properties. In some instances it is difficult to determine whether a plant is used for its food value alone, or whether perhaps it also has some medicinal uses. It may be stated that the medical practice of the Indians is not unlike the home medication among civilized peoples, differing largely in that it is more crude. In both instances the remedies used have essentially the following properties, named approximately in the order of their importance: Diaphoretic and diuretic (drinks in the form of decoctions); laxatives, emetics; astringents (used internally and externally), counter-irritants; antiseptics; sedatives and excitants. Indians have ascertained the fact, though unscientifically deduced, that the majority of aches, pains, and various pathological states are due to insufficient or abnormal action of skin, kidneys, and bowels. Restore the normal functions of these organs, and health returns; hence the widespread use of diaphoretics, diuretics, and laxatives. Cuts, bruises, sores, ulcers, and skin diseases are very common and require attention. Most of the herbs applied for these conditions have apparently counter-irritant and antiseptic properties. The most indefinite ailments of Indians are the various pains and aches. These may be rheumatoid, inflammatory, congestive, or otherwise. Pains in the gastric or abdominal region receive a general treatment, and are usually recognized as being different and requiring different treatments from pains in the head and muscles.

It must also be borne in mind that the medicine of the Indians of to-day has been greatly modified through the influence of whites. Many remedies are now used which were not used formerly, and many of the old-time remedies have been discarded. The post physicians have caused some tribes to become indifferent or lax in their tribal and individual medication, because of the free medical service provided by the United States. Furthermore, the savages soon recognize the superiority of modern medicine and gradually abandon the services of the medicine men, this in spite of the antagonism engendered through the invasion of their territories by the whites.

I

THE NATIVE AND INTRODUCED MEDICINAL AND POISONOUS PLANTS OF CALIFORNIA.

1. **Abies concolor** Lindl. White fir. *Coniferae*.

This tree is common throughout the State. Yields balsam. A decoction of the terminal branches is much used as a diuretic and in the treatment of malaria. (Calif. Geo. Survey. Bot. 2:118.) (U. S. Disp.)

Numerous other species and varieties are common and have similar uses.

2. **Abroma angusta** Lam. Wollut comul. *Sterculiaceæ* (*Byttneriaceæ*.)

A handsome evergreen greenhouse tree from India, East Indies, Asia and Australia. The sticky white secretion from the fleshy root bark is said to be of great value in dysmenorrhœa, having properties similar to those of cotton-root bark. Fiber used for cordage.

A. fatuosa L. is also cultivated. (American Journ. Med. Sci., July, 1873.)

3. **Abronia fragrans** Esch. Fragrant abronia. *Nyctaginaceæ*.

A small herbaceous plant said to range from the Columbia River southward. Found in Southern California, Utah and New Mexico. Flowers very fragrant, and would, no doubt, prove useful in the manufacture of perfumery and sachet powders. (U. S. Geo. Survey. Wheeler's Report. Bot. 6:49.)

4. **Abronia latifolia** Esch. Yellow sand verbena. *Nyctaginaceæ*.

Common along the seashore from Vancouver Island to Monterey (Calif.). Flowers fragrant, like those of **A. fragrans**. Roots are eaten by the Indians.

5. **Abrus precatorius** L. Wild licorice. Crab's eye vine. Prayer beads. Jequirity. *Leguminosæ*.

A greenhouse climber, native of India, which has been introduced into Africa, West Indies, South America and other countries. In the West Indies the roots are used like licorice. Seeds are very poisonous; used in Brazil as standards of weight. Used also in the treatment of conjunctivitis and keratitis. Seeds said to be eaten in Egypt; how prepared is not stated. Old-time criminal poisoning agent. Seeds are dangerous playthings for children. (Proc. A. Ph. A. 32; 182-184; 1884.)

6. **Acacia species.** Acacias. *Leguminosæ*.

Numerous species and varieties have been introduced from Australia and elsewhere. No attempt has thus far been made to classify them accurately. Some assert that perhaps one hundred and more species and varieties are found in the State.

The gum (gum arabic) bearing acacias are thorny or prickly shrubs adapted to dry, sandy soils. The Australian gum or wattle gum is obtained from **A. pycnanthe** Benth., **A. decurrens** Willd., **A. homalophylla** Cun., and perhaps other species. The bark, leaves and unripe fruit of some species are very rich in tannin and have been used in tanning. Some yield excellent timber.

It is to be hoped that some one will perform the great task of properly identifying the species and varieties of Acacias found in the State. (U. S. Disp.) (Bailey. Cycl. Am. Hort. 5.)

7. **Acacia catechu** Willd. Gum acacia. Cutch. *Leguminosæ*.

Yields the familiar gum acacia, catechu or cutch of the pharmacists. Cultivated in the southern part of the State; not commercially, however.

8. **Acacia farnesiana.** Acacia. *Leguminosæ*.

A native of India cultivated in the southern part of the State. The very fragrant flowers yield a very delicious perfume on distillation. Extensively cultivated for perfumery purposes in Southern France. Worthy of careful consideration for culture purposes.

9. **Acacia gregii** Gray. Acacia. *Leguminosæ*.

Yields shellac in Arizona. **Larrea mexicana** Moric, also yields shellac. Both species occur in the State.

10. **Acacia pycnanthe** Benth. Wattle gum. *Leguminosæ*.

The bark is much used medicinally in Australia. The infusion is given in infantile diarrhœa and catarrhal ophthalmia. The tincture, mixed with glycerine, is useful for sore nipples, discharging ears and chapped lips. A bark wash is useful in sore throat, as a gargle. The gum is given internally to cure piles, and in veterinary practice is applied to raw shoulders. Action, no doubt, due to the tannin present.

Other useful species of Acacia are **A. verek** G. et P. and **A. adansonii**, which yield gum senegal. **A. ferruginea** and **A. leucophaea** Willd. yield an intoxicating liquor. Whether these and some other species occur in the State is not definitely known. They would, no doubt, thrive well.

11. **Acer macrophyllum** Pursh. Large-leaved maple. *Aceraceæ*.

Common ornamental tree in northern part of State. Medicinal properties doubtful and use uncertain.

12. **Acer negunda californicum** T. and G. Box elder. *Aceraceæ*.
A common native. Medicinal use doubtful.

13. **Acer saccharinum** Wang. Sugar maple. *Aceraceæ*.

Yields maple sugar. According to Weschke this tree contains an alkaloid. (Contrib. Dept. Pharm., Univ. Wisconsin, 1886.)

14. **Achillea millefolium** L. Yarrow. Milfoil. *Compositæ*.

A well-known old-time medicinal herb, common everywhere. Yields oil. Has an extensive popular medicinal use among Indians and settlers. Tea is used in consumption, stomach-ache, headache; a lotion is used for sprains, etc. Enjoys an excellent reputation in the treatment of neuralgia, toothache, sore gums, and stomach troubles. (Contrib. U. S. Nat. Herb. 7: III, 391.)

15. **Achras sapota** L. Nase berry. Sapodilla. *Sapotaceæ*.

Native of West India, cultivated in southern California. Fruit edible. Seeds contain a glucoide (sapotin). Yields "chicle" a base for chewing gum. (Nat. Dist.)

16. **Achyrachaena mollis** Shauer. *Compositæ*.

Indians of California use the seeds for pinole (parched, ground and mixed with water). (Contrib. U. S. Nat. Herb. 7: III, 392.)

17. **Aconitum species**. Monk's-hood. *Ranunculaceæ*.

The native species are no doubt all poisonous and require further study chemically. (Calif. Geod. Survey. Bot. 1: 12.)

18. **Aconitum columbianum** Nutt. Aconite. Friar's cap. Blue-weed. Monk's-hood. *Ranunculaceæ*.

A native found in the Sierras and northern coast ranges, and along brooks of Oregon, Washington, California, Montana, Wyoming, Colorado, and South Dakota in moist, open woods. This is the most important of the native species. All parts of the plant are poisonous, seeds and roots most. The poisonous principle of this plant is, no doubt, closely related to that of **A. napellus** L. It requires further careful study. The roots have been mistaken for horseradish and the leaves for those of parsley. Many human beings and many heads of cattle have been poisoned by it. Treatment as for aconite poisoning.

19. **Aconitum fisheri** Reich'b. Aconite. *Ranunculaceæ*.

This European species is by some authorities believed to be identical with **A. columbianum**. This is a controversy of considerable importance. **A. fisheri** is said to be used as an adulterant of the official **A. napellus**.

20. **Aconitum napellus** L. Aconite. Wolf's-bane. Monk's-hood. *Ranunculaceæ*.

A well known, very important medicinal plant of which garden

varieties (English and German aconites) are grown throughout the State. Some have escaped from cultivation. Aconite for medicinal purposes is extensively grown in England and Germany. It could be very profitably grown in California. Good leaves are worth about fifteen to twenty cents per pound wholesale.

21. **Acorus calamus** L. Sweet flag. *Aroideæ*.

The dried rhizomes have been much used as a popular blood purifier and bitter aromatic tonic, and as a sialagogue. Used in flatulency, colic and typhoid conditions. Also used in beer making, in the preparation of hair powders, sachet powders, perfumery and in flavoring gin. Grows in marshy soils.

22. **Actæa eburnea** Rydb. *Ranunculaceæ*.

This plant is said to be poisonous and requires further study. Properties said to be similar to those of **cimicifuga**.

23. **Actæa spicata** L. Cohosh. European baneberry. *Ranunculaceæ*.

The black berries are poisonous; mixed with alum, they yield a black ink. Roots are antispasmodic and expectorant.

24. **Actæa spicata arguta** Torr. Baneberry. *Ranunculaceæ*.

Found in rich, rocky woodland soils. Highly esteemed as a medicine by the Indians. Acts as a purgative and in large doses as an emetic. The varieties **A. spicata alba** and **A. spicata rubra** have similar uses and properties. (F. Stearns, Proc. A. Ph. A., 1858.)

25. **Adenostoma fasciculatum** Torr. Chamisol Chamisso. Greasewood. *Rosaceæ*.

Given to sick cows by the Coahuilla Indians, according to Barrows. Oil extracted, mixed with lard and used in the treatment of skin affections. Tea from leaves and bark given internally for syphilis.

26. **Adenostoma sparsifolium** Torr. Yerba del pasmo. Convulsion herb. Bastard cedar. *Rosaceæ*.

Found in southern California. Used by early Spanish settlers as a remedy for numerous ailments, as colds, cramps, lockjaw, snake bite, and tetanus. The powdered twigs and leaves, fried in oil or grease, are used as an ointment. The twigs, steeped in a drink, are given to produce vomiting and to give bowel relief. (See paper by Barrows.) (Bailey's Cyclo. Am., Hort. 24.)

27. **Adiantum capillus-veneris** L. Venus's hair fern. *Polypodiaceæ* (Ferns).

A well-known fern. A syrup (Sirop de capillaire) of this plant is much used as a cough remedy. (Calif. Geol. Survey. Bot. 2:342.)

28. **Adiantum pedatum** L. Maiden hair fern. *Polypodiaceæ*.

Used in chronic catarrh and lung trouble. Stems used by Indians in basket and hat making. **A. nigrum** is similarly used.

29. **Æsculus californica** Nutt. California buckeye. Horse chestnut. *Sapindaceæ*.

A native ornamental tree of coast ranges of middle California. The bark is used to cure toothache and other aches. The fresh, unripe fruit is used by Indians to poison fish. The ripe fruit, raw or cooked, is eaten by Indians, fed to squirrels and given to horses to remove bots. Bark is said to produce abortion in cows. The mistletoe growing on this tree is also said to produce abortion. Requires further careful study as to chemistry of constituents and physiological action. (Contrib. U. S. Nat. Herb. 7 (No. III), 366.) (Calif. Geol. Survey, Bot. 1: 106.)

30. **Æsculus glabra** L. Ohio buckeye. *Sapindaceæ*.

A well-known tree, which is cultivated in many parts of the United States. Poisonous in over-doses, producing symptoms like those by corn cockle (**Agrostemma githago**). The fruit yields abundant starch. Roots and fruit used as a substitute for soap, due to the saponin present. Said to be useful in portal congestion.

31. **Æsculus hippocastanum** L. Horse chestnut. *Sapindaceæ*.

A well-known ornamental tree which is grown in nearly all parts of the United States. The bark and nuts are used as snuff and in the preparation of a wash for ulcers. In England the fruit is fed to cattle. (Am. Journ. Pharm., 44: 400.)

32. **Æsculus pavia** L. Red buckeye. *Sapindaceæ*.

A native of the eastern and southern United States, but can be cultivated almost anywhere. The active constituent of this plant is supposed to be nearly identical with that of the corn cockle. It is especially abundant in the young shoots and in the seed. Used to poison fish. It is also reputed to be a useful convulsant. (E. E. Batehlor. Am. Journ. Pharm., 45: 144.)

33. **Agaricus campestris** L. Toadstool. Mushroom. *Agaricaceæ* (Fungi).

Edible. At first refused by Indians until taught by whites. Reported to be poisonous.

34. **Agathis australis** Salisb. Kauri gum pine. Australian or New Zealand pine. *Dammara*. *Coniferæ*.

An ornamental tree, native of Australia and New Zealand, recently extensively introduced into California, where it does well. The gum (dammar resin) exudes from the roots in New Zealand and the old

gum is dug out of the ground. This gum is highly prized in the arts. On distillation it yields a terpene oil. A collodion-like preparation (Baumé Collodion) is made by dissolving an equal weight of the gum in 90 per cent alcohol. It is said to be very useful in the treatment of wounds, ulcers, eczema and other skin affections, forming an excellent substitute for collodion. (Proc. A. Ph. A., 31: 95, 1883.)

35. **Agave species.** Agaves. Century plants. *Amaryllidaceæ*.

Century plants in great variety and abundance are found in nearly all parts of the State of California, especially in the southern part, and nearer the coast. Thrive in sandy, dry soil.

36. **Agave americana** L. American agave. Aloe. *Amaryllidaceæ*.

Leaves are used medicinally. Yields pulque. The fiber is used in cordage making.

37. **Agave deserti** Engelm. Agave. Cactus. *Amaryllidaceæ*.

A small plant, native of southern California. Most highly valued by desert Indians, all parts of the plant being used. Fresh shoots or young plants are roasted and eaten, likewise the flowers. Nets, mats, etc., are woven out of the fiber. It yields pulque and "vino mescal." (D. P. Barrows, Land of Sunshine, 13: v. 314, 1900.) (Bailey, Cyclo. Am. Hort, 34.)

38. **Agave palmeri** Engelm. Amole. Mescal. *Amaryllidaceæ*.

Used as food, for the fiber, and in preparing mescal, the national drink of the native Mexicans. Rich in mucilage and grape sugar (citro-glucoside). Other species, as **A. parryi** and **A. shawii** are similarly used. (U. S. Geol. Survey, Wheeler's Report, Bot. 6: 52.)

39. **Agave utahensis** Engelm. Mescal. *Amaryllidaceæ*.

The fruit is baked in pits and eaten. (See Death Valley Report, by Coville.)

40. **Agave virginiana** L. Rattlesnake master. *Amaryllidaceæ*.

The roots, which are very bitter, are used in the treatment of colic, in the form of a tincture. Also as an antidote for snake bite.

41. **Aglaiia odorata** Lour. *Meliaceæ*.

A native of Cochin-China, cultivated in southern California. The flowers are very fragrant and employed in the manufacture of perfumery and sachet powders. In China the flowers are used to scent certain teas.

42. **Agrimonia gyrosepala** Wallr. Common agrimony. *Rosaceæ*.

This introduced species is closely related to the well-known medicinal **A. eupatoria** L., of which both the herb and root are used. An oil is distilled from it. A decoction of the flowers is useful as a gargle, and has some value as a vermifuge. It contains tannin.

The California species require further careful study as to medicinal properties.

43. **Agropyron repens** Beauv. Dog-grass. Couch grass. Quitch grass. *Gramineæ*.

This grass has escaped from cultivation and thrives well in all parts of the State. Has become a great agricultural pest in places. It is well known medicinally. The rhizomes and roots are used in irritable bladder, kidney diseases, gout, fevers, as a blood purifier, etc. Freely used in the form of a drink. The drug is cheap and the market uncertain. (U. S. Disp.)

44. **Agrostemma githago** L. Corn cockle. *Alsineæ*.

A very noxious European weed, introduced into the grain fields of the United States. Many cases of poisoning of human beings and of numerous heads of cattle have been traced to the flour made from wheat grown in cockle-infested fields and the fodder from such fields.

The physiological action and possible therapeutic value of this plant require further careful investigation. The active constituent is a freely soluble, non-crystallizable substance known as saponin, having a sharp burning taste; when inhaled in the smallest quantity it produces violent sneezing.

45. **Ailanthus glandulosa** Desf. Tree of heaven. *Simarubaceæ*.

A native of China, introduced and cultivated in various countries. Bark has cathartic properties due to an oleo-resin. Used as a vermifuge for dogs. Very disagreeable to take. **A. excelsa** resembles it closely and has similar properties. (Proc. A. Ph. A. 30:214, 1882.) (Proc. A. Ph. A. 25:181, 1877.)

46. **Alectoria fremontii** Tuck. Hair moss. Lichenes.

Used as food by Indians. Reported to have sedative properties. Used in hair tonics. The long, nearly black tufts resemble ladies' tresses. Has no medicinal value.

47. **Aleurites cordata** Müll. *Euphorbiaceæ*.

A native of southern China, cultivated in southern California. Said to yield the finest lac varnish.

48. **Aleurites moluccana** Willd. Candlenut tree. *Euphorbiaceæ*.

This tree is cultivated in southern California. It is a native of the Molucca Islands. The nuts are eaten and yield a valuable oil (the so-called "Kekune oil").

49. **Alliaria (Sissymbrium) officinalis** L. Hedge garlic. *Cruciferae*.

An introduced European plant. The herb and seeds are highly valued as a diuretic, diaphoretic and expectorant and for external

application in gangrenous affections and to promote the healing of cuts, bruises and ulcers. (U. S. Disp. 1557.)

50. **Allium bolanderi** Wats. Wild onion. *Liliaceæ*.

Bulbs used as food by Indians. Has diuretic properties. Decoction used for kidney troubles, and as an emmenagogue.

51. **Allium falcifolium** H. & A. Wild onion. *Liliaceæ*.

This species is especially valued as an article of diet by the Indians. Apparently not used medicinally, although it has marked diuretic properties.

52. **Allium unifolium** Kell. Wild onion. *Liliaceæ*.

Believed to be poisonous. The bulbs and leaves are fried and eaten by Indians.

Other species of wild onion found in the State are **A. breweri**, **A. lacunosum**, **A. serratum** and **A. attenuifolium**. All have the properties common to onions generally. Some are reported to be poisonous.

53. **Alnus** species. Alders. *Betulaceæ*.

Alders are common. The bark is used for tanning and dyeing, and the charcoal is usually employed in the manufacture of gunpowder. The bark, twigs and buds of **A. oregana** Nutt. (Oregon alder) are used as a tonic in tea, beer and other drinks. A bark ointment is used to cure eruptive skin diseases, cuts, sores, ulcers, etc. (Calif. Geol. Survey, Bot. 2:80.) (Kellogg Trans. Calif. Hort. Soc., page 163, 1865.)

54. **Alnus incana** Willd. Tag alder. Speckled or hoary alder. *Betulaceæ*.

Rich in tannin. Useful as a hæmostatic. Used in tanning.

55. **Alnus rhombifolia** Nutt. Mountain alder. *Betulaceæ*.

Bark very astringent and somewhat bitter and contains a peculiar dye-stuff. Indians use a decoction of the fresh or dried bark to induce perspiration, to check diarrhœa, to allay stomach-ache, to facilitate child-birth, to check hemorrhages in consumption, etc. Mixed with Indian tobacco, it is given to induce vomiting. (Contrib. U. S. Nat. Herb., 7: (No. III) 332.) (Calif. Geol. Survey, Bot. 2:80.)

56. **Aloe** species. Aloes. *Liliaceæ*.

Many species and varieties are cultivated as ornamental plants. They resemble the century plants (agaves), and thrive well in dry, sandy soil. Whether they could be grown profitably for the inspissated juice, which is used medicinally, would have to be determined experimentally. The dried juice is worth about 20 cents per pound.

57. **Aloe perryi** Baker. Socotrine aloes. *Liliaceæ*.

The inspissated juice of this plant constitutes the Socotrine aloes, which is a very useful laxative. No attempt has been made to grow it commercially in the State. **Aloe vera (vulgaris)** L. yields the Barbado aloes, which is also a very useful laxative.

58. **Athæa** species. Mallows. Hollyhoeks. *Malvaceæ*.

Native and introduced species occur in great profusion, some constituting very troublesome weeds. Much used as demulcents, as poultices, in the manufacture of lozenges, confections, etc., as a cough remedy, etc. **A. officinalis** L. and **A. rosea** L. are the two most important species. The roots of the former species are supposed to contain asparagin. (Proc. A. Ph. A., 30: 217, 1882.)

59. **Alyssum maritimum** L. Sweet alyssum. *Cruciferaæ*.

A fragrant ornamental plant used in sachet powders. Sparingly naturalized, frequently cultivated. A familiar old-time medicinal herb. Once used to cure hydrophobia, hiccough, etc.

60. **Amanita muscaria** Fr. Amanita. Fly Agaric. Toadstool. *Agaricaceæ*. (Fungi.)

The best-known of the poisonous fungi. Abundant in various localities of the United States. In Europe it has been used as a fly poison for hundreds of years. In Asia it has long been used as an intoxicant, producing symptoms not unlike those of Indian hemp.

This fungus contains several toxic compounds, the best known of which is muscarin. Many people are killed each year through the eating of toadstools. Cattle are poisoned accidentally. The symptoms of poisoning do not develop at once, usually twelve to fourteen hours elapse before the initial attack. There is no antidote, and treatment, which is entirely symptomatic, is, as a rule, of little avail. Transfusion of normal salt solution may be tried.

Since the eating of toadstools indicates a perverted taste, rather than otherwise, and since these plants have practically no food value, it is most urgently advised not to eat them under any circumstances; thus many a life may be saved.

61. **Amanita phalloides** Fr. Death cup. Poison amanita. *Agaricaceæ*. (Fungi.)

The most poisonous of all fungi found in California, parts of the Eastern and Middle States, and is said to be especially abundant in the vicinity of Washington, D. C. This is the fungus which caused the death of Count de Veehi, on November 10, 1897 (at Washington).

The active constituent phallin has been carefully investigated by Kobert. It resembles the white of egg (toxalbumen). Salt water

dissolves it readily. Boiling is said to decompose it, and to render it inert. It has the general toxic properties of muscarin.

62. **Amanita verna** Bul. Vernal amanita. *Agaricaceæ*.

Very poisonous. By some authorities believed to be identical with **A. muscaria**.

63. **Amaranthus species**. Pig weeds. Tumble weeds. *Amarantaceæ*.

These weeds are very abundant in certain localities. They are said to be useful in checking hemorrhages. **A. retroflexus** is cultivated by some Indian tribes for its food value, the seeds being most generally used. (Contrib. U. S. Nat. Herb, 7: (No. III) 346.) (Calif. Geol. Survey, Bot. 2: 41.)

64. **Amaranthus leucocarpus**. Wats. Pig weed. *Amarantaceæ*.

Used by Indians, medicinally and for food, as is also **A. powellii**. Wats. They have astringent properties. (Proc. A. Ph. A., 27: 153, 1879.)

65. **Ambrosia species**. Ragweeds. *Compositæ*.

These have enjoyed a popular medicinal use for ages. Used principally in the form of a wash for its astringent stimulating effects. Ragweeds are common along roadsides in nearly all parts of the United States.

66. **Ambrosia artemisiæfolia** L. Ragweed. Roman wormwood. Hogweed. *Compositæ*.

Has the properties of ragweeds generally. Contains a bitter glucoside (Am. Journ. Pharm., 1890.) It has been introduced into the Materia Medica of the Eclectics (see King's Dispensatory). Used principally in low fevers. It is also said to be a useful remedy in **Rhus** poisoning. (Proc. A. Ph. A., 28: 102, 1880.)

67. **Ambrosia psilostachys** D. C. Ragweed. *Compositæ*.

This plant has not been well investigated. It is generally believed to be inferior to the above species.

68. **Amelanchier alnifolia** Nutt. Service berry. *Pyraceæ*.

The berries, fresh or dried, are eaten by Indians. Perhaps contain amygdalin. The wood is used for making arrows; also for making the sticks with which Indians play the "rag game," resembling shinny-on-the-ice.

69. **Amomum (Elettaria) cardamomum** L. Cardomom. *Zingiberaceæ*.

A well-known spice and aromatic drug. The plant is said to thrive in southern California. Whether it could be grown profitably is not known.

70. **Ammobroma sonora** Torr. *Lennoaceæ*.

The fresh plants are dried in the sun or roasted and eaten by the Indians. Said to taste like sweet potatoes. (Calif. Geol. Survey, Bot. 1:464.)

71. **Ampelopsis quinquefolium** Michx. American ivy. Virginia creeper. *Vitaceæ*.

A very common cultivated arbor climber. Bark and twigs are used by the Eclectics as an alterative, tonic and expectorant. Also used in dropsy. Poisonous in large doses. (Proc. A. Ph. A., 25:187, 1877.)

72. **Amygdalus** varieties. Almonds. *Rosaceæ*.

Numerous varieties of the bitter and sweet almonds are grown in the State. Almond growing is a staple industry. A variety of uses made of the fruit. Numerous special reports on almond culture.

73. **Anagallis arvensis** L. Pimpernel. Poison chickweed. *Primulaceæ*.

A poisonous weed used by the ancients as a nervine in convulsions. Also used in hydrophobia, dropsy and consumption. Applied locally to sores and ulcers. Used in gout, and was at one time much employed as a plague remedy. It is said to contain a pepsin-like ferment. (U. of C. Agr. Exp. Rep., page 247, 1890.)

74. **Ananas (annanassa) sativa** Schultz. Pineapple. *Bromeliaceæ*.

Cultivated in southern California (Santa Monica). The fruit contains a digestive ferment, acting on albuminoids. Has been used to digest the membrane of diphtheria. There are numerous culture varieties. (See very complete paper on cultivation, etc., by P. H. Rolfs, No. 291.)

75. **Anaphalis margaritacea** B. and H. Everlasting. *Compositæ*.

A popular fragrant border plant. Eclectics use it as an astringent and expectorant. The leaves and flowers chewed and juice swallowed relieve ulceration of the mouth. A warm infusion used as a diaphoretic, in bowel complaints and hemorrhages. Used in fomentations to ulcers and swellings. The fresh juice is said to be aphrodisiac.

76. **Andromeda species**. Heathworts. *Ericaceæ*.

The group requires further study. Apparently a mixed genus. Several species have been used as a wash for ulcers. The shoots of **A. mariana** are said to be poisonous to sheep.

77. **Andropogon citratus**. Lemon grass. *Gramineæ*.

This grass has a very delicate lemon fragrance. Yields oil of lemon, useful in perfumery. Could no doubt be cultivated profitably for the manufacture of perfumery and sachet powders.

78. **Andropogon sorghum halepensis** Haeckel. Johnson grass. *Sorghum*. *Gramineæ*.

A common weed. A useful forage plant, rich in sugar.

79. **Anemiopsis californica** Hook. Yerba Mansa. *Saururaceæ*. *Piperaceæ*.

Considered to be a very useful remedy for cuts, bruises, sores and sprains. It is also said to be a useful diuretic, in rheumatism, as a blood purifier, in asthma, malaria, dysentery, gonorrhœa, etc. (U. S. Geog. Surv. Wheeler's Report, Bot. 6: 49.) (H. H. Rusby, Druggists' Circular, Jan., 1890.) (Schneider, A. Yerba mansa. Druggists' Circular, May, 1897.)

80. **Anemone globosa** Nutt. Red wine flower. *Ranunculaceæ*. Requires further study. Said to be poisonous.

81. **Anemone quinquefolia** L. Wind flower. *Ranunculaceæ*. Found in shady mountain woods. Perhaps identical with the European **A. nemerosa** L. Poisonous to cattle. Well known medicinally. (Am. Journ. of Pharm. 34: 300, 1862, and 45: 299, 1873.)

Other species of anemone are cultivated in the State.

82. **Angelica hendersoni**, C. and R., **A. tomentosa**, Wats, and the varieties **elata** and **californica**. *Umbelliferæ*.

These require further study. The Indians as well as whites use angelica root as a valued remedy and talisman. Chewed and rubbed on, the root is said to prevent as well as to cure rattlesnake bites. It is given in colic, catarrh and colds, for sore eyes, etc. The fresh sprouts are eaten.

83. **Angelica** sp. (?) *Umbelliferæ*.

An unknown species growing on the Sierra Gorda: has strongly aromatic roots and is said to be very useful medicinally. Young shoots are eaten. (Contrib. U. S. Nat. Herb. 7: (No. III) 371.)

84. **Anhalonium lewini** Henning. Cactus. Pellote. *Cactaceæ*.

Native of Mexico, said to be a powerful cardiac and respiratory stimulant, used in angina pectoris and asthmatic dyspnœa.

Several other species of **Anhalonium** have been used by Mexicans and Indians. The top of the branch of **A. lewini** constitutes the "mescal button" used by the Kiowa Indians of the Rio Grande to produce intoxication during some of their religious ceremonies. The cerebral manifestations due to this stimulant are extraordinary visual hallucinations, visions of infinite beauty, grandeur and loftiness, alternating with visions of monsters and other gruesome forms. There are also remarkable color hallucinations. The intoxication is not unlike that produced by Indian hemp.

As a remedial agent **Anhalonium** has also been tried in hypochondriasis, nervous headache, neuralgias, gout, hysteria, insomnia and other disorders. Various principles have been isolated, notably the alkaloids anhalonine; pellotine and an oily lophophorine. (Lewin in *Archiv. für Exp. Path. und Pharm.*) Other alkaloids have been isolated from other species (*Pharm. Journ. Trans.* 52, 1899.) (*Pharm. Journ. Trans.* 457. 1898.) (Mescal Button Religion. *Pacific Pharmacist.* 3:41-42, 1909.)

85. **Anona cherimolia** Mill. Cherimoya. Custard Apple. *Anonaceæ*.

A native of Peru. Quite extensively grown in southern California. Fruit is much relished and brings a good price in the open market. **A. macrocarpa**, another native of South America, is also cultivated in southern California. Fruit large and highly relished. **A. reniformis** and other varieties are also cultivated.

86. **Anona muricata** L. Sour sop. Custard Apple. *Anonaceæ*.

This plant is cultivated in portions of southern California. The large fruit is popular in the South. An acid drink is made from the juice. The seeds are said to be poisonous, and are used to poison fish; to exterminate lice and insect pests. The bark is drastic purgative.

87. **Antennaria parvifolia** Nutt. Cudweed.

Reported to be poisonous. Requires study.

88. **Anthemis cotula** L. Dog fennel. Mayweed. *Compositæ*.

A very common introduced weed with highly irritating properties. Used for colds, rheumatism, and in the preparation of an eye-wash. Has irritating properties when applied to the skin. An ointment used for rheumatoid affections is made by frying the flowers in lard. (*Contrib. U. S. Nat. Herb.* 7: (No. III) 392.)

89. **Anthoxanthium odoratum** L. Sweet Vernal-grass. *Gramineæ*.

Found in California near Mendocino City, Crescent City and in Marin County. Very fragrant, due to the presence of coumarin. Would prove of value in the manufacture of perfumes (sachet powders). Presence in meadows is said to impart the odor of this grass to other grasses and is supposed to flavor the butter. (*Calif. Geol. Surv. Bot.* 2:266.)

90. **Apium nodiflorum** Reich. Water parsnip. *Umbelliferae*.

This and other species are usually considered poisonous. Formerly used in skin diseases, scrofula, etc. Now rarely used.

91. **Aplopappus palmeri**. *Compositæ*.

The leaves and twigs are used by Coahuilla Indians to relieve swelling and pain. (Barrows.)

92. **Apocynum androsæmifolium** var. **pumilum** Gray. Dog bane. Indian hemp. *Apocynaceæ*.

Native of California. Properties similar to those of 93.

93. **Apocynum cannabinum** L. Canadian or Indian hemp. *Apocynaceæ*.

A common plant of which the bark fiber is much used by the Indians in weaving all manner of cordage and cloth fabrics. Native in California. More or less poisonous. Well known medicinally. (See Dispensatories.)

94. **Apocynum vestitum** Greene. Indian hemp. *Apocynaceæ*.

This plant is closely allied to **A. cannabinum** and has no doubt similar properties.

95. **Aquilegia vulgaris** L. Columbine. *Ranunculaceæ*.

A cultivated plant from Europe. The seeds contain an alkaloid (Aquilegine). The extract of the plant produces symptoms similar to those by aconite. Though not much used now, it was at one time considered diuretic and diaphoretic.

96. **Aquilegia truncata** F. and M. Columbine. *Ranunculaceæ*.

Quite common. Seeds perhaps contain an alkaloid like that of **A. vulgaris** (aquilegine).

The ripe seeds are taken internally in biliousness. Properties no doubt similar to those of **A. vulgaris** (diuretic and diaphoretic).

97. **Arachis hypogæa** L. Peanuts. *Leguminosæ*.

Extensively cultivated in the State. Yield oil and fat used for culinary and other purposes. Eaten roasted as food and used as a substitute for coffee. (Proc. A. Ph. A. (Abstract) 22: 151, 1874.)

98. **Aralia californica** Wats. Ginseng. California spikenard. *Araliaceæ*.

A decoction of the dried roots highly valued in diseases of the lungs and stomach, and for colds and fevers. **A. spinosa** as well as other species thrive in the State. (Calif. Geol. Surv. Bot. 1: 273.) (Contrib. U. S. Nat. Herb. 7: (No. III) 371.) (Am. Journ. Pharm. 489-492. 1898.)

99. **Aralia quinquefolia** Deene. (See **Panax quinquefolium**.) American Ginseng. *Araliaceæ*. (See paper by Geo. V. Nash, No. 253.)

100. **Aralia spinosa** L. *Papilionaceæ*.

Cultivated. Properties no doubt similar to those of **A. californica** Wats.

101. **Aragallus species**. *Papilionaceæ*.

These require further study, both as to active constituents and as to

physiological and toxic properties. Other species are found in the State. (**Aragallus** combined with **Astragalus** by Engler and Prantl in *Die Natürlichen Pflanzenfamilien*.)

102. **Aragallus** (*Astragalus*) **besseyi**. Ryd. Purple loco weed. *Papilionaceæ*. Poisonous. Fatal to cattle.

103. **Aragallus lagopus** Greene. Purple loco weed. *Papilionaceæ*. Poisonous.

104. **Aragallus lambertii** (Pursh) Greene. Colorado loco vetch. *Papilionaceæ*.

Wider range than that of the woolly loco weed (**Astragalus mollissimus**), but closely similar in all other respects.

105. **Aragallus spicatus** Ryd. White loco weed. *Papilionaceæ*. Poisonous.

106. **Aragallus splendens** Greene. Silvery loco weed. *Papilionaceæ*. Poisonous.

107. **Araucaria species**. Pines. *Coniferae*.

A number of *Araucaria* species have been introduced and thrive well. The so-called Norfolk pine or Norfolk island pine (**A. excelsa** R.) is a large, handsome tree. They have the constituents of pine generally. Turpentine is obtained from several species. They are familiar ornamental plants throughout the State.

108. **Arbutus menziesii** Pursh. Madrona. *Ericaceæ*.

Fruit said to be edible, though some claim it is poisonous. Grown at the Chico Station. Charcoal is used in making gunpowder. Bark for tanning. Cows will occasionally eat the leaves. The Indians use a leaf infusion for colds. (Contrib. U. S. Nat. Herb. 7: (No. III) 374.)

109. **Artium lappa** L. Burdock. *Compositæ*.

Well known medicinally. Seeds twenty-five cents per pound. Roots twenty-five or thirty cents per pound. Culture could no doubt be made profitable. Noxious weed when not checked.

110. **Arctostaphylos glauca** Lind. Manzanita. *Ericaceæ*. Native. Well known medicinally. Easily cultivated.

111. **Arctostaphylos manzanita** Parry. Manzanita. *Ericaceæ*.

Ripe fruit eaten, forming a very important article of diet among the California Indians. Tea of leaves much used for colds. Indians make "manzanita cider" from the crushed ripe fruit. Juice of plant is applied to sores and ulcers. The plant in its medicinal properties is closely similar to **A. glauca**.

112. **Arctostaphylos tomentosa** Dougl. Manzanita. *Ericaceæ*.

Less common than **A. manzanita**, but closely similar and similarly used.

113. **Arctostaphylos uva ursi** Spring. Bearberry. Mountain box. Rockberry. *Ericaceæ*.

Cultivated. Well known medicinally.

114. **Argemone mexicana** L. Prickly poppy. *Papaveraceæ*.

Common in cultivation. The plant has marked emetic, purgative and narcotic properties. Extensively used medicinally for all sorts of ailments, as a cathartic, etc.

115. **Aristolochia** and **Asarum species**. (See **Asarum**.) *Aristolochiaceæ*.

The species have long been known medicinally. The native species require further study. (Calif. Geol. Surv. Bot. 2:101.)

116. **Aristolochia serpentaria** L. and **A. reticulata** Nutt. Snake-root. *Serpentaria*. *Aristolochiaceæ*.

Not yet introduced, but would no doubt thrive well in moist, hilly woodlands.

117. **Armeria vulgaris** (*Statice Armeria*). Maiden pink. *Plumbaginaceæ*.

Said to be an active diuretic. Should be more carefully studied.

118. **Arnica species**. Arnica. *Compositæ*.

The California species require further study. The medicinal **A. montana** of Europe is reported from the northwestern United States. Is readily cultivated. Used in catarrh, nervous affections, dysentery, rheumatism, dropsy, gout, etc. The entire plant may be used; the flower heads are, however, preferred.

119. **Arnica fulgens**. Arnica. *Compositæ*.

Poisonous.

120. **Arnica monocephala**. Arnica. *Compositæ*.

Poisonous.

121. **Arnica montana** L. Arnica. *Compositæ*.

Well known. Flowers and roots and rhizomes used. Could be cultivated.

122. **Artabotrys odoratissima** R. *Anonaceæ*.

A native of India, cultivated in southern California. The flowers yield the famed volatile "ylang-ylang" oil of the Chinese.

123. **Artemisia species**. *Compositæ*.

Native and introduced species are common.

124. **Artemisia absinthium** L. Wormwood. *Compositæ*.

Common garden herb. Well known medicinally. Herb used. Fifteen to twenty cents per pound. Oil, \$4.50 per pound.

125. **Artemisia californica** Less. Old man. Sagebrush. Hill brush. *Compositæ*.

Leaves and branches have decided insecticide powers (H. H. Behr). Employed by the Mexicans as a popular cholera remedy. The Spanish-Californians regard it as a panacea for all ills. (Bot. Mex. Bound. Survey, Emory's Report, page 17, 1859.)

126. **Artemisia dracunculoides** Pursh. "Indian hair tonic." *Compositæ*.

The Indians use this plant as a hair tonic. It has not been examined as to its active properties. (Hall.)

127. **Artemisia frigida** Willd. Sierra salvia. Colorado mountain sage. *Compositæ*.

Much used in the Rocky Mountain region as a diuretic, diaphoretic and mild cathartic. It perhaps contains a glucoside. (F. A. Weiss, Am. Pharm. Journ. 1890.)

128. **Artemisia heterophylla** Nutt. Mugwort. Wormwood. *Compositæ*.

One of the most popular of native medicinal herbs. A decoction of leaves is said to be a specific in colic and colds. On account of its efficacy in bronchitis it has received the name of "bronchitis plant." Indians use a decoction for stomach-ache, headache, diarrhœa, rheumatism, and fevers. Decoction and poultices highly praised as a remedy for poison oak, also to check hemorrhages and to heal wounds. Externally it is used for sore eyes. The juice is used to counteract poison oak. (Contrib. U. S. Nat. Herb. 7: (No. III) 393.)

Other species as **A. bidentata**, **A. vulgaris californica** Beso., have similar properties and uses. (Le Maout and Decaisne, p. 505.)

129. **Artemisia tridentata** Nutt. Sagebrush. *Compositæ*.

Said to be poisonous. Used by the Coahilla Indians in bowel complaints. (Barrows.) A decoction of the leaves used as a cough medicine. Very likely has diaphoretic and diuretic properties. (Am. Journ. Phar. 62, 1890.) (U. S. D.)

130. **Arundinaria** and **Bambusa species**. Bamboo. *Gramineæ*.

Extensively cultivated as ornamental plants. (Fairchild.)

131. **Arundo donax** L. Giant reed. *Gramineæ*.

Extensively cultivated as an ornamental plant. Roots are said to be diuretic. (Bailey, Cycl. Am. Hort., p. 102.)

132. **Asagraea officinalis** Lind. Cevadilla.

Cultivated. Poisonous. Used almost wholly to destroy head-lice and other body vermin. (U. S. D.)

133. **Asarum caudatum** Lindl. Wild ginger. *Aristolochiaceæ*.

Highly aromatic and would no doubt prove very useful in the manufacture of perfumeries and sachet powders. Infusion said to be useful in female complaints. Two other species are reported, **A. hartwegi** and **A. lemmoni**. All require further study.

134. **Asclepias species**. Milkweeds.

These have the general properties of the *Asclepiadaceæ* and *Apocynaceæ*. The following species are native: **A. mexicana** Cov., **A. speciosa** Torr., **A. eriocarpa**, Benth., **A. vestita**, H. and A., **A. cordifolia**, Benth., and **A. californica** Greene. The Pacific coast species have caused the poisoning of many heads of cattle. The poisonous principles require further study. The sticky juice of **A. eriocarpa** and other species is considered an excellent lotion for cuts and sores; to kill warts, and is used in tattooing. The Yokis eat the young shoots of **A. mexicana**. Other medicinal species are to be found escaped from cultivation or grown in the Berkeley and other economic gardens. Indians make various uses of some of the milkweeds. The fiber is used for cordage. The milky juice is generally believed to be poisonous. **A. mexicana** has received considerable attention. **A. eriocarpa** is also poisonous and requires further study. (Contrib. U. S. Nat. Herb. 7: (No. III) 380); (Calif. Geol. Surv. Bot. 1: 474.)

135. **Asclepias californica** Greene. (**Gomphocarpus tomentosus**.) Milkweed. *Asclepiadaceæ*.

Said to be poisonous to cattle. Found in pastures. (U. of C. Agr. Exp. Sta. Rep., p. 248, 1890.)

136. **Asclepias cornuti** Desc. Milkweed. *Asclepiadaceæ*.

Well known medicinally. For commercial value of caoutchouc in **Asclepias cornuti** (see Proc. A. Ph. A. (Abstract) 23: 157, 1875).

137. **Asclepias eriocarpa** Benth. Milkweed. *Asclepiadaceæ*.

Claimed to be one of the best remedies for inflammatory rheumatism. The juice is also used as a healing application to cuts and wounds.

138. **Asclepias mexicana** Cav. Milkweed. *Asclepiadaceæ*.

Properties like those of **A. cornuti**. It is claimed that an insect resembling the Spanish fly, *Cantharis*, settles on this plant, and transmits to it vesicant and diuretic properties.

139. **Asclepias speciosa** Torr. Showy milkweed. *Asclepiadaceæ*.

Said to be poisonous. Used medicinally like other species. Cultivated as an ornamental plant.

Asclepias tuberosa L. and other species have been introduced.

140. **Asimina triloba** Dun. Common pawpaw. *Anonaceæ*.

Fruit edible, resembling the banana. Readily cultivated, ornamental. (Proe. A. Ph. A. (Abstract) 35:148, 1887.)

141. **Asparagus officinalis** L. Asparagus. *Liliaceæ*.

Eseaped from eultivation. Extensively eultivated in low lands. The rhizome is said to be laxative and diuretie and to aet as a heart sedative. Very likely of little or no medicinal value.

142. **Aspidium filix mas**. Swartz. Male fern. *Filices*.

Does not do well in eultivation. Root decoction is used for soreness and bruises. Well known medieinally. An old-time reliable vermifuge. (See Text-books and Dispensatories.)

143. **Aspidium (Dryopteris rigidum argutum**. Yerba del Golpo. *Filices*.

A decoction from the roots is used for the treatment of bruises and eontusions. Used as tænfuge (same as **Aspidium filix mas**). Poultiees made from mashed roots used externally for swellings, etc.

144. **Aster puniceus** L. Aster. *Compositæ*.

The rootlets of this ornamental plant are employed as a stimulating diaphoretie in rheumatic and catarrhal troubles. Numerous native and eultivated species found in the State.

145. **Astragalus species**. Loco weeds. *Papilionaceæ*.

Many, not all, species of Astragalus are poisonous. Aragallus and Astragalus species are much eonfused. The following are the more important poisonous species from the State: **A. hornii** Gray, **A. lentiginosus fremontii** Wats., **A. leucopsis** Torr., **A. menziesii** Gray, **A. matthewsii** Wats. Coahilla and other California Indians eat the seeds. (Barrows.)

146. **Astragalus blankinshipi** Nels. Purple loco weed. *Papilionaceæ*.

Poisonous. Requires further study.

147. **Astragalus drummondii** Dougl. *Papilionaceæ*.

This and other species are said to be poisonous.

148. **Astragalus lentiginosus**. Loco weed. *Papilionaceæ*.

Poisonous.

Requires further study. **Astragalus lentiginosus** (Douglas) var. **Fremontii**.

149. **Astragalus mollissimus** Torr. Wooly loco weed. *Papilionaceæ*.

Native of the great plain region of the United States. A highly poisonous weed which has done inestimable damage to ranchmen.

Between 1881 and 1885 the State of Colorado paid out nearly \$200,000 in bounties to eradicate the weed.

The poisonous principle has been studied, however, with unsatisfactory results. An acid (loco acid) has been isolated, to which the poisonous properties are attributed. Requires further careful study.

150. **Atriplex species.** *Chenopodiaceæ.*

Used as food and medicinally by Indians and Mexicans. They are rich in impure soda. (Palmer Proc. A. Ph. A. 27: 153, 1879.)

151. **Atriplex hortensis.** *Chenopodiaceæ.*

Very rich in sodium and other salts. Used as food and for medicinal purposes by Indians and settlers.

152. **Atropa belladonna** L. Deadly nightshade. *Solanaceæ.*

This plant thrives well in the United States, where it is grown as an ornamental plant, and experimentally and commercially in several places. The firm of Johnson and Johnson of New Brunswick, N. J., manufacturers of belladonna plasters, have grown belladonna experimentally for a number of years. The experiments are now being continued in California (Castro Valley, near Hayward, and elsewhere). (King's Dispensatory, 18th ed., p. 332.) Leaves and roots are used, which should not be collected from first-year plants. Collect from plants two or four years old, at the time of flowering. Price of roots and leaves per pound, about 12 cents wholesale. English belladonna is much more valuable than German belladonna. All parts of the plant are poisonous; used as a nerve sedative, diuretic, in catarrhs, in ophthalmology, in the manufacture of plasters and ointments.

Said to be a preventive and cure of scarlatina (homeopaths), checks secretions, dilates pupil (mydriatic), used in asthma, phthisis, to relax sphincter muscles, to relieve strangulated hernia, etc. (See, also, The Pharmaceutical Era, June 9, 1904, p. 556, Pacific Druggist, 1905, and Pacific Pharmacist, 1907.) For the comparative value of wild and cultured belladonna, see Proc. A. Ph. A. 30: 162. 1882.

153. **Aurantium dulcis** L. varieties. Oranges. *Aurantiaceæ.*

Extensively cultivated in the State. Other members of the family are cultivated in the State, to say nothing of the remarkable crosses between oranges and related fruits, as the tangelo, mandarin, pomelo, navel oranges, etc.

154. **Baccharis glutinosa** Pers. *Asteroidææ.*

A decoction of the leaves is used as an eyewash by the Coahilla Indians. (Barrows.)

155. **Balsamorhiza deltoidea** Nutt. Balsam root. *Compositæ*.

Seeds used as food (roasted and ground) by the Klamath Indians of Oregon; likewise the seeds of **B. digitata**.

The **Balsamorhiza** species (balsam roots) contain a terebinthine principle in the outer root parenchyma which the Indians remove before eating. This resin or turpentine requires further study.

156. **Balsamorhiza sagittata** Nutt. Wild sunflower. *Compositæ*.

Roots used medicinally by the Piute Indians. Petioles eaten. Fragrant. No doubt contain volatile oil like **B. terebinthacea**. Reported to be poisonous. (U. S. Disp.) Kelly, Drug. Circular (1897).

157. **Balsamorhiza terebinthaceæ** Nutt. *Compositæ*.

The root has a strong terebinthine odor and is used as a diuretic.

158. **Bamboo**. (See **Arundinaria**, 130.)

159. **Bananas**. (See **Musa**.)

160. **Berberis species**. Barberry. *Berberidaceæ*.

Three species occur, **B. dictyota**, **B. pinnata** (California barberry) and **B. nervosa** (Mahonia). These, no doubt, have properties not unlike those of **B. vulgaris**. (See J. M. Maiseh. The *Berberis* species of the Pacific coast. American Journal Pharmacy, 50:374-371, 1878, and Proc. A. Ph. A. 27:201-206, 1879.)

161. **Berberis aquifolium** Pursh. Oregon grape. *Berberidaceæ*.

Roots are used in treatment of ulcers and sores. The juice of the fruit fermented, with sugar added, makes an excellent wine. California Indians have long used the root decoction as a tonic. The bark is used medicinally. There is still considerable demand for this drug. (Calif. Geol. Surv., Bot. 1:14). (U. S. Surv., Wheeler's Rep. Bot. 6:41.)

162. **Berberis nervosa** Pursh. False Oregon grape. *Berberidaceæ*.

Berries are strongly acid, but are eaten and are said to promote the action of the liver. The bark and root are used in jaundice. **B. repens** has similar properties. (Calif. Geol. Surv. Bot. 1:15.) (Contrib. U. S. Nat. Herb. 7: (No. III) 348).

163. **Berberis pinnata** Lag. Barberry. *Berberidaceæ*.

Berries are edible. Stem and root contain a yellow die. Properties like those of **B. nervosa**.

164. **Beta vulgaris** L. Beet. Garden or red beet. Sugar beet. *Chenopodiaceæ*.

Escaped from gardens. Sugar beet culture is conducted on an enormous scale in California. (See paper by Geo. W. Shaw. Numerous state agricultural reports on sugar beet culture, etc.)

165. **Betula alba** L. European white birch. *Cupuliferæ*.

Cultivated. Leaves used in gout, dropsy, rheumatism. Saccharine

juice used in kidney and bladder complaints. Bark yields an oil, having the properties of oil of cade. The resinous exudation of young shoots, mixed with soda, is used as a tonic laxative. Inner bark used in intermittent fever. (Am. Journ. Pharm. 1881.)

166. **Betula lenta** L. Cherry. Sweet or black birch. *Cupuliferæ*. Cultivated. Ornamental. Used like **B. alba**.

167. **Bidens species**. Spanish needles. Beggars' sticks. *Compositæ*.

The California species require further study. The roots and seeds of **B. bipinnata** are popularly used as an emmenagogue and by the eclectics as an expectorant in laryngeal and bronchial diseases.

168. **Bigelovia groveolens** I. Gray. *Compositæ*.

The Coahilla Indians prepare a tea from the twigs given for coughs and pains in the chest. (Barrows.)

169. **Bigelovia veneta** (H. B. K.) Gray. Bushy goldenrod. "Yerba anti-rheumatica." *Compositæ*.

Resembles **B. menziesii**. Said to have aphrodisiac properties. Is used in the treatment of rheumatism. It contains a resinous exudation resembling that of **Grindelia robusta**. (U. S. Geog. Surv., Wheeler's Rep. 6: 46.) (U. of C. Exp: Sta. Rep. 1895, p. 96; 1896, pp. 64, 67, 70.)

170. **Blepharipappus douglasii**, H. and A. Greene. (**Layia calloglossa** Gray). *Compositæ*.

Decoction prepared with equal parts of milk and water, cooled and used as an application to sore and inflamed eyes.

171. **Blumea balsamifera**, D.C. **Blumea camphor**.

Introduced in southern California. Yields camphor by oxidation with nitric acid.

172. **Boisduvalia densiflora** Wats. *Onagraceæ*.

Seeds are rich in oil and are relished by Indians as a food.

173. **Boletus**. Pore fungi. *Boletaceæ*.

Eaten as food by Calpella Indians. Poisonous. (Contrib. U. S. Nat. Herb. 7: (No. III) 301.)

174. **Brodiaea lactea** Wats. *Liliacæ*.

Bulbs used by Indians as food. **B. capitata** used similarly by other Indians (Indian potato).

175. **Brunella vulgaris** L. Self-heal. Heal-all. *Labitæ*.

A cosmopolitan plant of European origin. Said to be useful as a gargle in throat diseases; useful in diarrhea and to check hemorrhages. It was highly prized among the common people of Europe.

176. **Bryonia alba** L. *Cucurbitaceæ*.

Introduced in gardens. Thrives well. Well known medicinally. (See text-books on *Materia Medica* and dispensatories.)

177. **Butneria occidentalis** Greene. Western spice bush. *Butneriaceæ*.

All parts very aromatic. Requires further study.

178. **Buxus sempervirens** L. Common box tree. *Euphorbiaceæ*.

An extensively cultivated evergreen shrub, native of Europe and western Asia. The wood is said to have diaphoretic properties, and a decoction is used in the treatment of rheumatism and secondary syphilis. The leaves are purgative. The volatile oil is given in epilepsy. (U. S. Disp.)

179. **Cactus species.** *Cactaceæ*.

There are several Mexican cacti which are said to be powerful heart stimulants. (**Anahalonium lewini**.) (See also **Opuntia** and **Cereus**.) (Baily, Cycl. Am. Hort. 203.)

180. **Coffea arabica** L. Coffee. *Rubiaceæ*.

Found in conservatories and thrives in southern portions of the State. Not cultivated commercially. Seeds contain caffeine.

181. **Calandrinia caulescens menziesii** Gray. Wild portulacca. *Portulaccaceæ*.

A fodder plant. Considered an excellent pot-herb, used for salads, etc.

182. **Calendula officinalis** L. Marigold. *Compositæ*.

Other species and varieties common in gardens. Well known medicinal plant. Used as a poultice in cancer, sores and ulcers; given in scrofula, jaundice, colic, etc. (U. S. Disp.)

183. **Callitriche palustris** L. Water fennel. Water starwort. *Callitrichaceæ*.

A decoction is given for dropsy and in urinary affections.

184. **Calochortus macrocarpus** Dougl. Mariposa lily. *Liliaceæ*.

The bulbs are greatly relished by Indians, eaten raw. All relish it, children especially. This is unquestionably the most highly-prized bulb known to Indians. Indians claim that the juice of **Calochortus concolor** Purdy is bad for the eyes (Hall). The bulbs of **Calochortus nuttallii** are also used as food by Indians. Resembles the Death Camas somewhat.

185. **Calumba.** (See **Jateorhiza**.)186. **Camassia esculenta** Lindl. Wild hyacinth. *Liliaceæ*.

A popular food of the Piute Indians; the bulbs are eaten. (Calif. Geol. Surv. Bot. 2: 158.)

187. **Camassia (Quamasia) leichtinii** Baker. Camas. *Liliaceæ*.

A very important Indian food plant. The bulbs are eaten raw and baked. The related **Quamasia quamash**, Death Camas, is very poisonous.

188. **Camelina sativa** L. False flax. *Cruciferæ*.

Introduced weed. At one time this plant was grown commercially for the oil in the seeds.

189. **Cananga (Unona, Uvaria, Canang) odorata** H. and T. Ylang-ylang. (See **Artabotrys**.)

190. **Cannabis sativa** L. Indian hemp. *Urticaceæ*.

Escaped from cultivation. The exact medicinal value of the California-grown plants requires further careful study. Extensively grown as a fiber plant in Butte County.

191. **Capsicum baccatum**. Bird pepper. *Solanaceæ*.

Easily grown. Supplies the bulk of the cayenne pepper of the market. The name bird pepper refers to the fact that turkeys are very fond of the fruit. Used as a stimulant tonic in atonic dyspepsia.

192. **Capsicum fastigiatum**. Red pepper. Cayenne or African pepper. *Solanaceæ*.

This is a common California product. Very extensively cultivated.

193. **Carica papaya**. Pawpaw. *Passifloraceæ*.

A common introduced plant. Grown as an ornamental plant, and for the fruit in southern California. The fruit contains a ferment papain, which acts on starch, emulsifies fat and converts albuminoids into peptones. Of great commercial interest.

194. **Carica quercifolia**. Pawpaw. *Passifloraceæ*.

Leaves contain high percentage of papain, which is much used as a substitute for pepsin. For fermentative action of juice, see Proc. A. Ph. A. 27: 231. 1879.

195. **Carob**. (See **Ceratonia**.)

196. **Carthamus tinctorius** L. American, false or dyer's saffron. *Compositæ*.

Native of India and Africa. Cultivated in various parts of the United States. Used for dyeing purposes and as an adulterant of, or as a substitute for, true or Spanish saffron, as a domestic diaphoretic, and laxative in measles, scarlatina, and in other eruptive diseases.

197. **Carum gairdneri** Gray. Wild caraway. *Umbelliferæ*.

Poisonous. Used by Indians. (Palmer.) (Proc. A. Ph. A. 27: 193, 1879.)

198. **Carya (Hicoria) species.** Hickory. *Juglandaceæ*.

To this group belongs the pecan and the various hickories. No systematic attempts have as yet been made to introduce these into the State. Bark and leaves astringent, used in dyspepsia and intermittent fever. Leaves of **C. porcina** and of other species used medicinally as a laxative and for external application in skin diseases. The bark used in dyeing brown, yellow and green.

199. **Cascara.** (See **Rhamnus**.)

200. **Casimiroa edulis** L. White zapote. *Rutaceæ*.

Introduced in southern part of State. Used as a hypnotic in Mexican hospitals. The seeds are used.

201. **Cassia acutifolia** Del. African Senna. *Leguminosæ*.

According to H. H. Fisher (*in lit.*), senna has been grown successfully near Corpus Christi, Texas, for several years. Seeds obtained from Mr. Fisher have been planted in the San Francisco Garden of Medicinal Plants; they germinated promptly, but the seedlings were killed by root rot. Attempts to grow it at Salinas, California, met with partial success only. It apparently grows exceedingly well near Mecca, California (Mr. and Miss Evelyth). Would no doubt thrive in the California cotton belts. Requires hot weather, with ample soil moisture. Further culture attempts should be made.

202. **Cassia marylandica** L. American senna. *Leguminosæ*.

This plant is common in the gardens and parks of California. Used as a cathartic like senna.

203. **Castanea chrysophylla** Dougl. Chestnut. Chinquapin. *Cupuliferæ*.

Varies in size from a shrub to a large tree, 150 feet high. Seeds edible. The fruit is good, but is now largely displaced by the Japanese chestnuts. (Contrib. U. S. Nat. Herb. 7: (No. III) 333.)

204. **Catalpa catalpa** Karst. Cigar tree. Bean tree. *Catalpa*. *Bignoniaceæ*.

Introduced as ornamental trees. The seeds, pods, and leaves have been found useful in asthma.

205. **Caucalis microcarpa** Hook et Arn. Hedge parsley. *Umbelliferæ*.

A poultice of this plant is used to counteract rattlesnake bites. (Calif. Geol. Surv. 1: 272.) (U. of C. Agr. Exp. Sta. Rep., p. 244, 1890.)

206. **Caulalia nodosa** Huds. *Umbelliferæ*.

This is also known as a rattlesnake remedy. The species require

further study as to their reputed properties. Probably identical with **C. microcarpa**.

207. **Ceanothus americanus** L. New Jersey tea. *Rhamnaceæ*.

Cultivated. Roots rich in tannin. Leaves used as a substitute for tea.

208. **Ceanothus cuneatus** Nutt. Lilac. *Rhamnaceæ*.

Native plant, which should be more carefully studied.

209. **Ceanothus divaricatus** Nutt. Soap bush. *Rhamnaceæ*.

The blossoms are used as a substitute for soap. (Calif. Geol. Surv. Bot. 2: 439.)

210. **Ceanothus integerrimus** H. and A. Lilac. *Rhamnaceæ*.

Seeds eaten by Indians. Bark and roots of this shrub used in malaria, catarrh, and liver troubles. Good forage plant. Fruiting capsule very bitter and should be studied more carefully as to possible medicinal properties.

211. **Ceanothus velutinus** Dougl. Mountain balm. Snow brush. White lilac. Manzanita. *Rhamnaceæ*.

The old Indians boil the leaves, dry them and smoke them like tobacco. Also employed medicinally, but no definite information could be obtained as to how; perhaps it was used as a tonic. The Indians appear to be quite enthusiastic about it, and pronounce it "very good medicine." Very likely used much like **C. americanus**, which owes its properties to the presence of tannic acid and an alkaloid ceanothine. (U. S. D.)

212. **Centaurea solstitialis** L. St. Barnaby's thistle. Yellow star thistle. *Compositæ*.

The mature plant is said to be poisonous to horses and cattle. Becoming a very troublesome weed. Cut green, it is said to make good fodder. Introduced from Europe. Requires further study.

213. **Cephalanthus accidentalis** L. Button willow. *Rubiaceæ*.

A tincture made of the bark has been found useful, as a tonic, as a laxative and as a remedy for fevers and coughs.

214. **Cerasus demissa** Nutt. Choke cherry. (*Amygdalaceæ*.) *Rosaceæ*.

Fruits eaten fresh or dried. Green as well as nearly ripe fruit is very astringent. Inner bark gathered in large quantities for medicinal use. Said to be useful as a tonic, to check diarrhoea and to relieve nervousness. The fresh berries are ground (crushed) up entire in a stone mortar and pestle. The dried fruit pulp is boiled and eaten. A decoction of the young shoots and bark is taken, apparently as a

beverage (coffee). Root is used medicinally. (Contrib. U. S. Nat. Herb. 7: (No. III) 356.)

215. **Cerasus emarginata** Dougl. (*Amygdalacæa*.) *Rosacæa*.

Used much like **C. demissa**. Fruit quite bitter and somewhat astringent. Perhaps used because of the medicinal effects due hydrocyanic acid; perhaps tonic.

216. **Cerasus occidentalis** Torr. Red bud. Judas tree. *Rosacæa*.

Bark used as a substitute for quinine. Requires further study. (Contrib. U. S. Nat. Herb. 7: (No. II) 356.)

217. **Ceratonia siliqua** L. St. John's Bread. Carob. *Leguminosæa*.

Quite extensively grown in the southern part of the State.

This tree was known to the ancients and the fruit was eaten, which is rich in sugar and has laxative properties. Seeds are very hard and are rejected. Cultivated in various warmer countries, and the pods are often used as fodder for horses.

The fruit is used in a patented remedy of California sold under the name of "Carob." It is tonic and laxative.

218. **Cercis occidentalis** Torr. Common Red bud. *Leguminosæa*.

Bark was used by old settlers as a substitute for quinine in the treatment of malarial fevers.

219. **Cercocarpus betulæfolius** Hook. *Rosacæa*.

Shrub, 2/15 feet high. Valued as fuel. Reported to have medicinal properties.

220. **Cereus (Cactus) grandiflorus** L. Night blooming cereus. *Cactacæa*.

This plant does well in the State when carefully cultivated. A very valuable heart tonic with the properties of digitalis. Poisonous. Culture well worthy a trial. Common as an ornamental plant.

221. **Chamæcyparis (Cupressus) lawsoniana** Parl. Oregon cedar. Ginger pine. *Coniferæa*.

Wood of excellent quality, very fragrant, credited with antiseptic and other properties, said to be especially useful in diseases of the lungs.

222. **Chenopodium species**. Pigweeds. *Chenopodiaceæa*. These weeds very common.

The following species are the most important: **C. ambrosioides** (Mexican tea), **C. anthelminticum** (Wormseed), and **C. californicum** (Soap plant.) Most of them are used medicinally, principally the seeds, as a vermifuge. Seeds are rich in oil. (See Proc. A. Ph. A. (Abstract) 27:152, 1879.)

223. **Chenopodium album** L. Pigweed. *Chenopodiaceæ*.

Leaves used as greens. Indians use old leaves to relieve stomach-ache.

224. **Chenopodium botrys** L. Jerusalem Oak. *Chenopodiaceæ*.

Is frequently cultivated for medicinal purposes. Other species are **C. murale**, **C. rubrum** and **C. vulvaria**. There are no doubt additional unidentified species. The Indians use the leaves as food and the seeds and other plant parts medicinally.

225. **Chenopodium californicum** Wats. Soap plant. *Chenopodiaceæ*.

Roots formerly much used as a substitute for soap. Still so used to some extent.

226. **Chimaphila menziesii** Spreng. Pipsissiwa. Prince's pine. *Ericaceæ*.

The leaves are highly valued as a tonic, astringent, and as a remedy for cataract. Other species are **C. corymbosa** Pursh. and **C. maculata** Pursh. No doubt the leaves of these species have medicinal value.

227. **Chlorogalum angustifolium** Kell. Soaproot. *Liliaceæ*.

Found in the San Joaquin Valley and upper Sacramento. Requires further study.

228. **Chlorogalum pomeridianum** Kunth. Soaproot. Soap plant. *Liliaceæ*.

Very common in California. Has received considerable attention. Used by California Indians and Spaniards for cleansing purposes. Rich in saponin. Poisonous; used by Indians to stupefy fish.

Young shoots eaten by nearly all Indians. Dried juice of bulbs used as a glue for fastening feathers to arrows. Roasted and powdered bulbs are used as an antiseptic application for ulcers and sores. A decoction of bulb is said to be useful as a diuretic and laxative, etc. (Contrib. U. S. Nat. Herb. 7: (No. III) 319.)

229. "Chucklusa."

An Indian name applied to several species of **Peucedanum**, used medicinally and as food. (Am. Journ. Pharm., 1890.)

230. **Cichorium intybus** L. Chicory. *Compositæ*.

This plant has been cultivated very successfully in California in the San Joaquin Valley. Well known. The dried roasted roots are used as a surrogate for coffee.

231. **Cicuta species**. Water hemlocks. *Umbelliferae*.

Most of the species are believed to be poisonous, and it is known that many are highly poisonous. It is stated that drinking water in which the poisonous species grow will cause symptoms of poisoning.

For cattle poisoning, melted lard is much used as a popular remedy. For references to chemistry, etc., see U. S. Disp.

232. **Cicuta bolanderi** Wats. Large water hemlock. *Umbelliferae*. Found only near San Francisco Bay. Requires further study. Poisonous.

233. **Cicuta douglasii**. Purple-stemmed water hemlock. *Umbelliferae*.

Very poisonous. Western Range, Oregon, Idaho, and Washington.

234. **Cicuta maculata** L. American water hemlock. *Umbelliferae*. A very poisonous plant, native of the United States, found in swampy lands, having a parsnip-like odor. Possible medicinal uses not investigated. Eastern in range. (Calif. Geol. Surv. Bot. 1: 260.)

235. **Cicuta occidentalis** Green. Wyoming water hemlock. *Umbelliferae*.

Poisonous. Used by Indians for suicidal purposes. The root is dug up and eaten. Piutes seem to have suicidal tendencies. Poisonous to cattle. Requires further study.

236. **Cicuta vagans** Greene. Oregon water hemlock. *Umbelliferae*. A western plant found in northern California, Idaho, and British Columbia. Poisonous properties like those of **Conium**. Requires further study.

237. **Cicuta virosa californica** C. and R. California water hemlock. *Umbelliferae*.

Near San Francisco Bay. Very poisonous. Requires further study as to identity as well as constituents. Well known in Europe. Eastern range in United States.

The active principle of the cicutas is not well known. It appears to be a compound, which has been named cicutoxin by R. Böhm. It is a resinous, non-crystallizable body, acid in reaction and very bitter, readily soluble in water. It is not an alkaloid, but a toxin, resembling andromedotoxin.

238. **Cinchona species**. Cinchonas. *Rubiaceae*.

Cinchonas have been grown in the Berkeley gardens, and the alkaloidal constituency thereof examined. It has been suggested that the climate of the mountainous regions of northern California would be well suited for cinchona cultivation, but it is very doubtful whether they would thrive, on account of the low winter temperature. (See paper by Happersberger.)

The conditions (atmospheric moisture, drainage, temperature, rainfall) in many localities of southern California, particularly near the

coast slopes, would seem suitable for cinchona culture, especially the hardy **C. officinalis**. (U. S. Disp., pp. 388-418.) (Bailey, Cycl. Am. Hort., 316.) (Univ. Calif. Coll. Agr. Rep., pp. 74-75, 1879; pp. 103-105, 1883.)

James MacPherson, who has resided at the plateau of the Nilgiri Mountains in India, states that the list of plants in the Report of the Park Commissioners of Golden Gate Park is closely similar to that of the Nilgiri Plateau.

For reference to literature and abstracts of papers on the history, uses and cultivation of Cinchonas, see volumes of Proceedings of the American Pharmaceutical Association, especially the earlier numbers ranging from the first number up to 1880 and later. Each volume will have several references to the subject.

239. **Cinnamomum camphora** Nees. Camphor tree. *Laurineæ*.

Has escaped from cultivation and thrives well throughout the State. Of slow growth. No practical attempts at cultivation and camphor production on a large scale have thus far been made in the United States. There seems to be no good reason why California, Florida and other warm states should not supply camphor. The California tree is evidently as rich in camphor as that of China and Japan, as is shown from recent tests made at the California College of Pharmacy by E. M. Kimberlin. Whether camphor production could be made profitable in California has not yet been determined. Carefully planned tests and experiments would be very desirable to determine this.

240. **Cinnamomum zeylanicum** Nees. Ceylon cinnamon. *Laurineæ*.

Cultivated in southern part of the State. Other species are also cultivated. No commercial use made of the bark. Handsome trees.

241. **Cirsium (Cnicus) arvensis** Scop. Canada thistle. *Compositæ*.

This plant is said to contain an alkaloid and have emetic, tonic and diaphoretic properties. Root astringent, and has been used medicinally. An introduced plant. (H. J. Pierce. Am. Journ. Pharm. 58: 1896.)

242. **Cistus species**. Rock rose. Labdanum. *Cistaceæ*. (See, also, **Labdanum**.)

Evergreen shrubs extensively cultivated. Contain a resinous substance (labdanum) which is of considerable commercial value in the Orient. It is an expectorant tonic, formerly much used in catarrh and dysentery. Now used only in plasters. (**C. labdaniferus** L. and other species.) (Am. Journ. Pharm. 47: 499. 1875.) (Proc. A. Ph. A. 27: 224. 1879.)

243. **Citrullus colocynthis** Schrad. Colocynth. Bitter apple. *Cucurbitaceæ*.

Has been grown in Mexico and promises to do well in this State. A laxative. Poisonous. Well known medicinally. (U. S. Disp.)

244. **Citrus limonum** L. and varieties. Lemon. *Aurantiaceæ*.

Extensively cultivated in southern portions of the State. Related fruits, as the grape fruit, lime, with their numerous culture varieties and artificial crosses, are cultivated in the State. (See publications by Le Long.) (Bailey, Cycl. Am. Hort. 322.)

245. **Claviceps purpurea** Tul. Ergot. Fungi.

This fungus occurs on rye and other cereals. On the western plains it is found on the following grasses: **Elymus species**, **Agropyron species**, **Koeleria cristata** (Prairie June grass), **Phalaris arundinaceæ** (reed canary grass), more commonly on **Elymus condensatus** (wild rye grass) and **Agropyron spicatum** (bluejoint grass). On these hosts it is the cause of poisoning cattle. General medicinal uses known to Indians. A very useful hæmostatic. (Contrib. U. S. Nat. Herb. 7: (No. III) 299.) (U. S. Disp. 511.)

246. **Clematis lasiantha** Nutt. Pipe-stem. Large-flowered clematis. *Ranunculaceæ*.

Quite common. Requires study. Perhaps has properties like those of **C. erecta**, **C. flammula**, **C. vitalba** and **C. virginiana**, which have been used medicinally in the treatment of cancer, ulcers, syphilitic eruptions, the itch, etc. Some species are much cultivated as ornamental plants.

247. **Clematis ligustifolia** Nutt. *Ranunculaceæ*.

Stem and leaves are chewed to cure colds. Another common California species known as hill clematis.

248. **Clintonia andrewsiana** Torr. Purple clintonia. *Liliaceæ*.

Considered a valuable diuretic, mild tonic and demulcent. (Kellogg, Trans. State Agr. Soc., p. 148.)

249. **Cnicus (Carduus) benedictus** L. Blessed thistle. *Compositæ*.

Introduced in the University gardens at Berkeley, but threatened to spread as a noxious weed and was promptly exterminated. Leaves worth about twenty-five cents per pound. Seeds and herb used in medicine.

250. **Cocos species**. Coco nuts. *Palmeæ*.

The cocoa nut palms thrive in southern California. Many species and varieties are being introduced.

251. **Cocos nucifera** L. Coco nut palm. *Palmae*.

Cultivated in warmer parts of the State. Promises to be a commercial success.

252. **Colchicum autumnale** L. Colchicum. Meadow saffron. *Convallariaceæ*.

A well-known, poisonous medicinal plant, native of southern Europe, Switzerland, and Turkey. Extensively cultivated in Europe. Requires rich, moist soil, in the open. Easy of cultivation. The corms (tubers) are used, having decided diuretic, laxative and alterative properties; much used in rheumatism and gout. Poisonous. Value, thirty-five cents per pound. Seeds are also used.

The corms are collected the second year, after seeds are ripe, washed, sliced, and dried in the sun. Seeds are collected when fully ripened. The present market is supplied from England and Germany.

253. **Coleosanthus californicus** Kuntze. Brickellia. *Compositæ*.

Leaves used as a substitute for tea. (Contrib. U. S. Nat. Herb. 7: (No. III) 393.)

254. **Collinsia bicolor** Benth. Innocence. Collinsia. *Scrophulariaceæ*.

Poultice of the leaves used for insect bites. A plant common throughout western California.

255. **Collomia gracilis** Dougl. *Polemoniaceæ*.

The seeds soaked in water give a highly mucilaginous, cooling drink, known by the Mexicans as "Chia." (See paper by E. Palmer.)

256. **Colutea arborescens** L. Bladder senna. *Papilionaceæ*.

Cultivated as an ornamental shrub. The leaflets are purgative and used as a substitute for senna.

257. **Compositæ**.

The following members of the family, besides many others having medicinal properties, are common:

Arnica discoidea Benth. Coast Arnica.

Arnica latifolia Bang. Arnica.

Cichorium intybus L. Chicory. Introduced.

Gnaphalium species.

Helianthus annuus L. Common sunflower.

Lactuca scariola L. Prickly lettuce.

Sonchus oleraceus L. Sow thistle.

Senecio vulgaris L. Common groundsel.

Solidago species. Golden rod.

Xanthium canadense Mill. Cocklebur.

258. "**Conchatana.**"

A medicine made from the roots of some plant used at Bodega. Requires further investigation.

259. **Conium maculatum** L. Poison hemlock. *Apiaceæ*. (*Umbelliferaæ*.)

A well-known poison plant, native of Europe and Asia, but common in United States. Escaped from cultivation. Leaves and seeds used, twenty cents per pound. Easily cultivated. (B. Hutehins, **Conium maculatum**, wild parsnip. Calif. College Pharm. 1902. Thesis.)

260. **Concallaria majalis** L. Lily of the Valley. *Convallariaceæ*.

A well-known plant, cultivated extensively as an ornamental plant. The rhizomes and roots are heart tonic and diuretic. Used medicinally in dropsy, heart disease, weak heart, etc. Properties much like those of digitalis. Poisonous. Cultivation easy, simple, and would no doubt be fairly profitable on a large scale. Price per pound, sixteen to twenty cents. For uses and physiological action see Proe. A. Ph. A. (Abstract) **31**:101, 102, 1883, and text-books on Materia Medica and dispensaries.

261. **Convolvulus arvensis** L. Common bindweed. European bindweed. *Convolvulaceæ*.

A very common troublesome weed. A tincture is made from the entire plant.

262. **Cornus florida** L. Dogwood. *Cornaceæ*.

Introduced ornamental plant. Cultivated as an ornamental tree throughout the State. Bark well known medicinally. Used in intermittent fevers, as an astringent tonic, etc. (U. S. Disp.)

263. **Cornus pubescens** Nutt. Red willow. *Cornaceæ*.

Eaten raw and dried for winter use. No medicinal uses appear to be made of this plant.

264. **Cotyledon californicum** Trelease. Hen-and-chickens. *Crassulaceæ*.

Indians use the leaves in making a soothing poultice. The young leaves of **C. edulis**, **C. lanceolata** and **C. pulverulenta** are eaten by the Indians.

265. **Coptis species**. Golden thread. *Ranunculaceæ*.

The native species require further study. The roots are bitter and used as a tonic and as a local application in aphthous ulcerations of the mouth. The Japanese **C. anemonifolia** S. and Z. is highly valued as a medicine.

266. **Crateagus oxyacantha** Gert. European Hawthorn. *Rosaceæ*.

Introduced; very common as an ornamental plant. Leaves, bark, flower and fruit have been used medicinally, principally as a cardiac tonic. (G. M. Beringer. *Am. Journ. Pharm.* **76**: 283-284, 1904.)

The native **Crateagus rivularis** Nutt. (Thorn tree) is said to be poisonous (thorns of the stem). Fruit sometimes eaten by Indians.

267. **Crocus sativus** L. Saffron. *Iridaceæ*.

I am not aware that this plant is actually grown, but it would certainly thrive well in the State. Stigmas used as a coloring agent by baker and confectioner. Well known medicinally. Cultivated in Pennsylvania and New York.

268. **Crotalaria sagittalis** L. Rattlebox. *Papilionaceæ*.

South, central and eastern United States. Not definitely reported from California. Poisonous plant which requires further study.

269. **Croton californicum** Müll. *Euphorbiaceæ*.

A bitter tea is made from the leaves and used for rheumatism, and as a salve (powdered leaves and tallow). Purgative.

270. **Croton tiglium** L. Croton oil plant. *Euphorbiaceæ*.

This and other foreign species and varieties grow very readily in the southern part of the State and some of them are very common as ornamental plants. Well-known medicinally. Poisonous.

271. **Cruciferæ**. Mustard family.

The mustard family is well represented in the State. Many members occur as very troublesome weeds. Many species are naturalized, and others are native. Their medicinal, popular and household use is familiar to all. The following are the more important species: (Calif. Geol. Surv. Bot. **1**: 25.)

Sisymbrium officinale Scop. Hedge mustard.

Sisymbrium pinnatum Walt. Tansy mustard.

Cakile americana Nutt. Sea rocket.

Brassica campestris L. Common yellow mustard.

Brassica arvensis L. Charlock.

Brassica nigra L. Black mustard.

Brassica alba Boiss. White mustard.

Raphanus sativus L. Wild radish.

Raphanus raphanistrum L. Jointed Charlock.

Arabis virginica Trelease. Cress.

Arabis glabra Beruh. Tower mustard.

Arabis blepharophylla H. and A. Cress.

Arabis breweri Wats. Brewer rock cress.

Barbarea vulgaris R. Br. Winter cress.

Nasturtium officinale R. Br. Water cress.

Nasturtium curvisiliqua Nutt. Western yellow cress.

Nasturtium palustre D.C. Mush yellow cress.

Cardamine oligosperma Nutt. Bitter cress.

Capsella bursa-pastoris Moench. Shepherds purse.

Capsella procumbens Fries.

Camelina sativa Crantz. False flax. Seeds rich in oil.

Alyssum calycinum L. Small alyssum.

Alyssum maritimum L. Sweet alyssum.

Lepidium medium Greene. Tall pepper grass.

Lepidium nitidum Nutt. Common pepper grass.

272. **Cucurbita foetidissima** H. B. K. Chili coyote. Gourd.
Cucurbitaceæ.

Leaves and the large roots are used for washing, but must be thoroughly rinsed, because they are very irritating to the skin. Leaves are highly valued medicinally. The pulp of the green fruit is mixed with soap, and applied to sores and ulcers. Seeds are ground and eaten.

273. **Cucurbita perennis** Gray. Chili coyote. Mock orange. *Cucurbitaceæ.*

Pulp of green fruit used as a substitute for soap. Macerated root used as a remedy for piles, and the seeds are eaten by the Indians. The roots are crushed by the Coahuila Indians, mixed with sugar and applied to the saddle sores of horses. (Barrows.) (U. S. Geog. Surv., Wheeler's Rep. Bot. 6:44.) (Calif. Geol. Surv. Bot. 1:239.) Also used by Mexicans in tanning.

274. **Cymopteris acaulis** Rydb. *Umbelliferaæ.*

This and several other species are used. Some species are perhaps poisonous. Roots said to be eaten by Indians.

275. **Cymopteris fendleri** Gray. *Umbelliferaæ.*

Resembles **C. anisatum** and, like that plant, emits a strong anise-like odor when boiled. The decoction used with whisky is used as a warm stomachic bitters. Also used as a kitchen confection in dressing, etc. It has carminative and tonic properties. Roots of most species eaten by Indians. (U. S. Geog. Surv., Wheeler's Rep. Bot. 6:44.)

276. **Cynoglossum grande** Dougl. Coyote. Dog ear. *Boraginaceæ.*

Cooked roots are eaten. Indians use grated roots to apply to scales and burns and to relieve stomachache. (Contrib. U. S. Nat. Herb. 7: (No. III) 282.)

277. **Cypripedium hirsutum** Mill. Larger yellow lady's slipper. *Orchidaceæ*.

Found in Maine, Minnesota, Alabama, Arkansas, and sparingly in Colorado. Can no doubt be introduced into California.

278. **Cypripedium montanum**. Lady's slipper. *Orchidaceæ*.

Not very plentiful and requires study. Another species, **C. californicum**, is found in Mendocino County.

279. **Cypripedium parviflorum** Salisb. *Orchidaceæ*.

Range much as preceding, but extending farther north and west, to the State of Washington. Can no doubt be cultivated in certain areas of California.

280. **Cypripedium reginæ** Walt. Showy lady's slipper. *Orchidaceæ*.

In swamps of Georgia, Missouri, and Minnesota. Can no doubt be introduced into the boggy swamp lands of California.

The poisonous nature of the above orchids was not suspected until about 1875, when Prof. H. H. Babcock called attention to symptoms produced not unlike those caused by poison ivy (**Rhus radicans**). In 1894 Prof. D. T. MacDougal of the Tucson Experimental Station investigated these plants more carefully and reached the conclusion that the active principle (oil) occurred in the glandular trichomes of the leaves and stems. The action and exact chemical nature of this substance requires further study. (D. T. MacDougal. On the poisonous influence of **Cypripedium spectabile** and **C. pubescens**. Minnesota Bot. Studies, Bul. 9, Jan., 1894.)

281. **Cytisus laburnum** L. (**Laburnum vulgare** Presl.) *Papilionaceæ*.

Cultivated in California. Poisonous. Has been used in asthma, whooping-cough, dyspepsia, headache, etc.

282. **Cytisus scoparius** L. Broom. *Papilionaceæ*.

Very common as an ornamental plant throughout the State. A decoction is used as a diuretic and cathartic, in cardiac affections and in dropsy. In large doses it is poisonous and emetic. Said to be useful as a supporter of the heart's action during chloroform and ether anæsthesia.

A very common ornamental shrub throughout the State. Well known medicinally. Numerous other species of cytisus are introduced. (U. S. Disp.)

283. **Dalea species**. *Leguminosæ*.

The California species are limited to the southeastern desert regions. They are used as food and medicinally by the Indians.

284. **Dalea emoryi** G. *Leguminosæ*.

This appears to be the most popular species among the Indians. (Proc. A. Ph. A. **27**: 258, 1879.)

285. **Daphne mezereum** L. Mezereon. Olive spurge. *Thymelacææ*.

Cultivated as an ornamental plant. Well known medicinally. A decoction of the bark is popularly used as a diuretic.

286. **Datisca glomerata** Hook. Durango root. *Datistacææ*.

Used by Indians to stupefy fish. Leaves and roots intensely bitter; used as a bitter tonic. Should be more carefully studied.

287. **Datura meteloides** D. C. Jamestown weed. *Solanacææ*.

The Coahilla Indians have used this noxious weed as a substitute for tobacco; also mixed with drinks and in the form of a poultice. According to Hall, an intoxicating drink is made from the crushed fruits. General medicinal properties similar to **D. stramonium**. Should be more carefully investigated. (Calif. Geol. Surv., Bot. **1**: 544.) (Barrows, Land of Sunshine, No. 13, p. 322, Nov., 1900.) (Hilgard, U. of C. Agr. Exp. Stat. Reports, p. 284, 1890.) (U. S. Dept. Agr. Off. Exp. Sta. Bul. No. 15, p. 369.) (Proc. A. Ph. A., **27**: 158, 1879.)

288. **Datura stramonium** L. Thorn apple. Jamestown weed. Jimson weed. Stink apple. *Solanacææ*.

Is becoming gradually introduced from the East. A rank weed in waste places. Well known medicinally. Very easily grown. The leaves and seeds are used medicinally. (U. S. Disp.)

289. **Datura tatula** L. Jimson weed. *Solanacææ*.

Common in the State. Closely related to **D. stramonium**. Contains atropine and hyoscyamine. The seeds are very poisonous. Should be more fully investigated.

290. **Daucus carota** L. Wild carrot. *Umbelliferææ*.

The seeds act as a mild, stimulating diuretic, used in dropsy and chronic nephritis. Contains peetin, vegetable jelly, etc. (U. S. Disp.)

291. **Daucus pusillus** Michx. Rattlesnake weed. *Umbelliferææ*.

Used by the Spaniards as an antidote for snake bite. (Calif. Geol. Surv. Bot. **2**: 452. Contrib. U. S. Nat. Herb. **7**: No. 3, p. 372.)

292. **Delphinium species**. Larkspur. *Ranunculacææ*.

Numerous species occur in the State, and all are more or less poisonous. Many are cultivated as ornamental plants. This group of plants causes very serious losses to ranchmen through the poisoning of cattle on the grazing ranges.

The symptoms of poisoning by the larkspurs are similar to those of aconite, and the treatment is the same as for aconite poisoning.

293. **Delphinium bicolor** Nutt. Purple larkspur. *Ranunculaceæ*.
Poisonous. Cultivated. Properties simliar to those of **D. consolida**.

294. **Delphinium californicum** T. and G. Coast larkspur. *Ranunculaceæ*.

Not very common. Poisonous.

295. **Delphinium consolida** L. Larkspur. *Ranunculaceæ*.

A common poison weed of Europe; introduced everywhere. Well known medicinally. Seeds used to destroy lice and other vermin. (U. S. Disp. and texts on materia medica.)

296. **Delphinium decorum** F. and M. Larkspur. *Ranunculaceæ*.

Reported to be poisonous. This species and **D. scopulorum** require further investigation as to poisonous properties.

297. **Delphinium geyeri** Greene. Larkspur. *Ranunculaceæ*.

Common on the ranches of Colorado and Wyoming. Fresh leaves are very poisonous. Requires further study.

298. **Delphinium glaucum**. Tall larkspur. *Ranunculaceæ*.

Poisonous to cattle. Requires further study.

299. **Delphinium hesperium** Gray. Western larkspur. Rattlesnake flower. *Ranunculaceæ*.

Poisonous to cattle. (Contrib. U. S. Nat. Herb. 7: (No. 3) 347.)

300. **Delphinium menziesii** D.C. Purple larkspur. *Ranunculaceæ*.

Common in California. Many heads of sheep have been poisoned by this plant.

301. **Delphinium nudicaule** T. and G. Red larkspur. Sleep root. *Ranunculaceæ*.

Is reported to have narcotic and soporific properties. Should be more carefully studied. (Contrib. U. S. Nat. Herb. 7: (No. 3) 347.)

302. **Delphinium recurvatum** Greene. Larkspur. *Ranunculaceæ*.

Very poisonous. Requires further study.

303. **Delphinium staphisagria** L. Stavesacre. *Ranunculaceæ*.

A common poison weed from Europe, well known medicinally. May be grown anywhere. Seeds used externally (infusion) to destroy lice and other vermin. (U. S. Disp.)

304. **Delphinium tricornе** Michx. Dwarf larkspur. *Ranunculaceæ*.

Eastern and southern in range, but is grown in California. The active constituents of this plant require further study. Fresh leaves are very poisonous.

305. **Delphinium trolliifolium** Gray. Larkspur. *Ranunculaceæ*.
Occurs from California northward into Oregon and British Columbia. Requires further study.

306. **Delphinium variegatum** T. and G. Sacramento larkspur. *Ranunculaceæ*.
Poisonous.

307. **Dicentra chrysantha** H. and A. Dutchman's breeches. *Fumariaceæ*.

Grows on high, dry ridges. Requires further study as to active constituents. Perhaps contains an alkaloid like that of **D. canadensis**. (W. T. Wenzell, Am. Journ. Pharm. 205, 1855.)

308. **Dicentra formosa** D.C. Dutchman's breeches. Bleeding heart. *Fumariaceæ*.

Found in shady woods. Said to be tonic, diuretic and alterative. Extensively used by the eclectics.

309. **Digitalis purpurea** L. Foxglove. Digitalis. *Scrophulariaceæ*.

An European plant, introduced everywhere; has escaped from cultivation and occurs spontaneously in several places along the entire Pacific coast as far north as Vancouver Island. Extensively grown in California. According to chemical analyses, the American article is fully as active as the European (English). Easy of cultivation. Thrives best in rather sandy, fairly rich, loose soil. Should be attempted on a large scale (several acres or more). Plant in rows and cultivate not unlike sugar-beet or potatoes. Full grown, bright green leaves of the second year's growth only are collected, at the time of flowering. Spread leaves thinly and dry quickly, carefully and uniformly. When dry, keep in tightly-closed, dry packages in dry place. Should be marketed promptly, as the drug deteriorates rather quickly (one year and less). A very useful drug, heart tonic, poisonous. Market value per pound, for good material, about forty cents.

310. **Dioscorea species**. Yam root. *Dioscoreaceæ*.

Most species are cultivated. Edible, tuberous roots, very rich in starch. The eclectics use the roots of **D. villosa** in bilious colic and the negroes of the southern states use them in the treatment of rheumatism.

311. **Diospyros virginiana** L. Persimmon. *Styracææ*.

Cultivated in the southern portions of the State. The unripe fruit is very astringent, rich in tannin, used in diarrhœa, dysentery, uterine hemorrhage. The bark is also very astringent and similarly used.

312. **Diplacus glutinosus** Wendl. Glutinous monkey flower. *Scrophulariaceæ*.

313. **Distichlis spicata** Greene. Salt grass. *Liliaceæ*.

Used in indigestion. Requires careful study as to its reputed properties.

314. **Drosera rotundifolia** L. Sundew. *Droseraceæ*.

Introduced, found in conservatories and other places. This species, as well as **D. longifolia** L. and varieties, are said to be useful in phthisis. Well known medicinally, though no longer officinal. Applied in the form of poultices to corns, bunions and warts. Used in Italy to make a liquor called "rossoli." (Proc. A. Ph. A. 27: 225-227, 1879.)

315. **Dryopteris felix-mas** (L.) Schott and **D. marginale** (L.) Gray. Male ferns. *Filicineæ*.

These important drug plants, of which the rhizomes and stipes yield the oleoresin (male fern oil) which is the most reliable remedy to expel tapeworm. May readily be grown in moist shady places. Whether they can be grown profitably remains to be determined. The grower should also market and manufacture the oil, which is worth thirty-five cents per ounce retail. The rhizomes are worth about twenty-five cents per pound.

316. **Duboisia species.** *Solanaceæ*.

These plants are readily grown, and some of them should be more carefully investigated as to chemical constituency and medicinal properties. **D. myoporoides** is well known; contains duboisine, an alkaloid identical with hyoscyamine.

317. **Duboisia myoporoides** R. *Solanaceæ*.

Grown in experimental gardens. Properties like those of belladonna and stramonium. Poisonous. (See 316.)

318. **Echinacea angustifolia** D.C. Niggerhead. *Compositæ*.

Said to be an antidote for rattlesnake bite, for blood poisoning, etc. Highly spoken of by such authority as J. U. Lloyd. Used as a cancer remedy and blood purifier. (Am. Journ. Pharm., 15-20, 1904.)

This species is closely related to **E. purpureum**, known as black Sampson. Both species are well worthy of more careful study as regards their several reputed properties. Much used by the eclectics.

319. **Echinocactus cylindrica.** Niggerhead. Hedgehog thistle. *Cactaceæ*.

The young shoots and seeds are eaten. Juicy, rich in water.

320. **Echinocactus polycephalus** E. and B. Devil's pincushion. *Cactacea*.

Seeds used as food by the Indians. Spines are used for needles.

321. **Echinocystis (Micrampelis, Megarrhiza) fabacea** Naud. Wild cucumber. Big root. *Cucurbitacea*.

Common in sandy soil. An oil expressed from the roasted leaves has been used to promote the growth of hair. Roots rich in starch and contain an aerid principle having purgative properties similar to those of jalap.

322. **Echinocystis marah** Cogn. Bitter root. Big root. Man root. Chili cajote. *Cucurbitacea*.

Closely related to **E. fabacea**. The enormous, tuberous roots, weighing from thirty to one hundred pounds, contain starch and an aerid poison having drastic purgative properties. The seeds and roots are used as a popular medicine in the treatment of rheumatism and venereal diseases. Used in the manufacture of a California "bitters." The medicinal properties of this plant are well worthy of more careful study. The abundant root starch could no doubt be used commercially. The stems and leaves are said to be inert.

323. **Elastica**. India rubber. From various plants.

Many rubber-yielding plants thrive in California, some of which could no doubt be grown profitably. Attempts are being made to secure seeds and living plants of **Parthenium argentatum**, the Mexican rubber plant, which is very rich in rubber. (Pacific Druggist, March, 1905, p. 14.) Rubber is also obtained from several species of milkweed. Rubber plant culture in the State of California is well worthy of careful consideration.

324. **Elymus species**. Rye grass. *Gramineæ*.

Used by the Indians as a mechanical counter-irritant in the treatment of granulated eyelid. The leaf is broken off and held by both hands, is drawn, apex forward, over the granulated lid. This also acts as a cleansing agent. Action purely mechanical, due to the spicules of silica of the marginal epidermal cells.

325. **Ephedra antispyhilitica** Wats. Mountain rush. *Gnetacea*.

This plant is not reported from the State. A decoction of the stems is much used in the treatment of gonorrhea. The plant evidently contains a tannin-like glucosid, ephedrin. It requires careful study. (U. S. Geol. Surv., Wheeler's Rep. Bot. 6: 50, 611.)

326. **Ephedra californica** Wats. *Gnetacea*.

Decoctions (tea) of stems used by Indians and Spaniards as a tonic and blood purifier and in venereal diseases. (Calif. Geol. Surv. Bot. 2: 108.)

327. **Ephedra nevadensis** Wats. *Gnetaceæ*.

Much used in Arizona as a remedy in the treatment of gonorrhea. The Coahilla Indians prepare a cooling drink from the dried twigs and leaves. The seeds are sometimes roasted and eaten.

328. **Ephedra trifurca** Torr. Canutilla. *Gnetaceæ*.

A native of Arizona, which, according to Dr. W. C. Eidenmüller of San Francisco, is an excellent remedy in the treatment of Bright's disease.

The exact botanical relationship of the above species of **Ephedra** should be very carefully determined, and the reputed properties of these plants should be very carefully investigated. Their extended, and evidently successful use in the treatment of gonorrhea would indicate that there may be present constituents other than tannin.

329. **Epilobium franciscanum** Barbey. Willow herb. *Onagraceæ*.

A decoction of the whole herb highly praised in inflammatory conditions of the alimentary canal.

330. **Equisetum arvense** L. Scouring rush. Field horsetail. *Equisetaceæ*.

Reported to be poisonous. Used medicinally, has astringent and stimulating properties. Used as a diuretic.

331. **Equisetum hyemale** L. Scouring rush. *Equisetaceæ*.

An infusion of the entire plant used as a diuretic in dropsical and renal diseases. (Am. Journ. Pharm., 419, 1886.) (Proc. A. Ph. A. 35:104, 1887.)

Equisetum variegatum Schl. is used for scouring purposes by settlers, and to smooth down arrows and other woodwork by Indians. Used by Indians and settlers as a stimulating diuretic in renal and dropsical disorders.

332. **Eremocarpus (Croton) setigerus** Benth. Turkey mullein. *Euphorbiaceæ*.

California Indians use the heavily-scented foliage of this plant to stupefy fish, hence it is sometimes called fish loco weed. Also used as an arrow poison. Turkeys are very fond of the seeds. Indians also used the bruised leaves as a counter-irritant applied to the chest to relieve internal pain. A decoction of the plant or leaves put in warm water is used as a wash in typhoid and other fevers. Much used as a poultice. Taste is very acrid. Poisonous. (Contrib. U. S. Nat. Herb. 7: (No. 3) 363.) (Proc. A. Ph. A. 30:250, 1882.)

333. **Ergot**. (See **Claviceps purpurea**.)334. **Erigeron species**. Fleabanes. *Compositæ*.

E. canadensis, **E. philadelphicus**, **E. glaucus**, **E. miser**, **E. angustatus** and other species are common in the State.

335. **Erigeron canadense** L. Fleabane. Horse weed. *Compositæ*.

A very common weed which is, however, quite readily exterminated. Familiarly known as having medicinal properties. Used as a tonic, diuretic and astringent in diarrhœa and dropsical complaints. The oil of fleabane is said to be very useful in uterine, pulmonary and other internal hemorrhages; also in the treatment of gonorrhœa. (U. S. Disp.)

336. **Eriodictyon californicum** Greene. Yerba santa. California balm. Mountain balm. *Hydrophyllaceæ*.

A native of California. One of the most popular medicinal plants of the State. Indians and settlers consider the leaves a specific for colds, asthma, and grippe. It is highly valued as a blood purifier, as a cure for consumption, bronchitis, catarrh, and rheumatism. The leaves are smoked and chewed like tobacco and made into a tea. The entire plant is cut, dried, and the leaves removed by flailing. The leaves are worth about thirty cents per pound.

Eriodictyon tomentosum Benth. A native of southern California. Has properties and uses similar to those of **E. californicum**. Less popularly known.

337. **Eriogonum fasciculatum** Benth. Wild buckwheat. *Polygonaceæ*.

The Coahilla Indians make a strong, black tea from the leaves, which is given for pain in the stomach and for headache. A tea made from the flowers is used as an eye-wash. Also said to be useful in bronchitis, grippe, and hoarseness.

338. **Eriogonum flavum** Nutt. *Polygonaceæ*.

Said to be poisonous. Occasionally cultivated as an ornamental plant.

339. **Eriogonum heracleioides** Nutt. *Polygonaceæ*.

Said to be poisonous. This and other species require further study.

340. **Eriogonum latifolium** Smith. Sour grass. *Polygonaceæ*.

Decoction of stem, leaves, and roots used for pain in the stomach, for headache and for female complaints. A root decoction is used for sore eyes. (Contrib. U. S. Nat. Herb. 7: (No. 3) 345.)

341. **Eriogonum nudum** Dougl. Blood root. *Polygonaceæ*.

Said to be useful in lung diseases and as a blood purifier.

Eriogonum virgatum Benth (wild buckwheat) is used by making a syrup from the entire plant; given in bronchial coughs.

342. **Erodium cicutarium** L. Red stemmed filaree. *Geraniaceæ*.

A very common weed. Said to be useful in dropsy. (W. A. Smith,

Am. Journ. Med. Sci., 1865.) Other species are **E. macrophyllum**, **E. botrys**, and **E. moschatum**.

343. **Eryngium aquaticum** L. Button snakeroot. *Umbelliferae*.

The root is bitter, pungently aromatic, used as a sialagogue, diaphoretic, and expectorant. Has been used as a substitute for senega. In large doses, emetic. The native species require further study.

344. **Erythræa douglasii** Gray. Canehalagua. *Gentianaceæ*.

Used in the treatment of malaria and as a blood purifier.

345. **Erythræa muhlenbergii** Griseb. Canehalagua. *Gentianaceæ*.

This and **Erythræa leucantha** Griseb. enjoy an excellent reputation among the Indians and settlers as a febrifuge and anodyne. Old settlers call it "opium plant."

346. **Erythræa trichantha** Griseb. Ague weed. *Gentianaceæ*.

Said to be a valuable remedy in the treatment of malaria.

347. **Erythræa venusta** Gray. Canehalagua. California centaury. *Gentianaceæ*.

Very extensively employed as a fever remedy, as a bitter tonic, anti-malarial, and is said to be antiseptic. General properties like those of gentian.

A species of *Erythræa*, mentioned by Dr. Kellogg, was reported to be a pleasant, bitter tonic, useful in malaria. Its medicinal properties are said to be entirely lost in the dry plant. (Proc. Calif. Acad. 1: 63, July, 1855.)

348. **Erythronium giganteum** Lindl. Dogtooth violet. *Liliaceæ*.

The Indians eat the roots and also crush them and apply them to boils and ulcers.

349. **Erythroxyton coca** Lam. Coea. *Erythroxyllaceæ*.

Apparently no attempts have been made to introduce this plant into California. It thrives in the Andes at an elevation of two thousand to five thousand feet. Would no doubt survive in the warmer portions of the State. It is worthy of a trial.

350. **Eschscholtzia californica** Cham. California poppy. *Papaveraceæ*.

This is the best known flowering herb of the State, and is found everywhere in great profusion and showing considerable variation in the coloration of the flowers. Has received considerable attention on the part of chemists and therapists. It is said to be a soporific and analgesic similar in action to opium, without any of the objectionable features of the latter drug. Flowers put in oil and placed in the sun, used as an application to cleanse the hair and scalp and as a hair tonic.

The species occurs in a great variety of forms, by some systematists given the rank of species.

Eschscholtzia douglasii is probably a form of the species. It is much used by Indians in the treatment of headache, as an emetic, to check the secretion of milk, to relieve stomach-ache, toothache, and as a poultice to ulcers and sores.

351. **Eucalyptus species.** Blue gum. Red gum, etc. *Myrtacea*.

Some one hundred or more species, varieties and forms of the genus eucalyptus have been introduced into the State, and all thrive well. **E. globulus** is perhaps the most common. The oil is manufactured and is used in the treatment of congestive headache, given in doses of five minims. Eucalyptol is much used as an antiseptic, in the treatment of malaria, as an ingredient of cough drops and other cough remedies, as a stimulating antiseptic in tooth powders and pastes, in the treatment of malaria, etc.

There is a voluminous literature on the botany, range, distribution, uses and products of the various species and varieties. There are several very important English monographs, and much of the work done by English investigators is recorded in the Pharmaceutical Journal and Translations, which should be consulted.

While the oil is manufactured in California, the industry is as yet not carried on on a large scale. A "boiler compound" is manufactured as a by-product of the oil by one firm.

352. **Eugenia michelii** Lam. Cayenne or Surinam cherry. Allspice. *Myrtaceæ*.

Cultivated in the southern portions of the State. Berries edible, with a spicy, aromatic flavor. Much esteemed for jellies. The bark and leaves of several species are used medicinally. (U. S. Disp.) **E. jambosa**, **E. pimento** (allspice) and other species are cultivated in the warmer portions of the State.

353. **Eulophus bolanderi** C. and R. *Umbelliferae*.

Indians collect the roots in large quantities and eat them raw or cooked. A staple article of diet, equal in importance to the bulbs of **Calochartus** (Mariposa lily). Taste not unlike that of the chestnut.

354. **Eupatorium bolanderi** D.C. *Compositæ*.

The Apache Indians are said to use this plant as a substitute for tobacco. It has narcotic properties. Smoking it produces nervous tremors (U. S. Geol. Surv., Wheeler's Rep. Bot., p. 45.)

355. **Eupatorium wrightii** Gray. Boneset. *Compositæ*.

This species requires study. Perhaps similar in properties to **E. perfoliatum**, **E. purpureum**, **E. teucrifolium** and **E. feniculaceum**.

356. **Euphorbia species.** Spurge. *Euphorbiaceæ*.

Introduced and native species are common. Some are poisonous and some of the native species are used as food. They have diaphoretic and emetic properties.

357. **Euphorbia albomarginata** T. and G. *Euphorbiaceæ*.

This species, as well as **E. ocellata** and **E. serpyllifolia**, are used as rattlesnake-bite remedies.

358. **Euphorbia corollata** L. Large flowering spurge. *Euphorbiaceæ*.

Well known medicinally. Can be grown anywhere in sandy soil. Diaphoretic, expectorant and cathartic. Emetic in large doses.

359. **Euphorbia glyptosperma** Engl. Spurge. *Euphorbiaceæ*.

Poisonous. Requires study.

360. **Euphorbia ipecacuanha** L. Ipecac spurge. *Euphorbiaceæ*.

Well known medicinally. May be grown anywhere in the United States. (U. S. Disp.)

361. **Euphorbia lathyris** L. Caper spurge. *Euphorbiaceæ*.

A common plant of California, found in gardens and fields. Milky juice poisonous. Seeds very poisonous. Diaphoretic, purgative, emetic. (Proc. A. Ph. A. 30: 250, 1882.)

362. **Euphorbia marginata** Pursh. Snow-on-the-mountain. *Euphorbiaceæ*.

Native of the western plains, a common weed. The nectar of the flowers is poisonous and the honey made from the flowers is poisonous, detected by the hot, acrid taste. The milky juice produces skin eruptions not unlike those by Rhus poisoning. Requires further study.

363. **Euphorbia ocellata** D. and H. *Euphorbiaceæ*.

Used as a remedy for snake bite. (University correspondence, Dept. of Botany, Univ. Calif.)

364. **Eurotia lanata** Moq. Winter sage. *Chenopodiaceæ*.

Said to be useful in intermittent fever. (Calif. Geol. Surv. Bot. 2: 56.)

365. **Evernia vulpina** Ach. Wolf's moss. Yellow moss. Lichenes.

Used by Indians to dry up sores and to relieve rheumatism. Also used for dyeing purposes and as packing material. A typical western lichen. No longer considered of any value medicinally.

366. **Exogonium purga** Benth. (*Ipomœa jalapa* Nutt). Jalap. *Convolvulaceæ*.

Well-known purgative. Can be cultivated in portions of the State.

367. **Fabiana imbricata** R. et P. Pichi. *Solanaceæ*.

A South American shrub cultivated in southern California. It is a terebinthine diuretic; it also has tonic and cholagogue properties; used in the treatment of acute and chronic nasal catarrh, in jaundice, in dyspepsia and to increase the secretion of bile. It has been employed in gonorrhea and gonorrheal prostatitis. (U. S. Disp.) (Bailey, Cycl. Am. Hort., 570.) (Proc. A. Ph. A. **37**: 1889.) (Proc. A. Ph. A. **34**: 394-397, 1886.) (Am. Journ. Pharm., p. 65, 1889.)

368. **Ficus carica** L. Fig. *Urticaceæ*.

Fig culture is a most important industry in California. Numerous culture farms or varieties are grown. **F. elastica** Roxb. and **F. indica** L. are also cultivated.

The fig is a popular fruit, has mildly laxative properties. Dried figs are often chopped up with senna leaves and taken as a laxative. (See reports of State Horticultural Society and of the College of Agriculture, Univ. Calif.) (Cycl. Am. Hort., 582-588.)

369. **Filago californica** Nut. and **Filago gallica** L. *Compositæ*.

Decoction of whole plant used for fever and ague.

370. **Fragaria species**. Strawberry. *Rosaceæ*.

Strawberry culture is conducted on a large scale in certain areas of the State. The native species are **F. californica** C. and S. and **F. chilensis** Duch. The herb and fruit (false fruit) are old-time gout remedies. The fruit has refrigerant properties. Strawberries produce symptoms of poisoning in certain susceptible individuals.

371. **Frankenia grandifolia** C. and S. Salt grass. Yerba reuma. *Frankeniaceæ*.

A native herb rich in salts and tannin, employed in catarrhal troubles, also applied externally and used as a gargle in sore throat. (Am. Journ. Pharm., 23-25, 1899.)

372. **Frasera albicaulis** Dougl. *Gentianaceæ*.

This plant is poisonous. Requires further study as regards its medicinal properties.

Frasera speciosa Dougl. (showy fraseria) is said to be poisonous. Other species occur in the State. The medicinal fraseras grow in the State; easy of cultivation.

373. **Fraxinus americana** L. and **F. ornus** L. Ash.

Cultivated. The bark of **F. americana** is used. **F. ornus** and other species yield the official gummy exudation. Manna has mildly laxative properties, with other laxatives as an adjuvant and to disguise. There are many false mannas found upon the market, obtained from other plants.

374. **Fraxinus oregana** Nutt. Oregon ash. *Oleaceæ*.

Indians apply the fresh mashed roots to wounds, especially to wounds received in bear hunts. (Contrib. U. S. Nat. Herb. 7: (No. 3) 378.)

375. **Fremontia californica** Torr. California slippery elm. Mountain leatherwood. *Sterculiaceæ*.

Abundant in the southern Sierra. Bark has demulcent properties; used in poultices, etc. (U. S. Geog. Surv., Wheeler's Report, Bot. 6: 41.)

376. **Fritillaria lanceolata** Pursh. *Liliaceæ*.

Cultivated as ornamental plants. The bulbs are eaten. Other species occur in the State. They require further study. Apparently of food value only.

377. **Fritillaria pudica** Sprengel. *Liliaceæ*.

Bulbs were formerly eaten by Indians, but now only in time of scarcity of food.

378. **Fucus species**. Bladder wracks. *Algæ*.

Demulcent properties in common with other seaweed. Also used as food by Indians. The dried stipes of several species of *Laminaria* were formerly much used as uterine tents.

379. **Fumaria officinalis** L. Fumitory. *Fumariaceæ*.

A common European cultivated plant. Extensive popular medicinal use. Laxative and tonic; increases secretion of bile. Leaves used in scorbutic affections and in eruptive diseases. (U. S. Disp.)

380. **Galega officinalis** L. Goat's rue. *Leguminosæ*.

A native of southern Europe, readily cultivated. Was at one time extensively employed in malignant fevers, the plague, for snake bite, worms, etc. Now rarely used.

381. **Galium aparine** L. Bed straw. Goose grass. *Rubiaceæ*.

A cold infusion forms a popular cooling drink in fevers.

382. **Galium triflorum** Michx. Sweet scented bed straw. *Rubiaceæ*.

The plant has the fragrance of the European *Asperula odorata*. A decoction is much used as a spring tonic ("May-drink").

383. **Garcinia mangostana** L. Mangosteen. *Guttiferaæ*.

Naturalized in the western portions of Jamaica. Cultivated in southern Florida. This highly valued fruit tree could no doubt be cultivated in the southern portions of the State. Fruit very delicious, about the size and form of the orange. The resinous juice is purgative and yields a pigment.

384. **Gardenia grandiflora.** Cape jasmine. *Rubiaceæ*.

A native of China, cultivated in the State. The fruit yields a yellow dye with which the yellow robes of the mandarins are stained. (Bailey's Cycl. Am. Hort., 626.)

385. **Garrya elliptica** Dougl. Silk tassel tree. *Cornaceæ*.

Valued as a tonic in malarial fevers. (U. of C. Agr. Exp. Sta. Rep., 1895-96, 1896-97.)

386. **Garrya fremontii** Torr. California fever bush. *Cornaceæ*.

Used as a tonic and antiperiodic. Contains a bitter principle not unlike quinine in its action. (D. W. Ross, Am. Journ. Pharm., 1877.)

387. **Gaultheria myrsinites** Hook. Wintergreen. *Ericaceæ*.

Closely related to **G. procumbens** and no doubt has similar medicinal properties. The fruit is delicious, likewise the fruit of **G. shallon** Pursh. (Salal.) (U. S. Disp.) (Calif. Geol. Surv. Bot. 1:455.)

388. **Gaura coccinea** Pursh. Scarlet gaura. *Onagraceæ*.

Said to be poisonous. Requires study.

389. **Gelsemium sempervirens** L. False jessamine. *Loganiaceæ*.

A native of the eastern and southern United States, cultivated in California. Properties well known. Used in fevers, rheumatism, aches and pains.

390. **Genista tinctoria** L. Dyer's weed. *Leguminosæ*.

Cultivated. The flowering tops are used in preparing a yellow dye. The tops and seeds are used medicinally, having purgative and emetic properties.

391. **Gentiana calycosa** Griesb. Gentian. *Gentianaceæ*.

Properties similar to those of **G. lutea** L. Requires further study.

392. **Geranium species.** Cranesbill. *Geraniaceæ*.

The native species require further study as regards astringent properties. Rich in tannin.

393. **Geranium dissectum** L. Common geranium. *Geraniaceæ*.

This species and **G. carolinianum** L. (Carolina geranium) are easy of cultivation.

394. **Geranium maculatum** L. Wild geranium. *Geraniaceæ*.

A native of the eastern United States, requires rich, moist woodland. Well known medicinally (U. S. Disp. and text-books on materia medica.)

395. **Geranium viscosissimum.** Wild geranium. *Geraniaceæ*.

A forage plant. Requires further study.

396. **Gilia aggregata** Spreng. *Polemoniaceæ*.

An infusion of the entire plant used as a drastic purgative. Also used as a tonic, in fevers, etc. Extensive popular use among Indians and settlers. Well worthy of careful study. May take the place of cascara bark. (See 398.)

397. **Gilia cotuæfolia** Steud. *Polemoniaceæ*.

Odor like that of chamomile. There are numerous California species of *Gilia* which require careful study as to identity and as regards medicinal (laxative, tonic) properties.

398. **Gilia squarrosa** Hook. Skunkweed. *Polemoniaceæ*.

Has a disagreeable odor from which it derives its name. **G. virgata floccosa** has properties like those of **G. aggregata**. Specimens sent to the writer were identified by Mr. Brandegee. (See 396.)

399. **Ginkgo biloba** L. Maiden hair tree. *Coniferæ*.

A handsome ornamental tree of Asia, cultivated in California. Easily propagated and free from disease. The seeds are eaten by the Chinese. The ripe fruit has a foul odor.

400. **Ginseng**. (See **Panax**.)401. **Glechoma hederacea** L. Ground Ivy. *Labiataë*.

A cosmopolitan introduced plant. Has mildly stimulating tonic, diuretic and aperient properties; useful in chronic pulmonary and vesical catarrh. Well-known popular medicinal plant. Figures extensively in plant lore. (U. S. Disp.)

402. **Glycyrrhiza glabra** L. Licorice. *Leguminosæ*.

Cultivated with more or less success in various parts of the United States. To make the venture a financial success, it must be undertaken on a large scale. (See Chap. III.) (Licorice culture in England, Proc. A. Ph. A., 23:212, 1875.)

403. **Glycyrrhiza lepidota glutinosa** Pursh. Wild licorice. *Leguminosæ*.

Native of California. Much like **G. glabra** and can no doubt be substituted for the true licorice. Cultivation is said to increase the active constituents.

404. **Gnaphalium decurrens** Ives. Cudweed. Lady's tobacco. *Compositæ*.

Pillows made of the leaves are used to cure catarrhal affections. Said to have sedative properties. **G. margaritaceum**, Life everlasting, and other species of the State (**G. decurrens californicum** D. C.) are said to have similar properties. A decoction is used in intestinal and pulmonary catarrh. Used externally in fomentations for bruises, etc.

Perhaps have but little actual medicinal virtue. The famed Edelweiss of the Alps belongs to this genus (**G. leontopodium**).

405. **Gnaphalium ramosissimum** Nutt. Cudweed. *Compositæ*.

Used by eclectics as an astringent and expectorant. The floss or down of the flower heads is used to stuff pillows.

406. **Godetia** (many species). *Onagraceæ*.

Leaves mixed with lard, heated and strained, when cool, used as an application for chapped hands, etc.

The seeds of **Godetia albescens** Lindl. are used as food. The leaf decoction highly valued as a wash for sore eyes. (Contrib. U. S. Nat. Herb. 7: (No. 3) 370.)

407. **Goodyera menziesii** Lindl. Rattlesnake plantain. *Orchidaceæ*.

Found in woodlands of northern California, near the coast. Requires further study as to medicinal properties.

408. **Gratiola ebracteata** Benth. *Scrophulariaceæ*.

Requires further study. Reported to have medicinal properties.

409. **Grindelia cuneifolia** Nutt. Gum plant. *Compositæ*.

Reported to have medicinal properties. (University of California correspondence.) No doubt has properties similar to those of **G. squarrosa**.

Used by Indians and settlers in pulmonary troubles and as a wash for poison oak.

410. **Grindelia glutinosa** Dunal. Gum plant. *Compositæ*.

Properties like those of **G. robusta** and other species. (U. S. Disp.)

411. **Grindelia hirsutula** Hook. Gum plant. *Compositæ*.

An infusion of the herb has been recommended against asthma by the Californians of Spanish descent.

412. **Grindelia robusta** Nutt. Gum plant. *Grindelia*. *Compositæ*.

A native, well known medicinally. Common. Could no doubt be grown profitably. Popular poison oak remedy. (U. S. Disp.) The old settlers used this plant (much praised in medicine to-day as a remedy for poison oak symptoms) for inflammatory rheumatism, giving large quantities of decoction and applying poultices of the leaves.

413. **Grindelia squarrosa** Dun. *Grindelia*. Gum plant. *Compositæ*.

Well-known medicinal plant. Tonic expectorant; poison oak remedy. (U. S. Disp.) Properties and use as for **G. robusta**. Could no doubt be grown profitably.

414. **Gramineæ**. Grasses.

The grass family is well represented in California. Some species have been reported as poisonous, but in several instances, at least, the

reports were no doubt erroneous, the poisonous effects noted having been due to a fungus (ergot) found on the grass.

The seeds of **Avena fatua** (wild oats), **Danthonia californica** (California wild oat grass), **Bromus marginatus** (poverty grass), **Elymus triticoides** (squaw grass), **Sitanion elymoides** (squirrel tail), **Hordeum murinum** (squirrel tail), **Hordeum vulgare** (barley), **Lolium temulentum** (poison darnel), and **Lolium perenne** (poison rye grass), are made into a meal (pinole) by the Indians and eaten.

415. **Gymnocladus canadensis** Lam. (**G. dioica**). Kentucky coffee tree. *Leguminosæ*.

Cultivated as an ornamental tree. The seeds are said to be poisonous. They contain a saponifiable fixed oil, a little fat, resin and a glucocide. The seeds were once much used as a substitute for coffee, particularly about the time of the Revolutionary War.

416. **Gymnogramma triangularis** Kaulf. Golden back fern. Filices. *Polypodiaceæ*.

A native of California. Contains a ceroptene. Used medicinally by the Indians and Spaniards. (Contrib. U. S. Nat. Herb. 7: (No. 3) 303.) (W. C. Blasdale, *Erythræa*, 1: 252-258, 1893.)

417. **Hagenia abyssinica** Gmelin. Cusso. *Rosaceæ*.

Cultivated in Europe and would no doubt do well in California. A well-known medicinal plant, but no longer enjoying its former popularity as a vermifuge. (U. S. Disp. and Texts on Materia Medica.)

418. **Hamamelis virginica** L. Witchhazel. *Hamamelidaceæ*.

Well known medicinally. Introduced and cultivated as an ornamental plant. A very popular Indian remedy for bruises, sores, ulcers, cuts and other injuries. The leaf infusion much used to rub on flea bites, as a mild counter-irritant and as a mild antiseptic for poison oak; also taken internally. (U. S. Disp.)

419. **Hedera helix** L. Ivy. *Araliaceæ*.

This familiar ornamental plant, introduced from Europe, has been long known medicinally. The leaves are used in preparing a dressing for itch, tetter, ulcers, cutaneous eruptions, etc. (U. S. Disp.) (Chemistry of **H. helix**, Proc. A. Ph. A. 26: 244, 1878.)

420. **Heleniastrum puberulum**. Sneezeweed. *Compositæ*.

Used as a snuff in catarrh. It is said to be tonic and antiscorbutic.

421. **Helenium autumnale** L. Sneezeweed. *Compositæ*.

An eastern plant found as far west as Oregon and Washington. The active constituents which occur in the flower require further study.

422. **Helenium montanum** Nutt. Sneezeweed. *Compositæ*.

Said to be poisonous. Requires further study.

423. **Helenium puberulum** D.C. Rosilla. Sneezeweed. *Compositæ*.

A highly valued popular medicinal plant. The flower heads and leaves boiled are said to be a "specific for a certain venereal disease," presumably gonorrhea. Used in the treatment of catarrh, as a tonic and antiscorbutic. The flower heads are very acrid (pungent), but are occasionally eaten. The flowers are powdered and used as snuff for catarrh. Joseph Lauer, of Mountain View, Cal., bottled and sold large quantities of medicine made from the flower; used as a catarrh cure. (U. S. Disp.) (Contrib. U. S. Nat. Herb. 7: (No. 3) 394.)

424. **Helianthemum scoparium** Nutt. Rock rose. *Cistaceæ*.

Properties presumably like those of **H. canadense**, which is used in the treatment of scrofula, scarlatina, prurigo, etc. (U. S. Disp.)

425. **Helianthus petiolaris** Nutt. and **H. lenticularis**. *Compositæ*.

Used medicinally by the Indians. (Proc. A. Ph. A. 27: 178, 1879.)

426. **Heliotropium curassavicum** L. Heliotrope. *Boraginaceæ*.

The mucilaginous juice of the leaves is dried, reduced to a powder and applied to wounds and abrasions.

427. **Hemizonia species**. Tar-weeds. *Compositæ*.

Common, viscid, resinous herbs, related to the Madagascars, which see. There are numerous native species. **H. luzulæfolia** D.C. is very common throughout the western part of the State. The odor is heavy, recalling somewhat that of myrrh.

428. **Heracleum lanatum** Michx. Masterwort. Cow parsnip. *Umbelliferae*.

Spaniards use a decoction of the herb and roots as a lotion for rheumatism. The basal part of the plant either dried, roasted or cooked, is eaten by Indians. Said to have emminative and stimulant properties, and has been used in epilepsy. Both roots and leaves act as an irritant when applied to the skin. Said to be poisonous.

429. **Heteromeles arbutifolia** R. Christmas berry. Toyon. California holly. *Pyraceæ*. (*Rosaceæ*.)

Found in coast ranges from San Diego to Humboldt County. The fruit is eaten by the Indians. The bark and leaf decoction is used to relieve aches of various kinds. (Am. Journ. Pharm., April, 1882.)

430. **Heuchera micrantha** Dougl. Alum root. *Saxifragaceæ*.

Astringent properties. Requires further study.

431. **Heuchera pilosisissima** F. and M. Alum root. *Saxifragaceæ*.

Requires further study. (U. S. Disp.)

432. **Hibiscus species**. Mallows. *Malvaceæ*.

Many species are introduced and cultivated as ornamental plants.

Hibiscus flowers are used in preparing shoe polish. Rich in a mucilaginous substance.

433. **Hibiscus californicus** Kell. Rosemallow. *Malvaceæ*.
Has not yet been investigated chemically.

434. **Hierochloa macrophylla** Thurb. Holy grass. Large leaved vanilla grass. *Gramineæ*.

Found in the coast redwood belt of California. Very fragrant, due to the presence of cumarin. Retains its fragrance for thirty years or more. Of possible great value to perfumers in the manufacture of sachet powders. Almost exterminated in Marin County. Attempts should be made to perpetuate it by cultivation.

435. **Humulus lupulus** L. Hop. *Moraceæ*.

Hop culture is one of the most important industries in the State. The plant has escaped from cultivation in different parts of the State. Strobiles much used by the Indians in the form of poultices for swellings and bruises.

436. **Hydrangea arborescens** L. Hydrangea. *Saxifragaceæ*.

Extensively cultivated as an ornamental plant. The root has long been known medicinally. The Cherokee Indians and white settlers use a decoction for calculus troubles. (Am. Journ. Pharm., 122, 1887.)

437. **Hydrastis canadensis** L. Golden seal. *Ranunculaceæ*.

This native of Canada and the eastern United States is becoming very rare, due to the herb gatherers. Whereas the rhizomes sold for about ten cents per pound some years ago, it is now worth over three dollars per pound. Cultural attempts are now being made in various parts of the United States. The efforts in California are thus far purely experimental. H. L. Scherb of Los Angeles has made attempts at its culture. Some plants received from him for the botanic garden in Golden Gate Park grew exceedingly well. Golden seal requires a moist, rich, shady soil. In fact, it is grown much like ginseng. The rhizomes with rootlets attached are dug up and dried. A most valuable medicine for which there will be continued good demand. (See Farmers' Bulletin No. 51, United States Department of Agriculture, for full particulars as to culture, etc.)

438. **Hyoscyamus niger** L. Henbane. *Solanaceæ*.

An introduced plant which has escaped from cultivation. Well known medicinally. (See Chap. III.) (Henbane culture in England. Proc. A. Ph. A. 25: 136, 1877.) (W. A. Puckner, The Assay of Hyoscyamus. Proc. A. Ph. A. 47: 297-301, 1899.)

439. **Hypericum species**. St. John's wort. *Hypericaceæ*.

The native species require further study. Perhaps have properties

similar to those of **H. perforatum** L., which is used in hysteria, mania, dysentery, gravel, hemorrhages, worms, lung troubles, jaundice, etc.

The following species occur in the State: **H. multilum** L., **H. anagaloides** C. and S. (false pimpernel), and **H. formosum scouleri** Coulter.

440. **Hypericum concinnum** Benth. St. John's wort. *Hypericaceæ*.
Extensive popular medicinal use. Carried as an amulet to ward off lightning and to reveal hidden or lost property.

441. **Hyssopus officinalis** L. Hyssop. *Labiataæ*.
A familiar European pot herb grown in gardens. The infusion is used in chronic catarrh, especially in the aged.

442. **Iberis species.** *Cruciferaæ*.
European plants readily introduced. Used medicinally.

443. **Iberis amara** L. Bitter candy-tuft. *Cruciferaæ*.
Introduced plant. Used by the ancients in rheumatism, gout and other diseases; useful in cardiac hypertrophy, asthma and in bronchitis.

444. **Ilex species.** Holly. *Ilicaceæ*.
The hollies are extensively cultivated as ornamental plants. Several species are used medicinally in gout, catarrh, pleurisy, smallpox, etc. (U. S. Disp.)

445. **Ilex paraguayensis** St. Hil. Maté. Paraguay tea. *Ilicaceæ*.
Well known medicinally. Contains theine. (U. S. Disp. and Texts on Materia Medica.) (Proc. A. Ph. A. 26: 299, 1878.)

446. **Illicium verum** and **I. religiosum** Sieb. Star anise. *Magnoliaceæ*.
Well known medicinally. Used as a spice and condiment. (U. S. Disp.)

447. **Imperatoria ostruthium** L. Master-wort. *Umbellifera*.
A European plant readily cultivated. Formerly much used in a variety of ailments, and because of its reputed value was given the name of **divinum remedium**. It has only slight stimulating properties, and is no longer used by physicians.

448. **Inula helenium** L. Elecampane. *Compositæ*.
Well known medicinally. Readily cultivated. Tonic, diaphoretic, expectorant, emmenagogue. (U. S. Disp.)

449. **Ipomœia species.** Bindweeds. *Convolvulaceæ*.
Numerous introduced species and varieties are cultivated in the State as ornamental climbing plants. The roots and leaves of some species are used medicinally, largely for the laxative properties. **I. tuberosa** furnishes scammony. The large tuberous roots of **I. pandu-**

rata constitute the jalap of the market. The leaves of **I. maritima** are used in the form of fomentations applied to the enlarged joints of serofulous patients.

450. **Ipomœia hederacea** Jacq. *Convolvulaceæ*.

A native of Japan. Cultivated as an ornamental plant in California. Contains a resinous principle, perhaps identical with convolvulin. Has decided laxative properties.

451. **Iris species.** *Iridaceæ*.

Many introduced species are found in the State, including **I. germanica**, **I. versicolor**, **I. florentina**. Readily cultivated. Requires rich, moist soil. The dried and peeled roots of **I. florentina** are known in the drug market as orris root; they have a fragrant violet-like odor, much used in tooth powders, sachet powders, perfumes, etc. **I. versicolor** is much used in cattle powders. Has cathartic and diuretic properties. (U. S. Disp.)

The following species are native and should be more carefully studied as to properties and constituents: **I. longipetala**, **I. douglasiana**, **I. macrosiphon**.

452. **Iris macrosiphon** Torr. Ground iris, wild damiana. *Iridaceæ*.

Found in the coast ranges from San Mateo to Trinity County.

Held in great esteem by Spanish and Mexicans as an aphrodisiac and emmenagogue.

453. **Isatis tinctoria** L. Dyers weed. *Cruciferaæ*.

Thrives in cultivation. Escaped from cultivation. Leaves yield an indigo dye and have been used medicinally in jaundice, scurvy and in other complaints.

To obtain the dye, the leaves are ground, made into a paste, placed in heaps and allowed to ferment. (U. S. Disp.)

454. **Isopyrum occidentale** H. and A. *Ranunculaceæ*.

Rare. Perhaps contains alkaloids like those of **I. thalictroides**. (Am. Journ. Pharm. 44: 453.)

455. **Jasminum species.** Jasmine. *Oleaceæ*.

Extensively cultivated as ornamental plants. The flowers yield the oil of jasmine, which is used only as a perfume. The oil is obtained by placing the flowers with alternating layers of cotton in the sun. The oil is taken up by the cotton and expressed. Distilling destroys the aroma.

456. **Jateorhiza palmata** Miers. Calumba. Columbo. *Menisfermaceæ*.

An introduced plant, native of Africa. Well known medicinally; readily cultivated. (U. S. Disp.)

457. **Juglans species.** Walnuts. *Juglandaceæ*.

Juglans californica Wats. Is found in the interior. Other species and varieties are extensively cultivated. (B. M. Long, California Walnut Industry. State Board of Horticulture, Sacramento, 1896.)

Juglans cinerea L. (butternut) (white walnut) is well known medicinally; introduced; extensively cultivated in the eastern states. Yields oil. Cathartic. Tonic. (U. S. Disp.)

458. **Juglans nigra** L. Black walnut. *Juglandaceæ*.

Extensively cultivated in the eastern states. Leaves used in the treatment of diphtheria. The decoction is used as a spray or as a gargle or both. Green fruit pickled and preserved. (Proc. A. Ph. A. 30: 246, 1882.)

459. **Juniperus species** and varieties. Junipers. *Coniferæ*.

The junipers require further systematic study. The fruit of some species is used as a diuretic. The balsam is used medicinally and in the manufacture of varnish. The twigs made into tea valued as a remedy in malaria.

460. **Juniperus californica** Carr. and variety **utahensis** Englm. California juniper. *Coniferæ*.

Fruit eaten by Indians, raw or made into a bread.

461. **Juniperus communis** L. Juniper. *Coniferæ*.

Well known medicinally. Stimulant, diuretic, tonic, etc. (U. S. Disp.)

462. **Juniperus occidentalis** Hook. *Coniferæ*.

A decoction of the leaves used internally as a remedy for malaria, kidney trouble, boils, headaches, and coughs. Indians use the pitch to fasten the feathers to arrow shafts and rubbed into the shafts to make them stronger and more elastic. Indians eat the berries. (U. S. Disp.)

463. **Juniperus phœnicea** L. Thus. *Coniferæ*.

Cultivated as an ornamental tree. Yielded the frankincense (olibanum) of the ancients. Olibanum was at one time considered a valuable stimulant, now rarely used internally. Inhaling the fumes of the burning incense is useful in bronchitis and other pulmonary troubles. Used as a substitute for balsam of tolu and in making unofficial plasters.

464. **Kalmia angustifolia** L. Narrow-leaf laurel. *Ericaceæ*.

Properties and uses as for **K. latifolia**.

465. **Kalmia latifolia** L. Broad-leaf laurel. *Ericaceæ*.

An eastern poisonous laurel, cultivated as an ornamental plant. Used by the negroes of North Carolina, in the form of a wash, for

sore eyes. The leaves contain gum, resin, tannic acid, arbutin and andromedotoxin (a highly poisonous crystalline substance). Has been used in diarrhea, syphilitic skin eruptions and in skin diseases. Entire plant highly poisonous. Other species no doubt have similar properties. (G. W. Kennedy, *Am. Journ. Pharm.* **20**: 264.)

466. **Kelps.** Seaweeds. Marine algæ.

Numerous species of seaweed are found along the entire Pacific coast. Some are used as food by Indians. They contain iodine, which could no doubt be extracted in commercial quantities. However, Hilgard (*Univ. Calif.*) declares that the California species are low in iodine percentage. According to Setchell (*Univ. Calif.*), the Japanese and Chinese of California collect species of **Nereocystis**, **Laminaria** and **Porphyra** for food, and even export them. Dr. Hus and others have likewise studied the economic value of the kelps of the Pacific coast.

The marine algæ of the Pacific and Atlantic coasts are quite distinct. Those of the Pacific coast are noted for their size. (*Proc. A. Ph. A.* **27**: 132-134, 1879.) (*Bul. Rhode Island Agr. Exp. Sta.* **21**: 1893.)

467. **Laminaria bulbosa.** Seaweed. *Algæ.*

Used in scrofulous affections and in other glandular enlargements. Used as food. (R. G. Whitlock, *Calif. Coll. Pharm. Thesis*, 1901.)

468. **Lantana brasiliensis** Link. Yerba sagrada. *Verbenaceæ.*

A Brazilian verbena which contains an alkaloid (lantanine) resembling quinine, which is said to be actively antiperiodic.

469. **Larrea mexicana** Maric. Creosote bush. *Zygophyllaceæ.*

Contains a gum which resembles the East Indian shellac (Sonora gum) used for cementing earthenware, etc. It also contains a coloring substance resembling cochineal. The Mexicans use the leaf infusion as a cure for rheumatism. Said to produce marvelous results when applied to necrosed bones. Also used in the treatment of syphilis; in consumption. Indians (Kokapah) use the tea in smallpox. A leaf poultice is applied to the pitted skin. Also used as a horse remedy. A very highly valued Indian remedy. Well worthy of more careful investigation. (*U. S. Geol. Surv., Wheeler's Rep. Bot.* **6**: 41.) (*Calif. Geol. Surv. Bot.* **1**: 92.) (*U. of C. Agr. Exp. Sta. Rep.*, 1895-97.) (*Proc. A. Ph. A.* **26**: 206, 1879.)

470. **Laurus nobilis** L. Sweet bay laurel. *Lauraceæ.*

A common old-time ornamental tree. The leaf oil is a well-known and important article, used in making bay rum and for other purposes. (*U. S. Disp. and texts on Materia Medica.*)

471. **Lavatera assurgentifolia** Kell. Tree mallow. *Malvaceæ*.

Common in the State. The leaves are rich in muelage. Eaten by horses and cattle. Demulcent.

472. **Lavendula angustifolia** Miller. Lavender. *Labiataæ*.

This European plant is extensively cultivated everywhere. The flowers and entire plant yield the oil of lavender, which is worth from one to three dollars per pound. The flowers bring about twenty cents per pound. The oil is much used as a flea eradicator and forms the base of many proprietary flea exterminators.

The plant is easily cultivated in California. The grower should also manufacture the oil, which is obtained from the fresh flowers and entire fresh plants. **Lavendula spica** (spike lavender) is also cultivated for the oil which it yields. Medicinally, the lavender oil and the pharmaceutical preparations made from the flowers are used in flatulency, as a carminative, in nervous headache, etc.

473. **Lavendula vera** D. C. Lavender. *Labiataæ*.

Extensively cultivated. The flowers are very fragrant and are much used in sachet powders, perfumes, etc. Lavender oil is official and forms the chief ingredient of many flea exterminators. Good quality of lavender oil has been produced in California. Could no doubt be grown profitably.

474. **Lawsonia alba** Lam. Henna. *Lythraiceæ*.

Cultivated in southern portions of the State. Used by the women of Egypt and of other countries to color the finger nails and by the men to dye the beard. The gum (labdanum) is collected by passing leathern rakes over the plants or is combed out of the wool of goats which have been among the plants. The plant is used in jaundice, leprosy, skin diseases, catarrh, dysentery, and in pulmonary affections. (U. S. Disp.) (Proc. A. Ph. H. 35: 164, 1887.)

475. **Lathyrus sativus** L. White vetch. *Leguminosæ*.

A forage plant. Horses feeding on this plant for a long time become paralyzed in the hind extremities. The laryngeal muscles are also paralyzed. The seeds contain a poisonous alkaline volatile substance, which is destroyed on heating, hence cakes made from the seed and thoroughly baked may be eaten and are said to be very nutritious. This plant requires further careful study as to physiological action and possible therapeutic value.

476. **Lathyrus watsoni**. Vetch. *Leguminosæ*.

An excellent fodder plant and sometimes cooked and eaten by the Indians. The older plants are boiled and applied as a poultice to swellings. (Contrib. U. S. Nat. Herb. 7: No. 3, 357.)

477. **Ledum glandulosum** Ait. Labrador tea. *Ericaceæ*.

Leaves used for killing vermin on cattle and to drive fleas from country houses. Resembles **L. palustre**.

478. **Ledum latifolium** Ait. Labrador tea. *Ericaceæ*.

North American marsh plant. Leaves aromatic and used as a tonic in lung troubles. Also used as a substitute for tea. (Proc. A. Ph. A. 26: 221, 1878.)

479. **Ledum palustre** L. Marsh tea. *Ericaceæ*.

Everygreen marsh plant. The leaves are balsamic, aromatic, bitter, used in dysentery, leprosy, and scabies. They are said to be narcotic and diaphoretic. In Germany substituted for hops in beer. (Proc. A. Ph. A. 24: 140, 1876.)

480. **Citrus limonum** L. Lemon. *Rutaceæ*.

Several varieties extensively cultivated in the State. Well-known popular fruit. (See State Hort. Reports and special reports on lemon culture.)

481. **Leonotis leonurus** L. Common motherwort. *Labiataæ*.

A tropical labiate, extensively cultivated, said to have purgative and emmenagogue properties. (Pharm. Journ. Trans., May, 1885.)

482. **Leucrocrrinum montanum** Nutt. Wild hyacinth. *Liliaceæ*.

A poisonous plant which requires further study as to chemical constituents and possible therapeutic value.

483. **Lewisia rediviva** Pursh. Bitter root. *Portulacaceæ*.

Indian food plant. The roots and the white inner bark contain a high percentage of starch. Indians store large quantities for winter use. The odor of the boiled root recalls that of tobacco, hence the appellation "tobacco root." (Calif. Geol. Surv. Bot. 1: 78.) (Am. Journ. Pharm., 1889.)

484. **Libocedrus decurrens** Torr. Incense cedar. *Coniferaæ*.

Found in the California coast ranges. Resin very fragrant. The volatile oil, which is found in all parts of the tree, has the odor of incense. The leafy sprigs are used by the Indians in preparing their acorn meal, serving the purpose of a filter and to impart the incense flavor. A decoction of the leaves used in stomach troubles.

485. **Lichens**. Moss. Tree moss. Lichens.

Lichens are abundant in the State, especially **Usnea barbata** (beard moss), which was at one time much used in hair tonics and as a remedy in brain disease. (See, also, **Usnea**, **Evernia**, **Cetraria**, and **Rocella**.) Species of **Sticta** are occasionally used in pulmonary complaints. **Cetraria Islandica** (Iceland moss) was formerly official. Lichens are

now rarely used medicinally excepting as popular remedies in certain countries.

486. **Ligusticum** sp.? *Umbelliferae*.

Indians use a decoction of the roots of an unknown species of *Ligusticum* as a cough remedy.

487. **Ligusticum filicinium** Wats. "Osha." Colorado cough root. *Umbelliferae*.

The large aromatic roots are much used as an expectorant tonic. By some considered a specific in the treatment of coughs and colds. Well worthy of more careful study. (See, also, "Osha.") (Am. Journ. Pharm., 1890 and 1891.)

488. **Ligusticum levisticum** L. Lovage. *Umbelliferae*.

An extensively cultivated well-known European plant. A stimulant aromatic used as a carminative, diaphoretic and emmenagogue.

489. **Ligustrum vulgare** L. *Oleaceae*.

This and other species are extensively cultivated as ornamental plants. The leaves are astringent and bitter, used as a decoction in the treatment of sore throat, ulcerations of the mouth, etc. Berries are said to have purgative properties, and are used for dyeing purposes.

490. **Lilium** species. *Liliaceae*.

Extensively cultivated throughout the State as ornamental plants, including those of medicinal value. An ointment made from **L. candidum** used in the treatment of dropsy.

491. **Limodorum giganteum** K. Swamp orchid. *Orchidaceae*.

Indians drink a decoction to combat manias and severe cases of illness. (Contrib. U. S. Nat. Herb. 7: No. 3, 330.)

492. **Linanthus ciliatus** Greene. California gilia. *Polemonaceae*.

Indians use an infusion of this plant in the treatment of coughs and colds and it is said to be a blood purifier. (Contrib. U. S. Nat. Herb. 7: No. 3, 381.)

493. **Linum** species. Flax. *Linaceae*.

Common flax (**L. usitatissimum**) is readily cultivated in the State. The following species are native: **L. lewisii** (blue flax), **L. adeno-phyllum**, **L. spergulinum**, **L. micranthum**, **L. californicum**, **L. congestum**, **L. brewerii**.

494. **Linum catharticum** L. Purging flax. *Linaceae*.

Much used as a mild cathartic; useful in muscular rheumatism; catarrhal affection, dropsy and diseases of the liver.

495. **Linum usitatissimum** L. Flax. *Linaceæ*.

Extensively cultivated as a fiber plant. Seeds rich in oil, which is used for technical and other purposes. Well-known plant.

496. **Lippia citriodora** Kunth. Lemon verbena. Sweet verbena. *Verbenaceæ*.

This and other species of lemon verbena are extensively cultivated as ornamental plants. The deliciously lemon-scented leaves are used in sachet powders. They contain tannin, a volatile oil and an aromatic substance. The Mexican species (**L. mexicana**) is used as a demulcent and expectorant.

497. **Liquidamber styraciflua** L. Alligator tree. Sweet gum. *Hamamelidaceæ*.

Introduced plant. A gum (storax, styrax, liquidamber) exudes from this plant, which is used as an expectorant, diuretic, stimulant; externally in ointments and cerates. Used largely in the manufacture of gum and as a flavoring agent. (U. S. Disp.) (Proc. A. Ph. A. **23**: 157-162, 1875.)

498. **Liriodendron tulipifera** L. Tulip tree. *Magnoliaceæ*.

A large, handsome ornamental tree. The bark is used as a stimulating tonic. It has diaphoretic qualities and is used in chronic rheumatism and in dyspepsia. (U. S. Disp.)

499. **Litmus**. *Laemus*. *Lichenes*.

A dye obtained from several species of lichen, largely from **Rocella tinctoria**, found in lower California.

500. **Lolium species**. Darnels. *Gramineæ*.

The nature of the poison of the loliums is not well understood. The poisonous principle temulin, found in the seed, is supposed to be due to the presence of a hyphal fungus. This same fungus is also found in other poisonous species of lolium, as **L. arvense**, **L. linicola** and **L. italicum**. (Pharm. Journ. Trans. 251, 1899.)

501 **Lolium temulentum** L. Darnel. *Gramineæ*.

Naturalized from Europe. Common in California. Well-known poisonous plant without reputed medicinal value. The parched seeds are eaten by Indians.

502. **Lonicera caprifolium** L. Honeysuckle. *Caprifoliaceæ*.

Well-known ornamental plant found everywhere. The flowers are used in the manufacture of perfumery and a syrup prepared from them is used in asthma and in lung troubles. The juice is said to relieve bee stings. The fruit of all species of *Lonicera* is emetic and cathartic.

503. **Lonicera interrupta** Benth. Honeysuckle. *Caprifoliaceæ*.

A tea of the leaves is used as a wash for sore eyes. (Contrib. U. S. Nat. Herb. 7: No. 3, 388.)

504. **Lophanthus urticifolius** Benth. *Labiataæ*.

The Indians use the dried and powdered leaves as a sachet powder. Very fragrant.

505. **Lotus wrangelianus** F. et M. *Leguminosæ*.

Reported to be poisonous. (U. of C. Agr. Exp. Sta. Rep., p. 258, 1897-98.)

506. **Luffa ægyptica**. Vegetable sponge. Rag gourd. *Luffa Cucurbitaceæ*.

This plant is cultivated by Chinese gardeners in the Sacramento Valley bottom lands. The large cucumber-like fruits are beaten and washed to remove pulp and the fibrous framework is dried and sold as a substitute for bath sponge. Common in California drug stores. (Proc. A. Ph. A. 32:180, 1884.) (Proc. A. Ph. A. 25:200, 1877.) (Bailey, Cycl. Am. Hort., 948.) (Cornell Exp. Sta. Bul., 67.)

The fruit of **L. echinata** contains an acrid poison similar to that of colocynth. Much used medicinally in the Orient.

507. **Lupinus species**. Lupines. *Leguminosæ*.

The lupines are present in great variety and abundance. They are rather showy plants, as a rule quite free from plant diseases. Some species are poisonous.

508. **Lupinus cyaneus**. *Leguminosæ*.

Reported to be poisonous to cattle.

509. **Lupinus leucophyllus** Dougl. *Leguminosæ*.

Poisonous. The poisonous principle has not yet been isolated.

510. **Lupinus luteolus** Kell. Butter weed. *Leguminosæ*.

Poisonous. (Contrib. U. S. Nat. Herb. 7: No. 3, 358.)

511. **Lupinus sericeus** Pursh. *Leguminosæ*.

Poisonous. Requires study as to the nature of the poisonous principle.

512. **Lycium species**. *Solanaceæ*.

Some species are cultivated as ornamental plants and have been used medicinally, especially **L. barbarum** L. (U. S. D.)

513. **Lycium andersonii** Gray. *Solanaceæ*.

The berries are eaten by the Indians. Requires further study as to reputed medicinal properties.

514. **Lycoperdon species.** Puffballs. *Lycoperdaceæ*. (Fungi.)

Some unripe species are edible. The ripe spores puffed into the nostrils are said to check nose bleed. Spores are also dusted on sores and ulcers to dry them up. Puffballs figure in Indian lore. Ghosts are said to paint their faces with the dust (spores). (Contrib. U. S. Nat. Herb. 7: No. 3, 300.)

515. **Lycopodium species.** Club moss. *Lycopodiaceæ*.

Many species are cultivated as ornamental conservatory plants. **L. clavatum** yields the lycopodium powder (spores). The club mosses are reputed to have diuretic properties. Have been used in rheumatism, diseases of the lungs and kidneys. Now rarely used medicinally. The spores are much used as a dusting powder and in the making of pills, etc., to make the flashlight in photography, etc.

516. **Lycopus lucidum americanum** Gray. Water hoarhound. *Labiataë*.

Supposed to have properties similar to those of **L. virginicus** L. and **L. europæus** L. U. S. D.)

517. **Lygodesmia juncea** Don. *Compositæ*.

A poisonous plant which requires further study.

518. **Lyonia (Pieris) mariana.** Stager bush. *Ericaceæ*.

A poisonous plant. The related plant **Leucothœe catesbæi** Gray. Branch ivy, *Ericaceæ*, is also poisonous.

519. **Lysichiton chamchatcensis** Shott. Skunk cabbage. *Araceæ*.

In bogs of Northern California. The pungent root is made into a salve for ringworm, swellings and inflammatory rheumatism. The root is said to form the chief ingredient of the patent medicine "Skookim." Bears dig up the roots and eat them.

520. **Maclura aurantiaca** Nutt. Hedge. Osage orange. *Moraceæ*.

Cultivated as a hedge plant in the central states. Very hard wood, which takes a high polish. The large yellow fruits resemble the orange in appearance, though unfit for food. The root bark yields a yellow dye. (Am. Journ. Pharm. 46: 257.)

521. **Madia species.** Tar weeds. *Compositæ*.

Tar weeds are exceedingly abundant in the State, constituting very annoying farm and roadside weeds. The tar weed odor permeates the country atmosphere in the fall of the year. A cooking oil has been obtained from the seeds of **M. dissitiflora**. The seeds of **M. densiflora** are agreeably aromatic. The old Spanish settlers used **M. elegans** medicinally. The madias are said to be useful in urinary troubles. (Contrib. U. S. Nat. Herb. 7: No. 3, 395.)

522. **Magnolia species.** *Magnoliaceæ.*

Handsome trees, extensively cultivated, especially *M. grandiflora*, with its large white blossoms. The bark and fruit of all species are reputed to have medicinal properties. The root bark is most generally employed, useful in malaria and rheumatism. A popular medicine is made by macerating the fruit or bark in brandy, said to be very efficacious in chronic rheumatism. (Proc. A. Ph. A. **35**: 147, 1887.)

523. **Malacothrix coulteri** Gray. *Compositæ.*

Said to be poisonous. (University of California Coll. Agr. Exp. Sta. Rep., p. 258, 1897-98.)

524. **Malpighia glabra** L. Barbadoes cherry. Nancee bark. *Malpighiaceæ.*

A native of Mexico, which could no doubt be grown in the southern parts of the State. The Mexicans use the bark in tanning; said to contain twenty-six per cent of tannin. (Am. Journ. Pharm. **16**: 239.)

525. **Malus rivularis** Roem. Oregon crabapple. *Rosaceæ.*

The sour fruits used in fevers, in wine making, etc.

526. **Malva species.** Mallows. *Malvaceæ.*

Very abundant in the State. Many introduced species cultivated as ornamental plants, arbor plants, etc. They possess demulcent properties.

527. **Malva parviflora** L. Mallow. *Malvaceæ.*

Has laxative properties; useful in indigestion. Eaten in India. Seeds used as a demulcent in coughs and colds and in urinary troubles.

528. **Malvastrum coccineum** Gray. Red false mallow. *Malvaceæ.*

A forage plant. Reported to be poisonous.

529. **Mandragora officinarum** L. Mandrake. *Solanaceæ.*

A European herb famed in history and folk lore. Was formerly credited with all manner of supernatural powers and marvelous curative properties. Now no longer used medicinally. This plant must not be confused with **Podophyllum peltatum**, May apple, which is also known as mandrake. (Peters' History of Pharmacy and Medicine.)

530. **Mangifera indica** L. Mango. *Aurantiaceæ.*

A tropical fruit tree, cultivated in portions of southern California and in Florida. The fruit is delicious. All parts of the tree have a sweet, resinous fragrance. (U. S. Dept. Agr., Div. Pomol. Bul. 1.) (Bailey Cycl. Am. Hort., 978.) (Proc. A. Ph. A. **25**: 218, 1877.)

531. **Manihot utilisima** Pohl and *M. aipi* Plan. Cassavas. *Euphorbiaceæ.*

These well-known starch yielding plants thrive well in the southern

part of the State. The large tuberous roots are rich in starch (cassava starch). (U. S. Dept. Agr. Farmers' Bul. No. 167, 1903.)

532. **Maranta species.** Maranta. Arrowroot. *Scitamineæ*.

Common in conservatories. Also cultivated in the open in southern California. Yields starch (maranta starch.)

533. **Marrubium vulgare** L. Hoarhound. *Labiata*.

A very common weed along roadsides and in neglected dry fields. A well-known medicinal plant, which can be grown without any difficulty whatever. Whites as well as Indians use a leaf decoction for coughs and colds and to check diarrhœa. Used in cough drops and confections.

534. **Matricaria chamomilla** L. Chamomile. *Compositæ*.

An old-time popular medicinal pot herb, easy of cultivation, and enjoying wide popular use as a tonic and diaphoretic, in the form of a tea. Especially popular among the Germans.

535. **Matricaria discoidea** D. C. Manzanilla. Chamomile. *Labiata*.

A fragrant native herb, common along walks and roadsides. A very popular domestic remedy, used as a tonic diaphoretic and to check diarrhœa; given in colic, especially in stomach and bowel complaints of children. Could be grown profitably and would no doubt displace the foreign species. (Calif. Geol. Surv. Bot. 1:401) (Contrib. U. S. Nat. Herb. 7: No. 3, 395.)

536. **Megarrhiza.** (See **Micrampelis**.)

537. **Melia azedarach** L. Pride of India. *Meliaceæ*.

A handsome tree from Persia and India, extensively cultivated in parks, etc., as an ornamental plant. The seeds are rich in oil. The bark decoction is said to have cathartic, emetic and narcotic properties. The bark is used as an anthelmintic, particularly in the southern states.

538. **Melilotus alba** Lam. White sweet clover. *Papilionaceæ*.

A European plant which has become disseminated throughout the United States with marvelous rapidity. The white flowers are fragrant and are used to scent tobacco, cheese, clothing, etc., in sachet powders, to keep away moths, etc. It is used medicinally.

539. **Melilotus officinalis** L. Yellow sweet clover. *Papilionaceæ*.

Well known medicinally. Contains cumarin. Found everywhere, though less abundant than **M. alba**.

540. **Melissa officinalis** L. Balm. *Labiata*.

Well-known medicinal herb found almost everywhere; naturalized in places. Readily cultivated. A popular honey bee plant.

541. **Mentha species.** Mints. *Labiatae*.

The mints are readily cultivated and are common as garden herbs. They yield oil and are well known medicinally. Mint culture is profitable if properly conducted on a large scale. Cultivated in various states, as Wisconsin, Michigan, Pennsylvania, some of the southern states and elsewhere. (Proc. A. Ph. A. **30**: 171, 1882.)

542. **Mentha piperita** L. Peppermint. *Labiatae*.

This and other species and varieties of peppermint can readily be cultivated in the State, especially in the coast regions. (See Chap. III.) Well known medicinally. Yields oil and menthol, which have a good market demand. (Schimmel & Co.'s Report for Oct., 1897.) (U. S. D. and Materia Medicae.)

Mentha pulegium L. (European Pennyroyal.) Can readily be cultivated. The oil (oil of Poley) contains pulegine and is said to be extensively used to produce abortion, although such action is denied by some authorities. No longer used by physicians.

M. spicata L. is the spearmint, which is much used as a condiment, etc. Well known medicinally. (U. S. D. and Materia Medicae.)

543. **Mentzelia affinis** Green. *Loasaceae*.

Said to be poisonous to sheep, though death of animals is ascribed to the formation of "clover hair balls" in the intestines and not to any poisonous principle that might be present. Requires further study.

544. **Mentzelia laevicaulis** T. and G. Blazing star. Loasa. *Loasaceae*.

A leaf decoction used in colic and as a wash in skin diseases. (Contrib. U. S. Nat. Herb. **7**: No. 3, 369.)

545. **Menyanthes trifoliata** L. Buckbean. Marsh trefoil. *Gentianaceae*.

A native of the boggy lands of California, said to have become exterminated in certain areas. Has enjoyed a wide, popular, medicinal use in intermittent fevers, scrofula, scurvy, rheumatism, jaundice, dropsy, etc. Much used as a cathartic. In large doses it causes vomiting. (U. S. D.)

546. **Mesembryanthemum acinaciforme.** *Ficoideae*.

Used medicinally by Indians. Fruit is eaten.

547. **Mesembryanthemum æquilaterale** Howarth. Fig marigold. Sea fig. Faeculy onion. *Ficoideae*.

Common along the dunes and cliffs near the sea. Cultivated as an ornamental and lawn plant, in parks, etc. Flowers are fragrant. Fruit is eaten by children and others. The taste recalls salted apples. Used medicinally by Indians and Spaniards. Has demulcent and diuretic properties.

548. **Mesembryanthemum crystallinum** L. Ice plant. Fig marigold. Diamond fig. *Ficoideæ*.

A native of southern Europe, much used as a lawn and border plant. The plant is very rich in potassium and sodium salts. The expressed juice is used medicinally; has demulcent and diuretic properties.

549. **Mezereum**. (**Daphne mezereum** L.) Mezereon. *Thymelacææ*.

Well-known medicinal shrub, of which the bark is used. (U. S. D. and Materia Medicas.) (See **Daphne**.)

550. **Micromeria chamissonis** Greene. Yerba buena. *Labiataæ*.

A plant well known to Californians. The old name for San Francisco was Yerba Buena, in honor of this small, fragrant herb. Used as a tea to cure colic and to purify the blood.

A mint-like plant having the properties of the mints. In great repute among Indians and the early missionaries, as a beverage in fevers and as a tonic. (Proc. A. Ph. A. **31**, 117, 1883.)

551. **Mimulus guttatus** D.C. *Scrophulariaceæ*.

Indians are said to use this plant as a source of salt. It is also eaten. (Contrib. U. S. Nat. Herb. **7**: (No. 3,) 387.)

552. **Mimulus langsdorffii** Donn. Monkey Flower. *Scrophulariaceæ*.

Decoction of roots used for diarrhœa and dysentery.

553. **Mimulus moschatus** Dougl. Musk plant. *Scrophulariaceæ*.

Cultivated on account of the musk-scented foliage. Reputed to be useful in certain nervous disorders.

554. **Mimusops species**. Zapote gum. Gum chicle. *Sapotacææ*.

Several species are cultivated in the southern part of the State. The seeds of most species yield oil. Some yield gum used in the manufacture of chewing gum. **M. elengi** and **M. hexandra** are used medicinally. The bark has astringent, tonic and sialagogue properties. In England the gum is said to be used as a substitute for gutta serena.

555. **Momordica balsamina** L. Balsam apple. *Cucurbitacææ*.

A climbing plant cultivated for its fruit, which is eaten by some and which has laxative properties. An infusion of the fruit, deprived of the seed, is used as a liniment for chapped hands, burns, piles, and the mashed fruit is used as a poultice. The extract is used in dropsy. Plant is poisonous.

556. **Monarda punctata** L. Horsemint. *Labiataæ*.

Well-known cultivated herb. It is somewhat bitter and pungent, rich in volatile oil, also yields a camphor. It is stimulant and carminative, used as a popular remedy in flatulent colic and in sick headache. **M. fistulosa** is said to be a very active diaphoretic, useful in fevers.

557. **Monardella lanceolata** Gray. Mountain mint. Pennyroyal. *Labiatae*.

A common herb. Popular remedy, used by the Spaniards to cure various ailments, to relieve colic, as a diaphoretic, etc.

558. **Monardella sheltoni** Torr. *Labiatae*.

A fragrant herb used as a tea and to relieve colic and to purify the blood. Other species occur in the State which no doubt have similar properties.

559. **Monolopia major** D. C. *Compositae*.

Reported to be poisonous. Requires further study. (U. of C. Agr. Exp. Sta. Rep. p. 258, 1897-98.)

560. **Morus species**. Mulberry. *Moraceae*.

Various species and varieties introduced into the State. **M. rubra** and **M. alba** are the best known. Fruits highly relished, mildly laxative and cooling; useful in fevers.

561. **Mucuna pruriens** D. C. Cowage. Cowhage. *Leguminosae*.

A climbing plant, sometimes cultivated. The fruit spicules used as a worm remedy (round worms). An effective but disagreeable remedy, which is no longer used by physicians. Plant not reported from the State.

562. **Musa sapientum** L. Banana. *Musaceae*.

The fruit of this plant is familiarly known. The bananas thrive in the State, but are apparently not grown on a large commercial scale. The fruit pulp is very nutritious, eaten raw or fried in butter. Fruits should be well ripened before eating.

563. **Mushrooms** or **Toadstools**. *Fungi*.

Well-known plants. Some are "edible" and some are poisonous. A wise precaution is not to eat any of them, thus avoiding the danger of poisoning. They have no food value. So frequent are fatal cases of poisoning that it was made desirable to organize "mycological clubs" throughout the United States as a means of mutual safeguarding against poisoning. All this trouble can be avoided by not eating mushrooms. The mushroom taste in the human animal is to be compared to the taste acquired by some cattle for noxious weeds. There is a voluminous literature on mushroom culture.

564. **Myosurus alopecuroides** Greene. Antioch mouse tail. *Ranunculaceae*.

Found in low grounds. Requires further study as to medicinal properties.

565. **Myosurus minimus** L. Mouse tail. *Ranunculaceae*.

Perhaps identical with above species.

566. **Myrica californica** Cham. California wax berry. *Myricaceæ*. Properties similar to **M. cerifera** L., which is well-known medicinally (U. S. D.) The Japanese species (**M. rubra**) is extensively cultivated in the State. They require further study.

567. **Myrtus communis** L. Myrtle. *Myrtaceæ*.

This European tree is extensively cultivated. The leaves contain myrtol, an active antiseptic; said to act as a nerve sedative and stimulant to mucus membranes. Used in bronchitis, cystitis and pyelitis.

568. **Narcissus pseudo-narcissus** L. Daffodil. *Amaryllidaceæ*.

Common garden plant. The bulb and flowers have been used medicinally. Used as an anti-spasmodic, sialagogue, diaphoretic, and in large doses as an emetic. Wild growing plants more active than the cultivated.

569. **Nardia**. Nard. Spikenard. *Araliaceæ*.

Garden plants. Properties like those of valerian. Not now used medicinally. Botanical origin uncertain. By some relegated to valeriana.

570. **Nasturtium officinale** R. Br. Water cress. *Cruciferae*.

Growing wild and cultivated for table use. Said to be useful in scorbutic affections and in constipation. Other species are similarly used.

571. **Nepenthes** and **Sarracenia** species. Pitcher plants. *Sarraceniacæ*.

The pitcher contains a very active proteolytic enzyme. The roots of same species are used as a diuretic, laxative and tonic. (Pharm. Journ. Trans. p. 483, 1899.)

572. **Nepeta** species. Catnip. *Labiatae*.

Several species are introduced. **N. cataria** is common. Anti-spasmodic and emmenagogue; tonic, excitant. Contain tannin and volatile oil.

573. **Nerium odorum** L. Oleander. *Apocynaceæ*.

Cultivated ornamental shrub. Used since time immemorial to destroy rats. Cases of poisoning by it have been reported. Two alkaloids have been isolated. Used as a heart tonic in valvular lesion. It also has diuretic and cathartic properties. (U. S. D.)

574. **Nicotiana** species. Tobacco. *Solanaceæ*.

The native species have been used by Indians as a stimulant, smoked and chewed. Some tribes have even cultivated the more desirable species.

575. **Nicotiana attenuata** Tor. Tobacco. *Solanaceæ*.

Formerly used as smoking tobacco by the Indians of Modoc County, California.

576. **Nicotiana bigelovii** Wats. Indian tobacco. *Solanaceæ*.

Used as snuff, also mixed with manzanita leaves and smoked.

577. **Nicotiana glauca** Graham. Tobacco tree. *Solanaceæ*.

Said to have caused the fatal poisoning of cattle that eat it, only however, when other food was scant. The plant is introduced from Mexico and is spreading rapidly in California, along ditches and banks, and in low, moist places. Has been mistakenly eaten for wild cabbage with fatal results (H. M. Hall). Requires further study.

578. **Nicotiana tabacum** L. Tobacco. *Solanaceæ*.

This species with its varieties is cultivated on a large scale. Various other species and varieties are found in experimental gardens and elsewhere. **N. bigelovii**, **N. attenuata** and **N. glauca** occur spontaneously.

579. **Nigella damascena**. *Ranunculaceæ*.

Used medicinally. Has been studied chemically. (Proc. A. Ph. A. 30: 211-212, 1882.)

580. **Nigella sativa** L. Nutmeg flower. *Ranunculaceæ*.

Cultivated. Seeds have a strong aromatic odor, recalling nutmegs. Used as a stimulant, diaphoretic, emmenagogue, and is said to increase the secretion of milk. Used as a corrigent, as a condiment and as an adjuvant with purgatives and tonics.

581. **Nostoc pruniforme**. *Algæ*.

It is stated that some nostoes have aseptic, if not antiseptic properties. It is recorded that specimens kept in water in a bottle remained in good condition for ten years. This matter requires further investigation.

582. **Nuphar advena** Soland. Yellow pond lily. *Nymphaeaceæ*.

Found in ponds and sloughs of California. Contains tannic acid. Requires further study.

583. **Nuphar luteum** Sebth. Water lily. *Nymphaeaceæ*.

Readily cultivated. Rich in tannic acid. (Am. Jour. Pharm. 96; 1883.)

584. **Nuphar polysepalum** Eng. Indian pond lily. *Nymphaeaceæ*.

Quite common. The seeds are used as food by the Klamath Indians. Contains tannic acid.

585. **Nymphaea odorata** Woodv. Sweet scented water lily. *Nymphaeaceæ*.

Readily cultivated. Rich in tannic and gallic acid. Used medicinally

by the ancients; reported to be aphrodisiac. Roots of *N. alba* were also esteemed as an aphrodisiac by the ancients. Numerous varieties found in cultivation. (Am. Jour. Pharm. 96: 1883.)

586. *Ocimum basilicum* L. Sweet basil. *Labiatae*.

A native of India and Persia, cultivated in gardens. The entire plant is highly aromatic. Has the general properties of aromatic plants. Seeds used in India in the treatment of gonorrhœa.

587. *Ænanthe californica* Wats. Fool's parsnip. *Umbelliferae*.

Reported to be poisonous. Requires further study as to poisonous constituents.

588. *Ænothera biennis* L. Evening primrose. *Onagraceae*.

Cultivated. Common throughout the United States. Before the introduction of the potato the fleshy roots of this plant were eaten. Medicinally used in whooping cough, spasmodic asthma; as an ointment in eruptive skin diseases of children and as an application to ulcers.

589. *Ænothera brevipes* Gray. Evening primrose. *Onagraceae*.

This and other species of evening primrose are eaten by Indians as a salad or stewed. Also used medicinally.

589. *Olea europæa* L. and varieties. Olive. *Oleaceae*.

Olives are extensively cultivated in California. There is a voluminous literature on the oil, fruit, cultivation, commerce, use, etc., of the olive.

591. *Opuntia species*. Prickly pears. Indian figs. *Cactaceae*.

The opuntias form a very important vegetation for the Indians of southern California. The young succulent shoots, the fruit, seeds and buds are eaten, cooked or steamed. The plants contain much stored water, which the thirsty traveler often uses. According to Mr. Vermillion (verbal report), railroad employees, civil engineers, and others employed in the desert regions, use the cut opuntia plants to purify drinking water. A number of pieces are placed in a pail of water, the dirt and clay particles cling to the abundant mucilage that exudes, and are carried to the bottom of the vessel. Other cacti are similarly used. Barrows states that there are over fifty species of cacti in the United States, a majority of which are found in California. Mr. Burbank and others have devoted much time and energy toward developing edible spineless varieties. (Bailey Cycl. Am. Hort. 1143-1152.)

592. *Opuntia basilaris* Englm. *Cactaceae*.

The fruits are eaten after being specially prepared. This is said to be the most valuable of the opuntias.

593. *Opuntia bernardina* Englm. *Cactaceae*.

Native of southern California. Properties and uses like other species.

594. **Opuntia engelmanni** Solm. Prickly pear. *Cactaceæ*.

Fruit is sweet. Large quantities are collected, dried and preserved for food by the Indians.

595. **Opuntia tuna** Mill. Prickly pear. *Cactaceæ*.

Said to have the properties of **Cactus grandiflorus**. Cultivated for the rearing of the cochineal insect (Parsons).

596. **Opuntia vulgaris** Mill. *Cactaceæ*.

Has the properties of the above species. (Proc. A. Ph. A. 32:179-180, 1884.)

597. **Orchis species**. Salep. *Orchidaceæ*.

The dried tubers of various species of orchis are known as Salep. They are mucilaginous, and highly nutritive. In mediæval times much used as an aphrodisiac, although having no such properties. Well-known medicinally in various countries.

598. **Orobanche (Aphyllon) species**. Beech drops. Cancer roots. *Orobanchaceæ*.

Parasitic plants of which there are many species in California. **O. uniflora** L. and other species are used in intestinal troubles. Formerly much used as an application to ulcers, especially to cancerous growths, hence the name "cancer root." "Martin's Cancer Powder" was made of a mixture of cancer root and white oxide of arsenic.

599. **Orobanche (Aphyllon) californica** C. and S. Cancer root. *Orobanchaceæ*.

Said to be rich in tannic acid. The rootstock of **O. ludovicianum** Gray, though bitter, is eaten by Indians (U. of C. Agr. Exp. Sta. Rep., 1897-1898, page 260.) (Cal. Geol. Surv. Bot. 1:585.)

600. **Origanum vulgare** L. Sweet marjoram. *Labiataæ*.

Well known and extensively cultivated pot-herb used as a spice. At one time much used medicinally, as a diaphoretic and emmenagogue, and externally as a poultice. Yields the well-known oil of origanum. Used as a condiment.

601. **Orophaca (Astragalus) cæspitosa** Britt. Low milk vetch. *Leguminosæ*.

This plant is reported to be poisonous to cattle. The poisonous constituents require further study.

602. **Oryzopsis membranacea**. Common sand grass. *Gramineæ*.

The seeds are used as food, as a substitute for rice.

603. "Osha."

This name is applied to a root derived from an unknown plant, perhaps a species of peucedanum. An analysis of the root was made by Dr. Hermann Haupt, who discovered an acid closely similar to angelic

acid. According to others "Osha" is the root of a Mexican umbellifer, which is said to contain oshaic acid. Requires further study as to medicinal value. (Am. Journ. Pharm. 1867, 1868, 1873.)

604. **Osmorrhiza brachypoda** Torr. Sweet cicely. *Umbelliferae*.

The roots are highly aromatic. A root decoction is much used as a cough medicine. Seeds should be examined for oil of anise.

605. **Osmorrhiza longistylis** T. and G. *Umbelliferae*.

This plant is introduced from Canada. The seeds contain oil of anise. (U. S. D.)

606. **Oxalis species**. Sorrel. *Geraniaceae*.

Rich in acid potassium oxalate, and may be used as an acid refrigerant, like **O. acetosella**.

607. **Oxalis acetosella** L. Wood sorrel. *Geraniaceae*.

The inspissated juice used as a cautery to remove cancerous growths of the lips. (Am. Journ. Pharm., page 252, 1882.)

608. **Oxalis corniculata** L. Yellow sorrel. *Geraniaceae*.

This plant has the property of the sorrels.

609. **Oxalis oregana** Nutt. Redwood sorrel. *Geraniaceae*.

Requires further study as to the nature of the acid.

610. **Oxytropis (Astragalus) lamberti** Pursh. Loco weed. *Leguminosae*.

A poisonous plant producing the symptoms of the loco weeds proper. (U. S. Geog. Surv., Wheeler's Rep. Bot. 6: 43.)

611. **Pæonia brownii** Dougl. Peony. *Ranunculaceae*.

A rare herb. The Spanish Californians considered the roots, which are eaten raw, an excellent remedy for dyspepsia. The powdered roots are made into a decoction and given for colds, sore throat, etc. A root decoction is also used as a horse medicine. The constituents and therapeutic properties require further study. Perhaps similar to **P. officinalis**. (U. S. D.)

612. **Pæonia californica** Nutt. Peony. *Ranunculaceae*.

The roots of this plant are said to be a tonic, antispasmodic, useful in nervous disorders. Also used in indigestion. (King's Dispensatory.)

613. **Pæonia officinalis** L. Peony. *Ranunculaceae*.

A common garden herb, well known medicinally. The roots have a strong, peculiar odor, and a nauseous, bitter taste, said to be useful as an antispasmodic. The seeds are purgative and antispasmodic.

614. **Palmae**. Palms.

Numerous species of palms thrive well in the State. The palms and yuccas give the California flora a tropical appearance, not in accord

with the prevailing coolness of the atmosphere. The date palm thrives as far north as San Francisco, but bears edible, well-ripened fruit only in the southern part of the State.

615. **Panax (Aralia) quinquefolium** D. and C. Ginseng. American ginseng. *Araliaceæ*.

Native of North America closely related to the Chinese ginseng (**Aralia ginseng**). Medicinally of very little value, but very valuable commercially. Used largely by the Chinese, who look upon it as a universal panacea. The wild growing ginseng is becoming scarce. Very extensively cultivated in different parts of the United States. There is a plantation at Sunnyvale, Santa Clara, and in other parts of California.

The plant requires shade (either natural or artificial) and a moist, rich soil. From time of seeding it takes about four or five years before root gathering is begun. Clean, large, unbroken, forked roots bring a good price. Specimens resembling the human form bring high prices. Market value variable, ranging from seventy-five cents to fourteen dollars per pound. California market good. Culture requires care.

616. **Papaver somniferum** L. Poppy. *Papaveraceæ*.

Cultivated everywhere, largely as an ornamental plant. In England also for the fruits and seeds. Experiments should be made to determine whether or not it is possible to secure the opium in some cheap and simple way. Until this is accomplished it will be impossible to cultivate the poppy profitably for the yield of opium, in the United States or any other civilized country.

The quality of opium from the poppy grown in California, has proven first-class. (J. H. Flint, *American Journal of Pharmacy*, **46**:105, 1874.) The same may be said of opium from other States of the Union. (*Am. Journ. Pharm.*, 286, 1894; 435, 1896).

617. **Parthenium argentatum** Gray. Mexican rubber plant. *Compositæ*.

A shrubby plant, native of Mexico, which is not reported from the State, but which would undoubtedly thrive on the dry hills of southern California. This plant contains a resin used medicinally by the Mexicans. The plant has come into prominence through the fact that it contains a high percentage of rubber (thirty to fifty per cent). A syndicate has secured possession of all plants about Torreon, Mexico, where it is most abundant. The rubber obtained from this plant is of fair quality, and is said to be exported very largely. Whether this plant can be cultivated readily is a matter which must be determined experimentally. Efforts to secure seed and living plants have thus far failed.

618. **Parthenium integrifolium** L. Prairie dock. *Compositæ*.

An infusion of this plant is used as a substitute for quinine in the treatment of fever and ague. It is used by the Indians as well as settlers. (Am. Journ. Pharm., pp. 494-495, 1882.)

619. **Paullinia pinnata** L. "Timbo." *Sapindaceæ*.

This plant is used medicinally in certain portions of the United States. It enjoys a considerable reputation and has received much attention on the part of students of materia medica. (Proc. A. Ph. A. 25: 189, 1877.)

620. **Pectis augustifolia** Torr. *Compositæ*.

A small composite with intensely fragrant flowers, odor of essence of lemon. This and one other species appears to have a special action on the salivary glands. (U. S. Geog. Surv. Wheeler's Rep. Bot. 3: 608, and 6: 46.)

621. **Pectis papposa** H. and G. *Compositæ*.

Lemon odor like that of the preceding species. May prove of great value as a source of desirable extract for the use of the confectioner. (U. S. Geog. Surv. Wheeler's Rep. Bot. 6: 46.)

622. **Pelargonium odoratissimum** Ait. Rose geranium. Nutmeg geranium. *Geraniaceæ*.

Extensively cultivated as a fragrant ornamental plant. The oil obtained from the leaves is much used as an adulterant of attar of rose, and is also used in the manufacture of perfumery. Three species are said to contain the fragrant oil, **P. roseum**, **P. capitatum** and the above.

623. **Perezia microcephala** Gray. *Compositæ*.

A root decoction is used in the treatment of asthma, as a throat wash, as a laxative, etc. The plant is found along the coast, from Monterey to San Diego.

624. **Perezia nana** Gray. *Compositæ*.

This and other species enjoy a use similar to the above. (Proc. A. Ph. A. 32: 149-155, 1884.)

625. **Persea gratissima** Gaertner. Alligator pear. *Lauraceæ*.

A native of tropical America which thrives well in the southern portions of the State. The pulp of this fruit is highly prized as an ingredient of salad dressings. Mexicans used the seed as an anthelmintic, and in the form of a liniment in the treatment of neuralgia.

626. **Persica vulgaris** Miller. Peach. *Rosaceæ*.

A well-known fruit tree extensively cultivated throughout the State. The leaves are laxative and sedative, due to the hydrocyanic acid present. Have been used in the treatment of whooping cough and in bladder irritation. Flowers are laxative and are used as a vermicide.

Poisonous in large doses. Peach oil made from the seeds is used as an adulterant of oil of sweet almonds. The expressed fruit juice yields peach brandy.

627. **Petasites palmata** Gray. Coltsfoot. *Compositæ*.

The Indians use this plant in the treatment of grippe, of consumption, as an application for sores, etc. The ash is rich in salt. (Contrib. U. S. Nat. Herb. 7: (No. III.) 395.)

628. **Peucephyllum schottii** Gray. *Compositæ*.

Said to be useful in the treatment of kidney and bladder trouble. Reported by H. H. Barton of Bishop, Cal.

629. **Peucedanum species.** *Umbelliferae*.

The roots of nearly all species are used as food by Indians. Some have medicinal properties. (See "Osha.") They contain peucedamine. (Am. Journ. Pharm., 1890.)

630. **Peucedanum grayii** C. and R. *Umbelliferae*.

This plant is reported to be poisonous. The poisonous principle requires further investigation.

631. **Peucedanum montanum.** *Umbelliferae*.

This is reported to be poisonous.

632. **Peucedanum palustre** Moench. Marsh parsley. *Umbelliferae*.

A European marsh plant, introduced into the State and elsewhere. The dried roots are aromatic and acridly pungent. In Russia this plant is used in the treatment of epilepsy.

633. **Peucedanum platycarpum.** *Umbelliferae*.

Reported to be poisonous. Requires further study.

634. **Peucedanum scopularum** Gray. Indian cabbage. *Umbelliferae*.

Indians eat the upper portions of the succulent stems, either raw or cooked. Said to have some medicinal properties.

635. **Peucedanum utriculatum.** Nutt. Fir elover. *Umbelliferae*.

The Indians eat the young leaves raw. (Contrib. U. S. Nat. Herb. 7: (No. III), 373.)

636. **Peumus boldus** Molina. Boldo. *Monimiaceæ*.

Grown experimentally in different parts of the State. A native of the Chilean Andes. Well known medicinally; has anæsthetic properties.

637. **Phacelia grandiflora** Gray. *Hydrophyllaceæ*.

Reported to be poisonous for some people. Requires further study.

638. **Phalaris arundinacea** L. Reed canary grass. *Gramineæ*.

By some reported to be poisonous, although this is denied by others. It is declared that the symptoms of poisoning are due to the presence of ergot, which is found upon it.

639. **Phoradendron species.** Mistletoe. *Loranthaceæ*.

The mistletoes occur abundantly on the junipers. The dried plant, powdered and mixed with a little flour, is sprinkled on the saddle sores of horses.

640. **Phoradendron flavescens** Nutt. Mistletoe. *Loranthaceæ*.

Found upon oaks and the buckeye. The Indians state that the plants found upon the buckeye are very useful medicinally. Used in the treatment of toothache, for which purpose the leaves are chewed. (Contrib. U. S. Nat. Herb. 7: (III), 344.) (Bull. Tor. Bot. Club 31: 435-443, 1904.)

641. **Physalis alkekengi** L. Alkekengi. Winter cherry. *Solanaceæ*.

A native of Southern Europe, cultivated in the United States. The berries, which are eaten, have laxative and diuretic properties, and are used in the treatment of fever.

642. **Phragmites vulgaris** Lam. *Gramineæ*.

Rich in sugar. The stalks are eaten as a substitute for sugar cane stalks.

643. **Phytolacca decandra** L. Poke root. *Phytolaccaceæ*.

Well known medicinally. Easily cultivated in the State of California. (See text-books on Materia Medica and U. S. D.)

644. **Phytolacca dioica.** Poke root. *Phytolaccaceæ*.

Well-known medicinal plant. **P. acinosa** of Japan is well known for its diuretic and poisonous properties. Other species are found in the State.

645. **Pimpinella anisum** L. Anise. *Umbelliferae*.

This plant thrives exceedingly well throughout the State. It could undoubtedly be cultivated profitably. The plant is well known and requires no further description.

646. **Pinus species.** Pines. Evergreens. *Coniferae*.

The pines are well represented in the State of California. There are many native as well as introduced species. The resinous exudate of the partially burned basal parts of **P. lambertiana** Dougl., loses its resinous qualities and becomes sweet, resembling manna for which it is sometimes substituted. This resin is said to have cathartic properties. The seeds from the immense cones are eaten by the Indians. In fact, pine seeds constitute a very important article of diet of the California Indians. Pine pitch is used in making and repairing canoes, tents, and in fastening arrow feathers, arrow heads, etc. The dry powdered resin is used as a dusting powder for sores and ulcers. Settlers mix the resin with corn meal and apply as a poultice to produce

counter-irritation. (Calif. Geog. Surv. Bot. **2**:123.) (Contrib. Nat. Herb. **7**:306-307.) (Proc. A. Ph. A., **26**:1878, **27**:1879.)

647. **Pinus contorta murrayana** Bulf. Murray's pine. *Coniferae*.

The wood of this tree is much used by the Indians in making tent poles, as fuel, etc.

648. **Pinus lambertiana** Dougl. Lambert's pine. Sugar pine. *Coniferae*.

The saccharine exudation has already been referred to. This is one of the handsomest and most highly valued of the California pines. The gum of the variety **monticola** is used as chewing gum.

649. **Pinus monophylla** Torr. Nevada nut pine. Piñon pine. *Coniferae*.

Rich in resin. The roasted seeds are eaten. (Calif. Geog. Surv. Bot. **2**:124.)

650. **Pinus ponderosa** Dougl. Yellow pine. *Coniferae*.

The gum exudation is used medicinally and as an adhesive agent in tent and canoe making, etc. The gum is also used for chewing purposes. (Contrib. U. S. Nat. Herb. **7**: (No. III), 307.)

651. **Pinus sabiniana** Dougl. Digger pine. *Coniferae*.

The nuts of this tree form the principal winter fruit of the Digger Indians. The seeds are rich in fat (51.5%) and proteids (28.05%). The yellow pitch is applied as a protective covering to sores, wounds and burns, and is used as a counter-irritant. The bark infusion is given in consumption. Steamed twigs and leaves are said to be useful in rheumatism and for bruises. (Contrib. U. S. Nat. Herb. **7**: (III), 307.)

652. **Pinus torreyana** Parry. Torrey pine. *Coniferae*.

A comparatively rare tree of southern California. The fruits are eaten by the Indians.

653. **Pirus species and varieties**. Pears, apples, etc. *Rosaceae*.

The multitudinous variety of apples, pears and quinces are extensively cultivated throughout the State. Some California apples are deficient in flavor.

654. **Pistacia mexicana**. Pistacia nut. *Anacardiaceae*.

A Mexican plant introduced into California. Contains a resinous juice. Requires further study.

655. **Pictacia vera** L. Pistachio nut. *Anacardiaceae*.

A native of the Orient and Mediterranean countries, cultivated in California. The green seeds are much used as a coloring agent (green) in confections and ice creams. **P. terebinthus** yields the fragrant tur-

pentine, which was used medicinally in the time of Hippocrates. **P. vera** may be grafted on **P. terebinthus**.

656. **Pittosporum species.** Coffee trees. *Pittosporaceæ*.

Handsome ornamental trees from Australia. The seeds are enclosed in a resinous exudate, which should be studied more carefully.

657. **Pittosporum undulatum** Nutt. *Pittosporaceæ*.

The blossoms of this tree yield a volatile oil, having the odor of jasmine flowers.

658. **Plagiobothrys campestris** Greene. Snowdrop. *Boraginaceæ*.

The tender shoots, flowers and seeds of this plant are eaten. A coloring substance is found in the young leaves resembling that obtained from **Alkanna tinctoria**. This substance is also found in other species, notably in **P. ursinus** of California. (Pammel and Norton, Ninth Annual Report of the Mo. Bot. Gardens, pp. 149-151.) (Contrib. U. S. Nat. Herb. 7: 382.)

659. **Plagiobothrys (Eritrichium) nothafulvus** Gray. *Boraginaceæ*.

Indians use the roots in preparing a red face paint. May prove of commercial value. (U. S. Geog. Surv. Wheeler's Report Bot. 6: 47.)

660. **Plantago species.** Plantains. *Plantaginaceæ*.

Introduced, and native species are common. They are reported to have diuretic properties. The Indians eat the seeds of **P. patagonica nuda** Gray. **P. patagonica californica** is said to be poisonous. (Calif. Geol. Surv. Bot. 2: 478.)

661. **Plantago major** L. Plantain. *Plantaginaceæ*.

Infusion of leaves used as gargle in diphtheria. Poultices made from leaves for reducing swellings from poisonous insect bites.

662. **Podophyllum peltatum** L. May apple. *Berberidaceæ*.

This small woodland plant of the Eastern States and Canada could no doubt be introduced into California. It requires rich, shady soil. Well known medicinally.

663. **Pogogyne parviflora** Benth. *Labiataæ*.

A fragrant herb used much like Yerba Buena. The leaves placed in houses are said to drive away fleas and other pests. Used as a tea, as a counter-irritant in colic, etc.

664. **Polygala species.** *Polygalaceæ*.

Most of the species contain a bitter principle and are used medicinally. The native species are woody perennials. **P. senega** is not found in the State, although it could no doubt be cultivated. (Cal. Geol. Surv. Bot. 1: 58-59.)

665. **Polygala boykinii** Nutt. *Polygalaceæ*.

This plant is said to have the properties of the Southern senega. (Proe. A. Ph. A. 30: 1882.)

666. **Polygala senega** L. Senega. The true senega is becoming somewhat rare, and its culture would undoubtedly prove a success financially. It requires fairly rich moist soil.

667. **Polygonatum multiflorum** Ell. Solomon's Seal. *Liliacæ*.

A European plant found everywhere in and out of cultivation. The berries and flowers are poisonous. Formerly much used in skin diseases and as a cosmetic. (U. S. D.)

668. **Polygonum amphibium** L. *Polygonacæ*.

Used in tanning in the Western States; said to contain 18 per centum of tannin. Used as a substitute for true sarsaparilla.

669. **Polygonum aviculare** L. Yard grass. Goose grass. *Polygonacæ*.

A very common weed in fields and yards. A decoction of this plant mixed with oak bark is used as an astringent, by Indians as well as whites. Used in kidney diseases. The fibrous roots are used as a substitute for quinine. The seeds are said to be emetic and cathartic. (Contrib. U. S. Nat. Herb. 7: 3, 345.)

670. **Polygonum hydropiper** L. Smartweed. Water pepper. *Polygonacæ*.

A yellow dye is obtained from this plant, which is used commercially in Europe. Used medicinally in the treatment of chronic ulcer and in kidney diseases.

671. **Polygonum multiflorum**. *Polygonacæ*.

The roots of this plant are eaten raw; said to become bitter on boiling.

672. **Polygonum nodosum** Pers. *Polygonacæ*.

This plant resembles **P. hydropiper**.

673. **Polygonum punctatum** Ell. Dotted smartweed. *Polygonacæ*.

Properties and uses like those of **P. hydropiper**. (Proe. A. Ph. A. 27: 147, 1879.)

674. **Polypodium californicum** Kaulf. Polypody fern. (*Polypodiaceæ*.) Filices.

The juice of this plant is used by Indians in the treatment of rheumatism and to rub on sores. An extract is used in the treatment of sore eyes. (Contrib. U. S. Nat. Herb. 7: 303.)

675. **Polyporus species.** Bracket or shelf fungi. *Polyporiaceæ*.

Some of these fungi are eaten by Indians as well as by whites. They have but little food value, being entirely too woody. (Contrib. U. S. Nat. Herb. 7: 300.)

676. **Polytrichum juniperinum.** Hair cap moss. Robin's eye. *Bryoideæ*.

This moss is said to be a powerful diuretic, useful in the treatment of dropsy. Other species of moss have similar properties, but are now but little employed by physicians.

677. **Populus species.** Poplars. *Salicaceæ*.

Cultivated as ornamental shade trees. The buds of **P. balsamifera** L. and of other species are highly balsamic, and have been used in kidney, pectoral and rheumatic complaints. The bark of several species (**P. tremuloides** and others) is used as a tonic remedy. (Am. Journ. Pharm. 226, 1892.) (Am. Journ. Pharm. 240, 1889.) (U. S. D.)

678. **Populus fremontii** Wats. Fremont's cottonwood. *Salicaceæ*.

The Indians use a bark decoction as a wash for bruises and cuts, especially for the sores on horses caused by saddle chafing.

679. **Populus tremuloides** Michx. American aspen. *Salicaceæ*.

Indians use the bark of this tree in intermittent fevers. It is likewise a popular domestic remedy, used as a tonic in fevers and malaria. The bark contains salicin and populin. (U. S. Geog. Surv. Wheeler's Rep. Bot. 6: 51.)

680. **Porphyra laciniata** Ag. Seaweed. *Bangiaceæ*.

A seaweed of the Pacific Coast used as food by the Indians and Chinese. Rich in salt and mucilage. (Proc. Cal. Acad. of Sc. Bot. 2: 230, series 3). (U. S. Nat. Herb. 7: 299.)

681. **Porphyra vulgaris** Ag. Seaweed. *Bangiceæ*.

Properties and uses like the preceding species. (Proc. A. Ph. A. 27: 134, 1879.)

682. **Portulaca oleracea** L. Common purslane. *Portulacaceæ*.

Common in low lands. Used medicinally by the Indians. Also enjoys an extensive popular medicinal use.

683. **Potentilla species.** Cinquefoil. *Rosaceæ*.

There are many California species, most of which are perhaps of no medicinal value. **P. canadensis** L. and **P. argentea** L. have been used as astringents in dysentery, chronic catarrh, night sweats, etc. The roots of **P. sylvestris** Neck (**P. tormentill**, **Tormentilla potentilla**, **P. erecta**) are rich in tannin, and are much used as an astringent remedy, and in tanning. They yield a red dye. These species are, however, not reported from the State.

684. **Potentilla glandulosa nevadensis** Wats. *Rosaceæ*.

A decoction of the stem and leaves is used in the treatment of headache and stomach-ache. Its value is undoubtedly due to its astringent properties. (U. S. D.)

685. **Potentilla reptans** L. Cinquefoil. *Rosaceæ*.

This European plant and the American **P. canadensis** L. have been used as astringents in dysentery, catarrhs, etc.

686. **Prinos (Ilex) verticillata** Gray. Black alder. *Aquifoliaceæ*.

A shrubby tree extensively cultivated. Well known medicinally. The bark, and occasionally the berries, are used as a tonic and astringent in the treatment of dysentery. A decoction is used as an application to ulcers.

687. **Prosopis (Algarobia) juliflora** C. *Leguminosæ*.

Indians mix the gum from this plant with mud and apply it to the head to kill lice and other parasites. A blue stain from the leaves and fruit is used as a face paint. The fruit is eaten.

The gum, which resembles gum arabic, has commercial value. The seeds are rich in grape sugar (30 per cent) and are used as food for cattle. Indians prepare an alcoholic drink from the seeds.

The pods and seeds are made into a meal and eaten by the Indians, and also form an excellent fodder for horses. It is reported that confectioners use large quantities of the gum, and that it promises to be of enormous value commercially. **P. pubescens** is similarly used. (Proc. A. Ph. A. 27:253-255, 1879.) (U. S. Geog. Surv. 3:607.) (U. S. Geog. Surv. Wheeler's Rep. Bot. 6:42.) (Wiesner's Rohstoffe 1.)

688. **Prunus species.** *Rosaceæ*.

Useful fruit trees, common everywhere. Seeds, leaves and other parts of these trees contain hydrocyanic acid to which they owe their medicinal properties. Cases of poisoning following the eating of fruits and seeds (kernels) have been reported. The young wilted foliage of some cherry trees has proven poisonous to cattle. (Cal. Geol. Bot. 1:166.)

689. **Prunus andersonii** Gray. *Rosaceæ*.

The fruit is eaten by the Coahilla Indians.

690. **Prunus caroliniana** Ait. Laurel cherry. *Rosaceæ*.

Common in the southern coast States and is cultivated in California. Grown as an ornamental plant and as a hedge. The poisonous principle which it contains requires further study.

691. **Prunus demissa** Walp. Western wild cherry. *Rosaceæ*.

This plant is poisonous. It has tonic and diuretic properties.

692. **Prunus domestica** L. Plums. Prunes. *Rosaceæ*.

Plums in great variety, including the prune plum, are extensively cultivated in California. Prunes have mild laxative properties. Cherries are also cultivated in great variety.

693. **Prunus ilicifolia** Walp. Islay. *Rosaceæ*.

The Indians prepare an alcoholic drink from the fruit. The dry leaves are very poisonous.

694. **Prunus laurocerasus** L. Cherry laurel. *Rosaceæ*.

A European plant common in Mexico and thrives well in different parts of the State. Poisonous.

695. **Prunus serotina** Ehr. Wild black cherry. *Rosaceæ*.

Well known medicinal plant which thrives well in California. Fatal cases of poisoning have been reported, due to the eating of fruits, seeds and leaves. The bark is much used in the preparation of cough remedies.

696. **Prunus subcordata** Benth. *Rosaceæ*.

The Indians eat the fruit fresh and also dry it for winter use.

697. **Prunus virginiana** L. Chokecherry. *Rosaceæ*.

A common tree of the United States, which has been a frequent source of fatal poisoning. The fruits are very poisonous. The names **P. virginiana** and **P. serotina** are generally confused.

698. **Pseudotsuga taxifolia** Britt. Douglas spruce or fir. *Conifera*.

A drink is prepared from the leaves, which is used as a substitute for coffee. A strong decoction made from the spring buds is used in the treatment of venereal diseases. The leaves are used by the Indians in the sweat bath to cure rheumatism.

699. **Psoralea carylifolia** Roxb. *Leguminosæ*.

The seeds are used in the treatment of leucoderma (white leprosy).

700. **Psoralea physodes** Dougl. *Leguminosæ*.

A native of California popularly employed as a tonic and emmenagogue. Other species are similarly used.

701. **P. soralea tenuiflora** Pursh. *Leguminosæ*.

This plant is said to be poisonous.

702. **Ptelea trifoliata** L. Wing seed. Water ash. *Rutaceæ*.

The bark is much used by Western physicians in the treatment of dyspepsia, and in ailments requiring a mild non-irritating bitter tonic.

703. **Pteris (pteridium) aquilina** L. Bracken fern. *Polypodiaceæ*.

Used by the Indians in making baskets. The rhizomes are said to be eaten by them. Are given to horses as a diuretic, but its action is

said to be violent and dangerous. Used also to destroy tape worm. (Contrib. U. S. Nat. Herb. 7:304.)

704. **Pulsatilla hirsutissima** Brit. *Ranunculaceæ*.

Reported to be poisonous.

705. **Puniaca granatum** L. Pomegranate. *Lythriaceæ*.

Well known fruit tree, extensively cultivated in southern portions of the State. Well known medicinally. (Proc. A. Ph. A. 28:176, 1880.)

706. **Purshia tridentata** D.C. *Rosaceæ*.

Indians use a decoction of the leaves as a cough medicine. The directions are "take lots of leaves, drink about a cup full."

707. **Pyrethrum species and varieties.** *Compositæ*.

Many species and varieties are cultivated, including **P. roseum** and **P. cinerariæfolium**, from which insect powders are made. Several brands of insect powders are manufactured in California, including the well-known buhach.

708. **Pyrola picta** Smith. White veined skin leaf. *Ericaceæ*.

Plasters and poultices made from the leaves are applied to bruises and sores.

709. **Pyrola rotundifolia bracteata** Gray. Indian lettuce. Canker lettuce. *Ericaceæ*.

A tincture of the fresh plant is used in the treatment of ulcers, sores and cancer.

710. **Pyrus cydonia** L. Quince. *Rosaceæ*.

This well-known fruit tree is common throughout the State of California.

711. **Quercus species.** Oaks. *Cupulifera*.

Some of the California oaks (**Q. lobata**, **Q. agrifolia**) are remarkable for size and grandeur. Nine species occur within the State. The bark of **Q. densiflora** (California tan bark oak) is very rich in tannin, used medicinally, and also in tanning. The seeds of the several species are roasted and eaten by Indians, and constitute a very important article of diet. Small galls of the size of a pea are common on the California live oak. Large galls, several inches in diameter, occur on another species of oak (**Q. lobata**, California oak galls) which are reported to be rich in tannin.

The fresh galls are used in the treatment of sore eyes. The bark of **Q. lobata** is used in the treatment of dysentery. The bark of **Q. californica** and **Q. douglassii** is mixed for tanning purposes. (P. H. Lane: Cal. Tan Bark Oak, Cal. College of Pharm., Thesis, 1902.) (Contrib. U. S. Nat. Herb. Vol. 7: No. 3), (Contrib. U. S. Nat. Herb. 7:343), (Proc. A. Ph. A. 27:275, 1879.)

712. **Ramalina reticulata**. Beard moss. Old man's beard. *Lichens*. Common on California live oak, hanging in long tufts from the branches. Also found on pines and other trees. Used for bedding and as a packing material. At one time used as a hair tonic. Has no medicinal value.

713. **Ramona (Audebertia) species**. Sage. Greasewood. Humming bird sage. *Labiatae*.

Noted honey yielding plants of Southern California. The honey from the flowers is of extra quality. The following are the more common species: **A. stachyoides** Benth., **A. nivea** Benth., **A. grandiflora** Benth. and **A. polystachia** Benth.

714. **Ranunculus species**. Crowfoot. *Ranunculaceae*.

Most of the species have acrid properties and are poisonous. **R. flammula** L., **R. scellaratus** L. and other species found in the State contain alkaloids (ranunculine) which are highly irritating and poisonous. The fresh leaves of several species are applied externally for blistering purposes. There are many native species.

715. **Ranunculus eisenii** Kellogg. Buttercup. *Ranunculaceae*.

This species contain an acrid, more or less poisonous principle, characteristic of the group. The parched seeds are eaten by Indians. The seeds of **R. californicus** are also eaten. (Cal. Geog. Surv. Bot. 1: 4.)

716. **Razoumofskya (Arceuthobium) occidentalis** K. Pine mistletoe. *Loranthaceae*.

A mistletoe parasitic on the digger pine. A decoction of the plant is used by Indians to relieve pain in the stomach. (Contrib. U. S. Nat. Herb. 7: 3, 345.)

717. **Reseda alba** L. White Mignonette. *Rcsedaceae*.

Escaped from gardens native of Europe. Perhaps useful as a diaphoretic and diuretic.

718. **Reseda luteola** L. Dyer's weed. *Rcsedaceae*.

Contains a yellow dye which has been used commercially. (Cal. Geog. Surv. Bot. 1: 53.)

719. **Reseda odorata** L. Common mignonette. *Rcsedaceae*.

A common European garden plant, which has escaped from cultivation. Similar in action to **R. luteola**.

720. **Rhamnus species**. Buckthorns. *Rhamnaceae*.

These constitute the most important medicinal trees of California. Their medicinal value is widely and favorably known. There is some confusion on the part of collectors and dealers with regard to species and varieties. Physicians and pharmacologists are not clear as to their

exact comparative medicinal value. The Indians have long made medicinal use of these plants and the whites ascertained their therapeutic value from the Indians. (See Dispensatories and Materia Medicae.)

721. **Rhamnus californica** Eshw. Cascara sagrada (sacred bark). Coffee berry. *Rhamnaceæ*.

Very common in California, varying in size from a small shrub to a tree of fair proportions. Readily cultivated. Common along the coast region.

722. **Rhamnus californica tomentella** Br. and Wats. California coffee tree. Sacred bark. *Rhamnaceæ*.

This tree is found in the interior of California, and is closely similar to the species both as to appearance and as to properties. A decoction is used as a poison oak remedy. The seeds are said to be used as a substitute for coffee.

723. **Rhamnus crocea ilicifolia** Greene. *Rhamnaceæ*.

The Piute Indians have used this plant as a cathartic and diuretic. The berries are eaten as food, and it is said that they tinge the veins red, due to a deposit of coloring matter.

724. **Rhamnus ilicifolia** K. Buckthorn. *Rhamnaceæ*.

Used medicinally by Indians. Has an orange-colored inner bark. Requires more careful study. (Contrib. U. S. Nat. Herb. 7:369.)

725. **Rhamnus purshiana** D. C. Cascara sagrada. *Rhamnaceæ*.

This species is exceedingly abundant in Oregon and Washington, somewhat less abundant in northern California. This is supposed to be the true medicinal sacred bark.

726. **Rheum species and varieties.** Rhubarbs. *Polygonaceæ*.

The rhubarbs, culinary as well as medicinal, thrive well in the State, particularly in the Coast region. The plants are propagated from seeds and from the lateral shoots, which are set out about six to eight feet apart, and left to grow from four to seven years, when the roots are dug up during dry weather, peeled and cut into pieces, varying in size. The initial drying is done in the open and completed by artificial heat, not to exceed 80° F. (See Chap. III.) (Proc. A. Ph. A. 25:132, 1877), (Proc. A. Ph. A. 26:196-201, 1878), (Proc. A. Ph. A. 23:145, 1875.)

727. **Rhododendron californicum** Hook. California rose bay. *Ericaceæ*.

It is stated that the honey made from the flowers of this plant is poisonous. The same is reported of the honey from **R. occidentale** Gray. The leaves and roots of the latter plant are said to contain a powerful narcotic poison.

728. **Rhododendron maximum** L. Great laurel. *Ericaceæ*.

Eastern in range; cultivated throughout the State. Poisonous. Requires further study.

729. **Rhododendron occidentale** Gray. Azelea. *Ericaceæ*.

Cultivated as an ornamental plant. Related to the Siberian **R. chrysanthemum**. (Proc. A. Ph. A. 30: 190, 1882.) (Proc. A. Ph. A. 29: 225-231, 1881.)

730. **Rhus diversiloba** T. and G. Poison oak. *Anacardiaceæ*.

Perhaps the greatest pest in California. The most annoying of all poisonous weeds. Said to be used by the Indians to counteract rattlesnake poisoning and to remove warts.

731. **Rhus integrifolia** B. and H. Sumac. Lemonade berry. *Anacardiaceæ*.

Rich in tannin. The seeds are used by Indians to prepare a cooling drink. May prove of commercial value. The fruits of **R. laurina** Nutt, and **R. ovata** Wats., are similarly used. The Indians use a tea made from the leaves of the latter species in the treatment of coughs and colds, and for pains in the chest. **R. succedanea**, **R. vermicifera** and **R. sylvestris**, yield illuminating wax. (Proc. A. Ph. A. 26: 295, 1878.)

732. **Rhus toxicodendron** L. Poison ivy. *Anacardiaceæ*.

Common throughout the United States, having properties similar to those of poison oak. Rare in California.

733. **Rhus trilobata** Nutt. Red fruited sumac. *Anacardiaceæ*.

Indians powder the berries, making a lotion used in the treatment of smallpox. The fruit is pleasantly acid, and is eaten by the Indians. A stem decoction is said to be excellent for coughs and lung trouble.

734. **Rhus vernix** L., (**R. venenata** D. C.) Poison sumac. *Anacardiaceæ*.

An Eastern poisonous plant which is spreading westward rapidly.

735. **Ribes species**. Gooseberries and currants. *Rosaceæ*.

The fruits have agreeable acid qualities and are eaten raw, cooked and preserved. Numerous varieties and forms are cultivated in the State. There are several native species. Among them **Ribes cereum** Dougl., of which the fruit is eaten by the Indians.

736. **Ricinus communis** L. Castor oil plant. *Euphorbiaceæ*.

A very common ornamental plant, which could be grown commercially. Well known medicinally. There are several varieties.

737. **Robinia pseudacacia** L. Locust tree. *Leguminosæ*.

A handsome ornamental tree with very fragrant flowers. The root bark is much used by the eclectics; said to have tonic, purgative and

emetic properties. Several active principles have been isolated. Poisonous. (U. S. D.)

738. **Roccela tinctoria** A. Orehil. Cudbear. Litmus. *Lichenes*.

This liehen is rare in California; abundant in Lower California. It was at one time a most important article in the dyeing industry.

739. **Romenya coulteri** H. California tree poppy. Matillija poppy. *Papaveraceæ*.

Well known native ornamental plants of southern California, with large showy flowers; very extensively cultivated in the State. There are several varieties or species. (**R. coulteri** Harv., and **R. trichocolyx** Eastwood.) The Indians of Lower California prized the curative powers of these plants very highly.

740. **Rosa species and varieties.** Roses. *Rosaceæ*.

Every one who has resided in California knows in what profusion roses grow throughout the State. The **Attar of rose** (oil of rose) yielding species and varieties would thrive fully as well as others. Attempts should be made to introduce the best attar varieties from Turkey, Bulgaria, France and other countries. No doubt the fragrance of some of the more suitable varieties could be increased by crossing, artificial selection and by special culture methods. The cultivation of the attar yielding roses and manufacture of the oil should be studied at Kizanlik, Bulgaria, and in other attar producing countries, as a preparation to begin similar enterprises in California. The late Dr. A. P. Whittell experimented with roses near Los Gatos some years since, producing a fine quality of attar. It is stated that a good quality of attar of rose has been obtained in California from the "American Beauty" rose, which is very fragrant. The Kizanlik oil of rose is worth six dollars per ounce. It is frequently adulterated.

The petals of **Rosa gallica** and varieties and the undeveloped buds of **R. centifolia** have market value.

741. **Rosa californica.** *Rosaceæ*.

A large plant attaining a height of ten feet or more. The tender shoots are made into a tea. The old straight wood is used for arrow shafts by the Indians. The leaves and petals are rich in tannin and possess astringent properties.

742. **Rosmarinus officinalis** L. Rosemary. *Labiataæ*.

A well-known plant cultivated every where. Used as a stimulating tonic. Yields rosemary oil. Well known medicinally.

The statements made under lavender also apply here. The flowers are worth about ninety-five cents per pound and the oil about \$1.50 per pound. The oil is used principally in perfumery, ointments, liniments and lotions. (See **Mentha** and **Lavendula**.)

743. **Rubia tinctorum** L. Madder. *Rubiaceæ*.

The plant has some medicinal use, but is cultivated principally for the dye (madder) which it yields and which is a highly valued pigment used by artists. It thrives well in the State under cultivation. The grower should also manufacture and market the dye. Full directions and suggestions for culture and manufacture must be sought elsewhere. (U. S. D. 1.) (U. of C. Exp. Sta. Rep. p. 244, 1890.)

744. **Rubus species.** Raspberries and blackberries. *Rosaceæ*.

Numerous native and introduced species and varieties occur in the State. The fruits are highly relished. The bark leaves and the fruits are used medicinally. The noted Loganberry is an acidulous fruit for convalescents. Highly prized for jellies and preserves. It is a cross between the raspberry and blackberry. (Dispensatories and Materia Medica.)

745. **Rubus idæus** L. Raspberry. *Rosaceæ*.

The red and black varieties are extensively cultivated in the State.

746. **Rubus vitifolius** C. and S. Blackberry. *Rosaceæ*.

This native plant is rich in tannin and could no doubt be substituted for the official species.

747. **Rumex species.** Dock. *Polygonaceæ*.

Many species occur within the State. They have medicinal properties. Several species have been grown commercially. Some are very troublesome weeds.

748. **Rumex crispus** L. Yellow dock. *Polygonaceæ*.

Used in cutaneous diseases, scrofula, syphilis, etc. The leaves are eaten as greens, and the seeds are made into a mush. Decoction given for inflammation of bladder, fevers and colds.

749. **Rumex hymenasepalus** Torr. Canaigre. Wild pie plant. *Polygonaceæ*.

This plant is very rich in tannin and has been grown on a commercial scale in California. Used in tanning. Used medicinally by Indians and Mexicans; also used as an article of diet.

750. **Ruta graveolens** L. Rue. *Rutaceæ*.

A well-known pot herb extensively cultivated everywhere. Used as a condiment and in the treatment of hysteria, colic, etc.

751. **Sabal serrulata** Nutt. Saw palmetto. *Palmaceæ*.

A native of the Southern states, which grows in the southern portions of California. The fruit with the pericarp (putamen) removed is used medicinally as a diuretic, nerve sedative, tonic and expectorant, and is official in the United States Pharmacopœia.

752. **Sabatia species.** Centaury. *Gentianaceæ*.

Much used in popular medicine; valued as a tonic and antiperiodic. Used as a substitute for quinine in the Southwest.

753. **Saccharum officinarum** L. Sugar cane. *Graminæ*.

This is the sugar cane of the South, and may be grown in portions of southern California. It yields sugar and syrup, used in medicine chiefly as a vehicle.

754. **Sagittaria latifolia** Willd. Common arrowhead. *Alismaceæ*.

Common in California on river islands and along the river shores of the interior. The tubers are highly relished by the Chinese and Indians.

755. **Salicornia ambigua** Michx. Pickleweed. *Chenipodiaceæ*.

This and other species yield impure soda on combustion. Pickled and eaten in England. Relished by cattle. Used as a pot herb. (U. of C. Agr. Exp. Sta. Rep., 1895-97.)

756. **Salix species.** Willows. *Salicaceæ*.

There are eight native species. Other species and varieties are being introduced. The bark is rich in tannin; used in basket making, etc.

757. **Salix lasiolepis** Benth. Arroyo willow. *Salicaceæ*.

A strong bark decoction is used as a wash for the itch. Given internally to cure chills and fever and to cause sweating. The roots and leaves are also used medicinally, particularly in fever and ague. (Proc. A. Ph. A. 27: 274, 1897.) (U. S. Nat. Herb. 7: 331.)

758. **Salvia species.** Sage. *Labiataæ*.

Numerous species and varieties, native and introduced, are found in the State. Some are cultivated as ornamental plants, and others as garden herbs. The seeds of several native species are eaten. Sage is a popular spice and medicinally is much used as a diaphoretic. It has astringent properties. (Cycl. Am. Hort.) (U. S. D.) (Proc. A. Ph. A. 30: 172-174, 1882.)

759. **Salvia columbariæ** Benth. Sage. Chia. *Labiataæ*.

Seeds used by the Indians, in soups, etc. They are rich in mucilage. The ancient Mexicans cultivated this plant for the seed, which constituted an important article of diet. (Cal. Geol. Surv. Bot. 1: 599.) The seed meal mixed with water forms an excellent emulsion drink in gastrointestinal disorders. The mucilaginous seeds are placed under the eyelid to remove foreign particles. (Contrib. U. S. Nat. Herb. 7: 384.) (U. S. Geog. Surv. Wheeler's Rep. Bot. 6: 49.) (U. of C. Agr. Exp. Sta. Rep., page 358, 1897-98.)

760. **Sambucus canadensis** L. Elder. *Caprifoliaceæ*.

A well-known cosmopolitan medicinal plant. Thrives everywhere.

761. **Sambucus glauca** Nutt. California pale elder. *Caprifoliaceæ*.

A popular household remedy. The Indians made many medicinal uses of the leaves and bark. The flowers are considered a very valuable diuretic and diaphoretic remedy. A decoction is much used for sores, sprains, ulcers, itch, skin diseases in general, to check hemorrhage, etc.

The berries of this species are used much like those of **Sambucus canadensis**. The abundant stem pith is used as a tinder with flint and steel. (Contrib. U. S. Nat. Herb. 7: 388.)

762. **Sapium sebiferum** Roxb. Tallow tree. *Euphorbiaceæ*.

Cultivated in California; a native of Asia. The Chinese use the fat obtained from the seed for lighting purposes. (Pharm. Journ. Trans., 401, 1883; 901, 1887.)

763. **Saponaria officinalis** L. Bouncing Bet. Soapwort. *Caryophyllaceæ*.

Said to be poisonous; contains saponin; used as a substitute for soap. Has been used as a substitute for sarsaparilla in the treatment of serofulous diseases.

764. **Sarcodes sanguinea** Torr. Snow plant. *Ericaceæ*.

Found in the Sierras. Reported to be poisonous. The Indians of Montana and southern California use it to relieve toothache. The dried and powdered herb is made into a wash for the cure of ulcers, sore mouth, etc. Requires further study.

765. **Sarrecenia flava** L. Pitcher plant. *Carrecceniaceæ*.

Used as a tonic, laxative and diuretic. Other species have similar properties and uses. Some grow in the open, others require glass covers.

766. **Sarsaparilla**. (See **Smilax**.)

767. **Sassafras sassafras** Salisb. Sassafras. *Lauraceæ*.

A well-known medicinal plant which may be cultivated.

768. **Saxifraga species**. *Saxifragaceæ*.

There are native species and several introduced species are cultivated as ornamental plants. Some species contain berganin, which is said to be intermediate in action between salicylic acid and quinine. (Phar. Jour. Trans. Aug., 1888.)

769. **Saxifraga peltata** Torr. Indian rhubarb. *Saxifragaceæ*.

The Hupa Indians eat the stems. This, as well as other species, are quite rich in tannic and gallic acid.

770. **Schinus molle**. Pepper tree. *Anacardiaceæ*.

A native of South America. Extensively grown as an ornamental tree. All parts of the plant are pungent and spicy; the odor recalling that of pepper. The fruit is about the size of the pepper and like the

pepper assumes a reddish color on ripening, but otherwise there is no similarity. All parts of the plant are rich in a gum, which is used medicinally by the Peruvians. It is said to be used in diseases of the eye and to harden the gums. (H. A. Wessel, The Pepper Tree of California, Cal. Coll. of Pharm. Thesis, 1904.)

S. terebinthifolius, also a native of South America, is far less common, but is otherwise similar.

771. **Scopola carniolica** Jaq. Scopola. *Solanaceæ*.

The plant does not occur in the State. A valuable newer remedy, having properties nearly identical with those of belladonna. The drug is official. The rhizomes and leaves are used. Poisonous. Resembles belladonna in appearance and may be cultivated like that plant. For a time it was believed that it would be used as the equal to belladonna, but thus far it does not seem to meet with favor among physicians nor among pharmaceutical manufactures. (Proc. A. Ph. A. 47: 285-297, 1899.) (U. S. D.)

772. **Scorzonella (Microseris) maxima** Biot. Compass plant. *Compositæ*.

The bitter roots are eaten by the Indians. The gum from the milky juice is used as chewing gum. (Contrib. U. S. Nat. Herb. 7: 391.)

773. **Scrophularia nodosa** L. Figwort. Scrofula plant. *Scrophulariaceæ*.

A European plant naturalized in the United States. The leaves are used in scrofula, as a tonic, diuretic, diaphoretic and as a local application in hemorrhoids. The native species require further study as to chemical constituents and as to medicinal properties.

774. **Scutellaria californica** Gray. Skullcap. *Labiataæ*.

The leaves are very bitter, and the Indians are said to have used them as a substitute for quinine. Two other species are quite common in the coast ranges and Sierras (**S. tuberosa** Benth. and **S. angustifolia** Pursh.) Require further study.

775. **Sechium edule**. Choco. Vegetable pear. *Cucurbitaceæ*.

A Central American plant which thrives well in California. The large starchy roots are eaten; likewise the rather large fruits, which may be prepared like summer squash. The plant is very prolific, a hundred or more fruits ripening on one plant in one season.

776. **Sedum species**. Stone crop. *Grassulaceæ*.

The European species are much used in popular medicines; valued in the treatment of ulcers, wounds, warts, dysentery, lung troubles, etc. The native species require further study.

777. **Sempervivum tectorum** L. Houseleek. Hen - and - chickens. *Grassulaceæ*.

A common European ornamental border plant. The bruised leaves are used as a cooling application to burns and other external inflammations. The juice is said to remove warts and corns. Pieces of the leaves are used to remove corns.

778. **Senecio species.** Groundsel. *Composita*.

There are numerous native and introduced species, which are said to have medicinal properties. **S. aureus** L. (Ragwort) is used by the Indians as a counter-irritant. The European **S. vulgaris** L. enjoys an extensive popular use, particularly valued in amenorrhea. The bruised leaves are applied to sores, ulcers and swellings. The eclectics find it very useful medicinally. Several active principles have been isolated. The group is well worthy of further careful study.

779. **Senna.** (See **Cassia**.)

780. **Serenæa (Sabal) serrulata** Hook. Saw palmetto. *Palmæ*.

The fruit is rich in oil, which is obtained by crushing and expression. No alkaloid has been found. (Pharm. Archives, pages 101-116, 1899.) (See **Sabal serrulata**.)

781. **Shepherdia (Lepargyræa) argentea** Green. Buffalo berry. *Elæagnaceæ*.

A native ornamental plant, well suited to a dry soil and climate. The fruit is quite rich in acid, and is made into jelly. (Am. Journ. Pharm. Dec. 1888.)

782. **Sida hederacea** Torr. *Malvaceæ*.

Said to be demulcent and laxative. Requires further study. Abundant about Sacramento and elsewhere in the State.

783. **Sida rhombifolia** L. Jelly leaf. Queensland hemp. *Malvaceæ*.

A native of Australia. Rich in mucilage, having demulcent properties. **S. paniculata** L. of Peru is rich in mucilage and is said to be a very active vermifuge. The plants are rich in fiber, which is used as a substitute for hemp.

784. **Silene species.** Catch fly. Champion. *Caryophyllaceæ*.

Five species occur in the State, which require further study as to active constituents and properties.

785. **Silene laciniata** Cav. Yerba del India. *Caryophyllaceæ*.

Spaniards make this into a tea. Considered very useful in the treatment of sores, aches, ulcers and sprains. The Eastern species (**S. virginica**) is said to be poisonous, and a useful anthelmintic.

786. **Silybum marianum** Gaert. Mariana. *Composita*.

Seeds used as an antispasmodic. Requires further study.

787. **Simmondsia californica** Nutt. *Garryaceæ*.

A large shrub with a curious fruit. The nuts (seeds) taste something like filberts but leave a bitter after taste. The Indians use the seed as food. The Coahilla Indians prepare a drink from the ground seeds. The oil of the seeds is much used as a hair tonic.

788. **Sinapis alba** L. and **S. nigra** Koch. Mustard. *Cruciferae*.

English mustard has been grown on an enormous scale in the Lompoc Valley in California. "Mustards" of all kinds are very profuse throughout the State, growing very rank and constitute a very troublesome pest to the farmer.

789. **Sisyrinchium bellum** Wats. Star grass. Azulea. Villela. *Iridaceæ*.

A common California plant. A tea made from it is used in the treatment of fevers. A popular notion prevails that it is possible to subsist for many days on this tea alone.

790. **Sisymbrium pinnatum** Greene. Tansy mustard. Palmita. *Cruciferae*.

The seeds, cooked and seasoned with salt, with milk and sugar added, are eaten. Used largely by the old squaws.

791. **Sium cicutæfolium** Gmel. Water parsnip. *Umbelliferae*.

A poisonous plant. Children and others occasionally eat the roots, mistaking them for parsnips. (Proc. A. Ph. A. 25: 168, 1877.)

792. **Smilacina amplexicaulis** Nutt. False Solomon's seal. *Liliaceæ*. Common in woodlands along the coast. (U. S. D.)

793. **Smilax species**. Sarsaparilla. *Smilacææ*.

The medicinal sarsaparilla is not cultivated commercially within the State. No doubt certain portions of southern California would be well suited to this plant.

794. **Solanum dulcamara** L. Bittersweet. *Solanaceæ*.

A well-known foreign medicinal plant which could be cultivated very readily.

795. **Solanum nigrum** L. Black nightshade. *Solanaceæ*.

Specially common in the eastern United States, but rapidly spreading westward, and very abundant in certain localities in the State. Commonly known as deadly nightshade, and also as belladonna, and by some has been mistaken for the true belladonna. The unripe fruits are poisonous, but the ripe fruits are said to be eaten. The active constituent is solanine, whose physiological action requires further study.

796. **Solanum triflorum** Nutt. Spreading nightshade. *Solanaceæ*.
A native of the great plains. Poisonous. Requires further study.

797. **Solanum umbelliferum** Esch. *Solanaceæ*.

Fruit is mashed, oil expressed and used as an application to pimples.
Decoction of roots for stomach-ache and bowel complaints.

798. **Solidago californica** Nutt. Golden rod. *Compositæ*.

All *Solidago* species are credited with diuretic properties. Decoction of entire plant, also powder, used to clean old sores.

The golden rods are peculiar to the United States, and the golden rod is the national flower. **S. odora** Ait. was formerly official in the U. S. Pharmacopœia. This and other species have diuretic and diaphoretic properties. (Proc. A. Ph. A. 28: 146, 1880.)

799. **Sonchus oleraceus** L. Sow thistle. Milk thistle. *Compositæ*.

A common introduced weed. The brown inspissated juice is said to be a powerful hydrogogue cathartic. Combined with belladonna and aromatics, it is given in the treatment of dropsy. Used as an anti-opium remedy by the Chinese of Oakland and San Francisco. Supposed to contain a narcotic. (Proc. A. Ph. A. 24: 141, 1876.) (Pac. Pharm. 2: 113, 1908.)

800. **Sorbus aucuparia** L. Mountain ash. *Rosaceæ*.

A small tree of Europe, much cultivated as an ornamental plant. The fruit contains a saccharine substance, sorbin, which readily undergoes alcoholic fermentation. All parts of the tree are highly astringent, and may be employed in tanning. Used in the treatment of scurvy, ulcers, sores, hemorrhoids, etc. (Proc. A. Ph. A. 30: 237, 1882.)

801. **Sophora japonica** L. Japanese pagoda tree. *Leguminosæ*.

This, and other species, are cultivated as ornamental trees. Said to contain a poisonous volatile alkaloid (sophorine) similar to cytisine.

802. **Spilanthes oleracea** L. Paracress. *Compositæ*.

A native of India, which may be cultivated in the southern portions of the State. Used in India as a toothache remedy.

803. **Spiræa species**. Hardhacks. *Rosaceæ*.

Familiar shrubs cultivated everywhere. Most of the species contain a colorless volatile oil, resembling the oil of gaultheria. The roots contain tannic acid, and are used for their astringent properties. The flowers possess, in a feeble degree, the properties of salicylic acid. (Cycl. Am. Hort. 1699.)

804. **Stachys bullata** Benth. Hedge nettle. *Labiata*.

Used as cough medicine.

805. **Sterculia species.** *Sterculiaceæ.*

Several species are cultivated in the State. The fruit contains caffeine particularly that of **S. acuminata**. Sterculia gum is obtained from various Indian, African and Australian species. (Pharm. Journ. Trans. Nov. 1889.)

806. **Stipa viridula** Trin. *Gramineæ.*

It is reported that this grass has a powerful action on the brain and spinal cord. Further study is necessary. Some consider this a valuable forage plant.

807. **Suæda californica** Wats. Seablite. *Chenopodiaceæ.*

This and other species are very rich in soda salts. In Spain, plants of this kind are cultivated for purposes of yielding soda by combustion.

808. **Symphytum officinale** L. Comfrey. *Convolvulaceæ.*

A well-known medicinal plant, widely cultivated, and in places escaped from cultivation.

809. **Syringa vulgaris** L. Lilac. *Oleaceæ.*

This and other species and varieties are extensively cultivated as ornamental plants. The leaves and fruit of the above species are said to have tonic and antiperiodic properties. Contains lilicin.

810. **Tamarindus indica** L. Tamarind. *Leguminosæ.*

A well-known fruit tree cultivated in the southern portion of the State. The fruits are mildly laxative, pleasantly refrigerant, made in cooling drinks for fevers. The fruit is also made into a confection with senna. The leaves furnish a yellow dye; the flowers and fruits are used as a mordant in dyeing. The powdered seeds mixed with glue form a very lasting wood cement. A decoction of the bark is given in asthma. The plant enjoys a wide popular use in India and other tropical countries.

811. **Tanacetum vulgare** L. Tansy. *Compositæ.*

A well-known introduced medicinal plant, used as an anthelmintic, tonic, in dropsy, etc., as a local application to ulcers, and criminally to produce abortion.

812. **Taraxacum taraxacum** Karst. Dandelion. *Compositæ.*

A cosmopolitan plant common in lawns every where where it is often a great pest which is exterminated with difficulty. Root used. Not poisonous. Leaves eaten as salad and greens. Well-known medicinally. (Proc. A. Ph. A. 47: 305-307, 1899.)

813. **Taxus baccata** L. Yew. *Coniferaæ.*

This and many other species are cultivated. The fruit is very poisonous. This poisonous principle occurs in the seed rather than in the fleshy pericarp.

Taxus brevifolia Nutt. (Pacific yew) has bright red berries which are edible, but the seeds are considered poisonous. The wood is very tough. (Contrib. U. S. Nat. Herb. 7: 305.)

814. **Thalictrum species.** Meadow rue. *Ranunculaceæ*.

Many species seem to have medicinal or poisonous properties. Several have been examined and found to contain alkaloids (thalictrine), which is said to be a very powerful cardiac poison. The group requires further study.

815. **Thalictrum polycarpum** Wats. Meadow rue. *Ranunculaceæ*.

Perhaps contains thalictrine. The juice is applied externally to relieve headache. Decoction of roots used for colic and stomach-ache. Said to have the action and properties of strychnine. (Am. Journ. Pharm., page 336, 1881.)

816. **Thea (Camellia) japonica.** Japanese tea. *Ternstræmiaceæ*.

The leaves of this plant are much used as an adulterant of true tea. It does not contain any theine. (Proc. A. Ph. A. 27: 209, 1879.)

817. **Thea (Camellia) sinensis** Link. Tea. *Ternstræmiaceæ*.

A shrub extensively cultivated in China, Japan and other countries. Has been introduced into the Southern States, with varying success. Can be grown in California (southern part).

818. **Therofon (Borkinia) elatum** Greene. Boykinia. *Saxifragaceæ*.

A delicately aromatic plant growing on wet, mossy banks. The Yuki Indians use it medicinally. (Contrib. U. S. Nat. Herb. 7: 353.)

819. **Thuja occidentalis** L. Arbor vitæ. *Coniferae*.

This and other specimens are cultivated in the State. A decoction is much used in the treatment of intermittent fevers, coughs, scurvy, rheumatism, as an emmenagogue, etc.

820. **Thymus vulgaris** L. Thyme. *Labiatae*.

Thrives well in California, where it is a very common pot and garden herb. (See statements under lavender.) The oil, which is made from the leaves, is worth \$1.50 per pound, the leaves are worth about thirty cents per pound.

821. **Thysanocarpus elegans** F. and M. Lace pod. *Cruciferae*.

A leaf decoction is given in colic and stomach-ache. The seeds are eaten. (Contrib. U. S. Nat. Herb. 7: 352.)

822. **Tilia americana** L. Linden. *Tiliaceæ*.

The saccharine exudation of the leaves resembles manna. The leaves of **T. argentea** (**T. tomentosa**) are used as a substitute for tea in Greece. (Proc. A. Ph. A. 31: 145, 1883.)

823. **Torreya californica** Greene. California nutmeg. *Coniferæ*.

The seeds of this handsome tree resembles the nutmegs in form, size and markings. They are pungent and astringent, and have been used to adulterate true nutmeg. The green leaves have an odor resembling that of the tomato vine. The white fresh portion of the seeds has a bland taste, recalling that of the meat of the cocoanut. The roasted seeds are aromatic and taste something like peanuts. Eaten by Indians. (Contrib. U. S. Nat. Herb. 7: 305.) (Journ. Am. Chem. Soc. 17: 935-941, 1895.)

824. **Torula (Saccharomyces) cerevisæ** Turpin. Yeast.

This and related species and varieties constitute the omnipresent yeast organisms which convert sugar into alcohol and carbonic acid gas and several minor side products. These minute organisms are active in all alcoholic fermentations and are employed in making beer, root beer, bread, etc. The yeast cake of the grocer consists of a pure culture of the organisms, dried and pressed. Yeast fermentations and poultices are much used in swellings, boils, skin diseases, etc. There is an extended literature on the uses of the yeast organisms in commerce, in arts, in the household and in manufacture. (Proc. A. Ph. A. 9: 91, 1860.)

825. **Trichostema lanatum** Benth. Romero. Woolly blue-curls. *Labiata*.

Found in southern California. Used as a cosmetic and as an application to old sores and to inflamed tissues. The Spaniards of California look upon this plant as a panacea for many ills.

826. **Trichostema lanceolatum** Gray. Vinegar weed. Tar weed. *Labiata*.

Occurs in western California. Very rank odor; poisonous; much used as a fish poison. A leaf infusion is used as an application to cure headaches. Also used as a wash in typhoid fever. (Contrib. U. S. Nat. Herb. 7: 385.)

827. **Trifolium species**. Clovers. *Leguminosæ*.

There are many native and introduced species and varieties. The Indians use the flowers, seeds and leaves of several species as food. Medicinally these plants are reputed to have blood-purifying properties. The flower heads of red clover are used in the preparation of a quack cancer remedy. A more careful investigation of constituent and physiological action would be desirable. (Proc. A. Ph. A. 29: 222, 1881.)

828. **Trigonella fœnumgræcum** L. Fenugreek. *Leguminosæ*.

A well-known medicinal plant which thrives well in the State of California. Never given internally; used in emollient applications, plasters, poultices, etc. Much used in veterinary practice.

829. **Triosteum perfoliatum** L. Horse gentian. Bastard ipecac. *Caprifoliaceæ*.

A native of the United States, which spreads very rapidly and is very easily cultivated. It has cathartic and diuretic properties, and in large doses is emetic.

830. **Trillium species.** Bethroot. *Liliaceæ*.

The roots are very persistently pungent and have decided emetic properties. Used medicinally by Indians.

831. **Trillium sessile giganteum.** *Liliaceæ*.

The tuberous roots are used medicinally by Indians. A decoction is said to have soporific properties. The crushed roots and leaves are used as a poultice for boils, etc. (Contrib. U. S. Nat. Herb. 7: 329.)

832. **Turnera diffusa** Willd. Damiana. *Turneraceæ*.

This plant is found in the West Indies, Mexico and California. It yields the damiana of the drug market, but its action is considered unreliable. (Proc. A. Ph. A. 24: 185, 1876.) (U. S. D.)

833. **Tussilago farfara** L. Coltsfoot. *Compositæ*.

An introduced plant which spreads very rapidly. The leaves and entire plant are used medicinally in lung troubles, coughs and colds. Used in scrofula. (Am. Journ. Pharm. 340, 1887.)

834. **Typha latifolia** L. Flag tule. Cat tail. *Typhaceæ*.

Indians use roots and base of the stems as food. The down is used for bedding. Medicinal uses uncertain.

835. **Ulex europæus** L. Furze. Gorze. *Leguminosæ*.

A popular European plant, cultivated as an ornamental plant in California. The seeds contain an alkaloid (ulexine) which is similar to cytisine; used in cardiac dropsy. (U. S. D.)

836. **Ulmus species.** Elm. *Ulmaceæ*.

Several native and introduced species occur in the State. They are handsome ornamental shade plants. The bark is very rich in mucilage, and forms a very popular demulcent medicine.

837. **Umbelliferous plants.**

Members of this group occur in great variety, wild growing as well as under cultivation. Among them may be mentioned fennel, caraway, cumin, dill, parsley, angelica, conium and others.

838. **Umbellularia californica** Nutt. California laurel. Mountain laurel. *Lauraceæ*.

A tree common throughout the State. Very variable in size. All parts of the plant are highly aromatic. The leaves, which contain a volatile oil, are used as a condiment in soups. The seeds also contain oil.

The oil is said to have anæsthetic properties and is reported to be useful in nervous disorders, in intestinal colic and in atonic dyspepsia. It has antiseptic properties. Also used as a flea exterminator. (U. of C. Agr. Exp. Sta. Rep., 173, 1897-1898.) (J. M. Stillman and E. O. O'Neil, Am. Chem. Journ. 4: 206-211, 1882 and 1883.) (Proc. A. Ph. A. 31: 109, 1883.)

839. **Urginea maritima** (L.) Baker. Squill. *Liliaceæ*.

A native perennial of Southern Europe which thrives remarkably well in California, the bulbs which are used medicinally developing to large size. Grows best on loose, sandy, quite rich hillsides. In order to make culture profitable it must be done on a large scale.

840. **Urtica urens** L. Small nettle. *Urticaceæ*.

An introduced weed, having the irritating properties of the nettle group. Other species are **U. lyalli californica** and **U. holosericea** Nutt. (Cal. Geog. Surv. Bot. 2: 65.)

841. **Usnea lacunosa** Tuck. Beard moss. *Lichenes*.

A common lichen on oaks and other trees, used as bedding material. No longer used medicinally.

842. **Ustilago avenæ** Jen. Oat smut. *Fungi*.

Found on wild oats, cultivated oats and on other members of the grass family. Has the properties of corn smut. (U. S. D.)

843. **Vaccaria vulgaris** Hast. Medic. Cow herb. *Caryophyllaceæ*.

An introduced weed which is reported to have poisonous properties, although it appears to be used as a fodder plant. Requires further study.

844. **Vaccinium ovatum** Pursh. Huckleberry. *Ericaceæ*.

Found in the coast ranges of California. The berries are eaten. The leaves are astringent and have diuretic properties and are used as a substitute for **Uva ursi**.

845. **Valeriana officinalis** L. Valerian. Garden heliotrope. *Valerianaceæ*.

A well-known medicinal plant, readily cultivated every where. Flowers are very fragrant. The rhizomes and roots constitute the drug valerian, which is highly valued as a nerve sedative. Useful in hemi-crania, hysteria, low fevers, etc.

A native species (**V. Sylvatica** Banks) found in the wet grounds of the Sierras has the strong scented roots of the official species. Indians are said to use the roots for food.

846. **Vanilla planifolia** Andrews. Vanilla. *Orchidaceæ*.

A native of Mexico and cultivated in the tropics. Has been successfully and profitably cultivated in temperate countries in hothouses.

Readily propagated from cuttings; requires very rich, moist soil and much care in order to develop a good quality of vanilla. Could not be grown in the open, even in the hottest parts of the state.

847. **Veratrum viride** Ait. American hellebore. *Melanthaceæ*.

A native of the United States which is very readily cultivated; requires rich, wet, shady ground. The rhizomes and roots are used in nervous excitement, typhoid fever, convulsions, chorea, mania, etc. The rhizomes are worth about twenty-five cents per pound. This plant is closely similar to if not identical with the European hellebore. (**V. album**).

Among the native species are **V. speciosum** Rydb. (False hellebore) **V. fimbriatum** Gray. These require further study as to constituents and physiological action.

848. **Verbascum thapsus** L. Mullein. Indian tobacco. *Scrophulariaceæ*.

A large weed, introduced from Europe. Used as an adulterant of and a substitute for tobacco. The ancient Greeks and Romans used the leaves as tallow wicks in funeral torches. An old-time remedy which is but little used at the present time. Given in colds, catarrhs, etc.

849. **Veronica officinalis** L. Speedwell. *Scrophulariaceæ*.

A cultivated European plant. It is considered diaphoretic, diuretic, expectorant and tonic. Used in pectoral and nephritic complaints, diseases of the skin, and as an application to wounds. Other species are similarly used.

850. **Viburnum species**. Haw. *Caprifoliaceæ*.

V. opulus (cramp bark) and **V. prunifolium** (black haw) are well-known medicinal trees, which occur under cultivation as ornamental plants.

851. **Viola species**. Violets. Pansies. *Violaceæ*.

V. tricolor and other species are common. Has emollient and laxative properties; used in pectoral, kidney and cutaneous diseases. Medicinal value doubtful.

852. **Vitis species** and varieties. Grapes. *Vitaceæ*.

Numerous varieties extensively cultivated in the State. There is an extensive literature on grape culture and wine manufacture.

853. **Wistaria chinensis** D. C. Wistaria. *Leguminosæ*.

This handsome ornamental climbing plant is very common throughout the State. It contains a crystalline poisonous glucoside (Wistarin). (Pharm. Journ. Trans. Oct. 1886.)

854. **Wyethia species.** *Compositæ.*

The species of California have been quite generally employed medicinally. The Indians use the seeds of several species. They require further study.

855. **Wyethia helenioides** Nutt. *Compositæ.*

Used as a domestic remedy in the treatment of colds, coughs, asthma, throat diseases, influenza, etc. Found in some drug stores, and is said to be prescribed by many California physicians, especially in the country towns. The roots are bitter and aromatic.

856. **Wyethia longicaulis** Gray. Sunflower. *Compositæ.*

The Indians look upon this as a very valuable medicinal plant. A decoction is used as an eye wash, to relieve headache and as an emetic. The dried and powdered roots are applied to ulcers and sores. Also used in rheumatic diseases (in the form of a poultice).

857. **Wyethia mollis** Gray. Indian wheat. *Compositæ.*

Abundant in the Sierras, in open woods. The Modoc Indians powder the seeds and make it into a mush. The mashed roots are used as a poultice for swellings by the Klamath Indians. Seeds and roots form an important food for the Indians.

858. **Xanthium species.** Cockle burs. *Compositæ.*

X. strumarium and **X. spinosum** are found within the State. They are noxious field and yard weeds. Used medicinally and in hair tonics. (Proc. A. Ph. A. 25: 158-162, 1877.)

859. **Xanthoxylum fraxineum** L. Prickly ash. *Rutacæ.*

A well-known medicinal tree, extensively cultivated as an ornamental plant. It has diaphoretic and anodyne properties, used in earache, toothache, and in rheumatic affections. Other species are cultivated and have enjoyed various medicinal uses. **X. piperitum** is regarded by the Chinese and Japanese as a valuable poison antidote.

860. **Yucca species.** Yucca. *Liliacæ.*

Yuccas are cultivated in great variety and abundance. The tender flowering stems of some species are eaten. The Indians use the fiber for textile fabrics.

861. **Yucca mohavensis** Sarg. Amole. Wild date. Soap weed. Spanish bayonet. *Liliacæ.*

Common in southern California. The stiff, dagger-like leaves are rich in fiber. The roots are used as a substitute for soap; said to be excellent for cleansing woolen goods and hair, to which it imparts a peculiar gloss. The fruit is said to resemble the banana, and is highly relished by the Indians. (U. S. Geog. Surv. Wheeler's Rep. 6: 608.)

The Coahilla Indians eat the green fruits after roasting in a live coal fire. The raw, ripe fruits are somewhat astringent.

862. ***Yucca whipplei*** Torr. Spanish bayonet. *Liliaceæ*.

Flowering heads and stalks are roasted and eaten by the Coahilla Indians.

863. ***Zamia integrifolia***. Cooutie root. *Cycadaceæ*.

The tuberous roots are rich in starch and constitute a valued article of diet.

864. ***Zauschneria californica*** Prest. *Onagraceæ*.

Used as a wash for cuts, sores, etc., especially for horses. The dried and powdered leaves are dusted over wounds and sores.

865. ***Zea mays*** L. Indian corn. *Gramineæ*.

Various field varieties of Indian corn are extensively cultivated in certain portions of the State, particularly sweet corn and popcorn. The only part used medicinally is the corn silk (greatly elongated styles and the stigmas) which has diuretic properties. Corn smut is a fungus which attacks the grain and which has properties similar to those of ergot.

866. ***Zingiber officinalis*** Rose. Ginger. *Scitamineæ*.

This well-known spice plant may be grown commercially in the southern portions of the State. So far no one has made the attempt.

867. ***Zygadenus species***. *Liliaceæ*.

Most members of this group are poisonous. They are widely distributed throughout the State, and annually cause considerable loss to cattlemen. The poisonous constituents require further study.

868. ***Zygadenus elegans*** Pursh. Alkali grass. *Liliaceæ*.

Very poisonous. The children of Indians frequently eat of the roots with fatal results.

869. ***Zygadenus venenosus*** Wats. Hogs potato. Death camas. *Liliaceæ*.

Found in the coast ranges from Monterey to British Columbia. All parts of the plant are poisonous, the bulbs in particular, but hogs have been observed to eat bulbs greedily and without apparent ill effects. Many heads of cattle are poisoned annually due to this plant. It acts as a powerful cerebral excitant. A poultice is applied externally to cure boils and rheumatism, and to alleviate the pain of bruises and sprains.

LIST OF COMMON NAMES IN ALPHABETICAL ORDER.

(Numbers refer to number sequence of the plants mentioned in I, Chapter IV.)

	Page.
American agave, 36	60
aspen, 679	136
ginseng, 99	68
hellebore, 847	156
ivy, 71	65
saffron, 196	78
senna, 202	79
Amole, 38, 859, 861	60, 151
Angelicas, 82, 83	66
Anise, 644	109
Star, 446	109
Apple, balsam, 555	122
Apples, 653	133
Antioch mousetail, 564	123
Araucaria, 107	69
Arbor vitae, 819	152
Aragallus, 101	68
Arnica, 118-120	70
coast, 257	86
Arrowhead, 752	145
Arrowroot, 532	120
Arroyo willow, 757	145
Ash, 373	101
mountain, 800	150
Oregon, 374	102
prickly, 859	157
water, 702	138
Asparagus, 141	73
Aspen, American, 679	136
Aster, 144	73
Attar of rose, 622, 629, 738, 740	130, 143
Australian pine, 34	59
Azalea, 729	142
Azulea, 789	149
Balm, 540	120
California, 336	97
Balsam, apple, 555	122
root, 155	75
of tolu, 463	111
Bamboo, 130	71
Banana, 562	123
Baneberry, 23	58
Barbados, aloes, 57	63
cherry, 524	119
Barberry, 160, 163	75
Bastard cedar, 26	58
ipecac, 829	154
Basil, sweet, 586	126
Baumé collodion, 34	59
Bay, California rose, 727	141
laurel, sweet, 470	112
rose, 727	141
Bayonet, Spanish, 862	158
Bean tree, 204	79
Bearberry, 113	70
Beard moss, 485, 710, 841	114, 140, 155
Bed straw, 381	102
sweet scented, 382	102

	Page.
Beech drops, 598	127
Beet, 164	75
Beggars' ticks, 167	76
Belladonna, 152	74
Bethroot, 830	154
Big root, 321	95
Bindweed, 449	109
Birch, 165	75
black, 166	76
sweet, 166	76
white, 165	75
Bird pepper, 191	78
Bitter apple, 243	85
candytuft, 443	109
root, 322, 483	95, 114
Bittersweet, 794	149
Black alder, 686	137
haw, 850	156
nightshade, 795	149
cherry, wild, 695	138
Blackberry, 744, 746	144
Bladder senna, 256	86
wrack, 378	102
Blazing star, 544	121
Bleeding heart, 308	93
Blessed thistle, 249	85
Blood root, 341	97
Blue curl, woolly, 825	153
Blue flax, 493	115
Blue gum, 351	85
Blue joint grass, 245	85
Blueweed, 17	57
Baldo, 636	131
Boneset, 355	99
Bouncing Bet, 763	146
Box, 178	77
elder, 12	57
Boykinia, 818	152
Bracken fern, 703	138
Bracket fungus, 675	136
Branch ivy, 518	118
Brickellia, 253	86
Bronchitis plant, 128	71
Broad-leaf laurel, 465	111
Broom, 282	90
Buckbean, 545	121
Buckeye, 29	59
Buckthorns, 720-725	140, 141
Buckwheat, wild, 337	97
Buffalo berry, 781	148
Burdock, 109	69
Bushy goldenrod, 169	76
Buttercup, 715	140
Butternut, 457	111
Butterweed, 510	117
Button, mescal, 84	66
snakeroot, 343	98
willow, 213	80
Cabbage, Indian, 634	131
skunk, 519	118
Cactus, 37, 84	60, 66

	Page.
California balm, 336	97
barberry, 160	75
buckeye, 29	59
centaury, 347	98
coffee tree, 722	141
elder, 761	146
fever bush, 386	103
gilia, 492	115
laurel, 838	154
nutmeg, 823	153
pale elder, 761	146
poppy, 350	98
rose bay, 727	141
slippery elm, 375	102
spikenard, 98	68
tree poppy, 739	143
water hemlock, 237	83
wax berry, 566	124
Calumbia, 456	110
Camas, 187	78
death, 869	158
Camphor, 239	84
Canada thistle, 241	84
Canadian hemp, 93	68
Canaigre, 749	144
Cane, sugar, 753	145
Canary grass, reed, 245, 638	85, 131
Cancer root, 598, 599	127
Canchalagua, 344, 345, 347	98
Candytuft, bitter, 443	109
Canchatana, 258	87
Candlenut tree, 48	61
Canker lettuce, 709	139
Canutilla, 328	96
Caraway, wild, 197	78
Cardamom, 69	64
Cape jasmine, 384	103
Caper spurge, 361	100
Carob, 217	81
Carrot, wild, 290	91
Cascara sagrada, 721, 725	141
Cassava, 531	119
Castor oil plant, 736	142
Catalpa, 204	79
Catchfly, 784	148
Catechu, 7	56
Catnip, 572	124
Cat tail, 834	154
Cayenne cherry, 352	99
pepper, 192	78
Cedar, bastard, 26	58
incense, 484	114
Oregon, 221	81
Centaury, 752	145
California, 347	98
Century plant, 35	60
Cereus, night blooming, 220	81
Cevadilla, 132	72
Ceylon cinnamon, 240	84
Chamisa, 25	58
Chamiso, 25	59
Chamomile, 534, 535	120
Charlock, 271	88
Cherimoya, 85	67

	Page.
Cherry, Barbados, 524	119
cayenne, 352	99
choke, 214, 695	80, 138
laurel, 690, 692, 694	137, 138
Surinam, 352	99
winter, 641	132
Cherries, 688	137
Chestnut, 203	79
Chewing gum, 15	57
Chicory, 230	82
Christmas berry, 429	107
Chia, 255, 759	86, 145
Chickweed, 73	65
Chicle, 15, 554	57, 122
Chili, cajote, 272, 273, 322	89, 95
Chinquapin, 203	79
Chokecherry, 697	138
Chucklusa, 229	82
Cider, manzanita, 111	69
Cigar tree, 204	79
Cinchonas, 238	83
Cinnamon, 240	84
Cinquefoil, 683, 685	136, 137
Clematis, large-flowered, 246	85
Clintonia, purple, 248	85
Clovers, 827	153
Clover, fir, 635	131
sweet, 538	120
yellow sweet, 539	120
Club moss, 515	118
Choco, 775	147
Choke cherry, 214	80
Coast arnica, 257	86
larkspur, 294	92
Coca, 349	98
Cochineal, 469	112
Cocklebur, 257, 858	86, 157
Cockle, corn, 44	61
Cocoanuts, 250	85
Cocoanut palm, 251	86
Coffee, 180	77
tree, 721, 722	141
Kentucky, 415	106
trees, 656	134
Cohosh, 23	58
Colchicum, 252	86
Collinsia, 254	86
Collodion, 34	59
Colocynth, 243	85
Colorado cough root, 487	115
loco vetch, 104	69
mountain sage, 127	71
root, 487	115
Coltsfoot, 627, 833	131, 154
Columbine, 95, 96	68
Columbo, 456	110
Comfrey, 808	151
Common agrimony, 42	60
box tree, 178	77
geranium, 393	103
bindweed, 261	87
red bud, 218	81
Compass plant, 772	147
Convulsion herb, 26	58

	Page.
Corn cockle, 30, 44	59, 61
India, 865	158
Cottonwood, 677-679	136
Couch grass, 43	61
Cough root, 487	115
Cowage, 561	123
Cow herb, 843	155
parsnip, 428	107
Coyote, 276	89
Crabapple, Oregon, 525	119
Crab's eye, 5	55
vine, 5	55
Cramp bark, 850	156
Cranesbill, 392	103
Creosote bush, 469	112
Cress, 271	88
para, 802	150
Croton oil plant, 270	88
Crowfoot, 712	140
Cucumber, wild, 321	95
Cudbear, 736	143
Cudweed, 87, 404, 405	67, 104
Cup, death, 61	63
Currants, 735	142
Custard apple, 85, 86	67
Cusso, 417	106
Cutch, 7	56
Daffodil, 568	124
Damiana, 832	154
wild, 452	110
Dammar, 34	59
resin, 34	39
Dandelion, 812	151
Darnels, 500, 501	116
Date, wild, 861	157
Deadly nightshade, 152	74
Death camas, 869	158
cup, 61	63
Diamond fig, 548	122
Digger pine, 651	133
Digitalis, 309	93
Dock, 747	144
prairie, 618	130
yellow, 748	144
Dog bane, 92	68
ear, 276	89
fennel, 88	67
Dog-grass, 43	61
Dogtooth violet, 348	98
Dogwood, 262	87
Dotted smart weed, 673	138
Douglas spruce, 698	138
Durango root, 268	91
Dutchman's breeches, 307, 308	93
Dwarf larkspur, 304	92
Dyer's saffron, 196	78
weed, 390, 453, 718	103, 110, 140
Elder, 760	145
box, 12	57
pale, 761	146
Elecampane, 448	109
Elm, 836	154
Ergot, 245, 414	85, 106
European white birch, 165	75
Evening primrose, 588, 589	126

	Page.
Everlasting, 75	65
Faculty onion, 547	121
False flax, 188, 271	78, 89
hellebore, 847	156
jessamine, 389	103
mallow, red, 528	119
pimpernel, 439	108
saffron, 196	78
Solomon's seal, 792	149
Fenugreek, 828	153
Fern, bracken, 703	138
polypody, 674	135
venus, 27	58
Fever bush, California, 386	103
Field horsetail, 330	96
Fig, 368	101
diamond, 548	121
marigold, 547	121
Figs, Indian, 590	126
Figwart, 773	147
Filaree, red stemmed, 342	97
Fir, 1	55
clover, 635	131
spruce, 698	138
Flag tule, 834	154
Flax, 493, 495	115, 116
blue, 493	115
purging, 494	114
Fleabane, 334, 335	96, 97
Flowering spurge, 358	100
Fly agaric, 60	63
Foot's parsnip, 587	126
Foxglove, 309	93
Fragrant abronia, 3	55
Frankincense, 463	111
Fraseria, showy, 372	101
Friar's cap, 10, 18	57
Fumitory, 379	102
Furze, 835	154
Galls, oak, 711	139
Garden heliotrope, 845	155
Gaura, scarlet, 388	103
Gentian, 391	103
horse, 829	154
Geranium, 392-395	103
wild, 394-395	103
Giant reed, 131	71
Gilia, California, 472	115
Ginger, 866	158
wild, 133	158
pine, 221	81
Ginseng, 98, 615	68, 129
Chinese, 615	129
Goat's rue, 380	102
Gold thread, 265	87
Goldenrod, 257, 798	86, 150
bushy, 169	76
Golden back fern, 416	106
seal, 437	108
Goose grass, 381, 667	102
Gooseberries, 735	142
Gorze, 835	154
Gourd, 272	89
Grape, 850, 852	156

	Page.
Grasses, 414	105
Greasewood, 25, 713	59, 140
Great laurel, 728	142
Grindelia, 412	105
Ground iris, 452	110
ivy, 401	104
Groundsell, 257, 778	86, 748
Gum acacia, 7	56
arabic, 6	56
blue, 351	99
chicle, 554	122
dammar, 34	59
kauri, 34	59
plant, 409-413	105
red, 351	99
sweet, 497	116
Hair cap moss, 674, 676	136
moss, 46	61
Hardhacks, 803	150
Haw, 850	156
black, 850	156
Hawthorn, 266	88
Heal-all, 175	76
Heathwarts, 76	65
Hedge, 520	118
garlic, 49	61
nettle, 804	150
parsley, 205	79
Hedgehog thistle, 319	94
Heliotrope, 426	107
garden, 845	155
Hellebore, American, 847	156
false 847	156
Hemlock, poison, 259	87
water, 231	82, 83
Hemp, Canadian, 93	68
Indian, 92, 93, 94, 190	68, 78
Queensland, 783	148
Henbane, 438	108
Hen-and-chickens, 264, 777	148
Henna, 474	113
Hibiscus, 432	107
Hickory, 198	79
Hill brush, 125	71
Hoarhound, 533	120
water, 516	118
Hog's potato, 869	158
Hogweed, 66	64
Holly, 429, 444	107, 109
Hollyhocks, 58	63
Holy grass, 434	108
Honeysuckle, 502, 503	116, 117
Hop, 435	108
Horse chestnut, 29	59
gentian, 829	154
weed, 335	97
Horsemint, 556	122
Horsetail, 330	96
Houseleek, 777	148
Huckleberry, 843	155
Hummingbird sage, 713	140
Hyacinth, wild, 186, 482	77, 114
Hydrastis, 437	108
Hyssop, 441	109

	Page.
Hydrangea, 436	108
Ice plant, 548	122
Iceland moss, 485	114
Incense, cedar, 484	114
Indian cabbage, 634	131
corn, 865	158
figs, 591	126
hair tonic, 120	70
hemp, 92, 93, 94, 190	68, 78
lettuce, 709	139
pond lily, 584	125
rhubarb, 769	146
rubber, 323	95
shellac, 469	112
tobacco, 576, 848	125, 156
wheat, 857	156
Innocence, 254	86
Ipecac, bastard, 829	154
spurge, 360	100
Iris, 451	110
Islay, 693	138
Ivy, 419	106
American, 71	65
branch, 518	118
Jalap, 366	100
Jamestown weed, 287, 288	91
Japanese pagoda tree, 801	150
tea, 816	152
Jasmine, 455	110
cape, 384	103
Jelly leaf, 783	148
Jerusalem oak, 224	82
Jessamine, false, 389	103
Jequerity, 5	55
Jimson apple, 288, 289	91
Johnson grass, 78	66
Judas tree, 216	81
June grass, 245	85
Juniper, 459-463	111
California, 460	111
Kauri gum, 34	59
Kekune oil, 48	61
Kelps, 466, 467	112
Kentucky coffee tree, 415	106
Labdanum, 242, 474	84, 113
Labrador tea, 477, 478	114
Laburnum, 281	90
Lace pod, 821	152
Lacinus, 499	116
Lady's slipper, 277, 278	90
larger yellow, 277	90
showy, 280	90
Lady's tobacco, 404	104
Lambert's pine, 648	133
Large-leaved maple, 11	56
Large-flowered clematis, 246	85
Large flowering spurge, 358	100
Large water hemlock, 232	83
Larkspur, dwarf, 304	92
purple, 293, 294, 300	92
red, 301	92
Sacramento, 306	93
western, 299	92
Larkspurs, 292-306	92

	Page.
Laurel, broad-leaf, 465	111
California-leaf, 465	154
narrow-leaf, 464	111
cherry, 690, 692	137
great, 728	142
mountain, 838	154
sweet bay, 470	112
Lavender, 472, 473	113
spike, 472	113
Leaf, skin, 708	139
Leatherwood, mountain, 375	102
Lemon, 244, 480	75, 114
grass, 77	65
verbena, 496	116
Lemonade, berry, 731	142
Lettuce, canker, 709	139
Indian, 709	139
Lichen, 46, 485, 712	61, 114, 140
Licorice, 402	125
wild, 5, 403	55, 104
Life everlasting, 404	104
Lilac, 208, 807, 809	80, 151
white, 211	80
Lily-of-the-Valley, 260	87
Lily, pond, 582, 583, 585	125
Linden, 822	152
Liquidamber, 497	116
Litmus, 499, 736	116
Loasa, 544	121
purple, 102, 146	69, 73
silvery, 106	69
Loco vetch, 104	69
weed, 610	128
weeds, 145, 148	73
white, 105	69
woolly, 104, 149	69, 73
Locust trees, 737	142
Lotus, 505	117
Lovage, 488	115
Luffa, 506	117
Lupines, 507-511	117
Madder, 743	144
Madrona, 108	69
Magnolia, 522	119
Mahonia, 160	75
Maiden pink, 117	70
Maidenhair fern, 28	59
tree, 399	104
Male fern, 142, 315	73, 94
Mallow, red false, 528	119
Mallows, 58, 432, 526, 527	63, 107
tree, 471	113
Mandrake, 529	119
Mango, 530	119
Mangosteen, 383	102
Manna, 373	101
Man root, 322	95
Manzanilla, 535	120
Manzanita, 110, 111, 211	69, 80
cider, 111	69
Maple, 11	56
Maranta, 532	120
Mariana, 786	149
Marigold, 182	77
fig, 547	121

	Page.
Marsh parsley, 632	131
trefoil, 545	121
Mariposa, lily, 184	77
Master-wart, 428, 447	107, 109
Maté, 445	109
Matillija poppy, 739	143
May apple, 662	134
drink, 382	102
weed, 88	67
Meadow rue, 814, 815	152
saffron, 252	86
Medic, 841	66
Mescal, 38	60
button, 84	66
Mexican tea, 222	81
rubber plant, 617	129
Mezereon, 285, 549	91, 122
Mignonette, 719	140
white, 717	140
Milfoil, 14	57
Milkweeds, 134-139,	72
Milkthistle, 799	150
vetch, 601	127
Mints, 541	121
Mistletoe, 640	132
pine, 716	140
Monkey flower, 312, 552	94, 122
Monk's-hood, 17	57
Moss, beard, 485, 710, 841	114, 140, 155
club, 515	118
hair cap, 676	136
Iceland, 485	114
tree, 485	114
wolf's, 365	100
Motherwort, 481	114
Mountain alder, 55	62
ash, 800	150
balm, 211, 336	80, 97
box, 113	70
laurel, 838	154
leatherwood, 375	102
mint, 557	123
rush, 325	95
Mouse tail, 564, 565	123
Mulberry, 560	123
Mugwort, 128	71
Mullein, 848	156
turkey, 332	96
Murray's pine, 647	133
Mushroom, 33, 563	59, 123
Musk plant, 553	122
Mustard, 271, 788	88, 149
tansy, 800	149
Myrtle, 567	124
Nance bark, 524	119
Nard, 569	129
Narrow-leaf laurel, 464	111
Nase berry, 15	57
Nettle, small, 840	155
Nevada nut pine, 649	133
New Jersey tea, 207	80
New Zealand, pine, 34	59
Niggerhead, 318, 319	94
Night blooming cereus, 220	81

	Page.
Nightshade, black, 795	149
spreading, 796	150
Norfolk pine, 107	69
Nostoc, 581	125
Nutmeg, California, 823	153
flower, 580	125
geranium, 622	130
Nut pine, 649	133
Oak galls, 711	139
Jerusalem, 224	82
poison, 730	142
Oaks, 711	139
Oat smut, 842	155
Ohio buckeye, 30	59
Oil of Poley, 542	121
Old man, 125, 129	71
Old man's beard, 710	140
Oleander, 573	124
Olibanum, 463	111
Olive, 590	126
spurge, 285	91
Onion, faculty, 547	121
wild, 50	62
Opium, 616	129
plant, 345	98
Orange, 153	74
Osage, 520	118
Orchid, 277, 278, 279, 280	90
swamp, 491	115
Orchil, 736	143
Oregon alder, 53	62
ash, 374	102
cedar, 221	81
crabapple, 525	119
false, 162	75
grape, 161	75
water hemlock, 236	83
Orris root, 457	110
Osage orange, 520	118
Osha, 487, 603	115, 127
Pacific yew, 813	151
Pagoda tree, 801	150
Palmetto, saw, 751	144
Palmita, 790	149
Palms, 614	128
Panax, 99	68
Pansies, 851	156
Paracress, 802	150
Paraguay tea, 445	109
Parsley hedge, 205	79
marsh, 632	131
Parsnip fools, 587	126
water, 90, 791	67, 149
wild, 259, 791	87, 149
Paw paw, 140, 193, 194	73, 78
Peach, 626	130
Peanuts, 97	68
Pear, 653	133
alligator, 625	130
prickly, 590, 594, 595	126, 127
vegetable, 775	147
Pellote, 84	66
Pennyroyal, 542, 557	121, 123
Peony, 611, 612, 613	128

	Page.
Pepper grass, 271	81
tree, 770	146
Peppermint, 542	121
Persimmon, 311	93
Pichi, 367	101
Pickleweed, 755	145
Pie plant, wild, 749	144
Pig weeds, 63, 64, 222, 223	64, 81, 82
Pimpernel, 73	65
Pine, digger, 651	133
ginger, 221	81
Lambert's, 648	133
mistletoe, 716	140
Murray's, 647	137
princes, 226	82
sugar, 648	133
Torrey, 652	133
yellow, 650	133
Pineapple, 74	65
Pines, 107, 645	69, 132, 133
Piñon pine, 649	133
Pipsissiwa, 226	82
Pipe-stem, 246	85
Pistacia nut, 654, 655	133
Pitcher plants, 571, 765	124, 146
Plantain, 660, 661	134
Plums, 692	138
Poison ivy, 732	142
oak, 730	142
amanita, 61	63
chickweed, 73	65
hemlock, 259	87
sumac, 734	142
Poke root, 643, 644	132
Poley oil, 542	121
Polypody fern, 674	135
Pomegranate, 705	139
Pond lily, yellow, 582	125
Poplars, 677	136
Poppy, 616	129
California, 350	98
prickly, 114	70
tree, 739	143
Potato, hog's, 869	158
Prairie dock, 618	130
June grass, 245	85
Prayer beads, 5	55
Prickly ash, 859	157
lettuce, 257	86
pear, 591, 594, 595	126, 127
poppy, 114	70
Pride of India, 537	120
Primrose, evening, 588, 589	126
Princes pine, 226	82
Prunes, 690	138
Puffballs, 514	118
Purging flax, 494	115
Purple clintonia, 248	85
larkspur, 293, 300	92
loco weed, 102, 146	69, 73
Pulque, 37	60
Purslane, 682	136
Pyrethrum, 707	139
Queensland hemp, 783	148

	Page.
Quince, 710	139
Quitch grass, 43	61
Raggourd, 506	117
Ragweeds, 65, 66, 67	64
Ragwort, 778	148
Raspberry, 744, 745	144
Rattlebox, 268	88
Rattlesnake master, 40	60
plantain, 407	105
weed, 291	91
Red buckeye, 32	59
bud, 216	81
common, 218	81
false mallow, 528	119
gum, 351	99
larkspur, 301	92
pepper, 192	78
stemmed filaree, 342	97
willow, 263	87
wind flower, 80	66
Redwood sorrel, 609	128
Reed canary grass, 245, 637	85, 131
Resin, dammar, 34	59
Rhubard, Indian, 769	146
Rhubarbs, 726	141
Robin's eye, 676	136
Rockberry, 113	70
Rock rose, 242, 424	84, 107
Roman wormwood, 66	64
Romero, 825	153
Romneya, 739	143
Rose geranium, 622	130
Rosemallow, 433	108
Rosemary, 742	143
oil, 742	143
Roses, 740	143
Rosilla, 423	107
Rubber, Mexican, 323	95
plant, 617	129
plants, 323	95
Rue, 748	144
goat's, 380	102
meadow, 814, 815	152
Rye grass, 324	85
wild, 245	85
Sacred bark, 721	141
Sacramento larkspur, 306	93
Saffron, 267	88
meadow, 252	86
Sage, 713, 758, 759	140, 145
garden, 758	145
humming bird, 713	140
winter, 364	100
Sagebrush, 125	71
Salep, 597	127
Salt grass, 313, 371	94, 101
Salvia, Sierra, 127	71
Sand grass, 602	127
verbena, 4	55
Sarsaparilla, 793	149
Sassafras, 767	146
Saw palmetto, 757, 780	144, 148
Saxifrage, 768	146
Scarlet gaura, 388	103

	Page.
Scopola, 771	147
Scrofula plant, 773	147
Scouring rush, 330, 331	96
Small nettle, 840	155
Smartweed, 670	135
dotted, 673	135
Smut oat, 842	156
Snakeroot, 116	70
button, 343	98
Sneezeweed, 420-423	106, 107
Snow brush, 211	80
plant, 764	146
Snowdrop, 658	134
Snow-on-the-mountain, 362	100
Soap brush, 208, 210	80
plant, 222, 225, 228	81, 82
weed, 861	157
Soaproot, 228	82
Soapwort, 763	146
Socotrine alves, 57	63
Solomon's seal, 667	135
false, 792	149
Sonora gum, 469	112
Sorghum, 78	66
Sorrel, 606	128
redwood, 609	128
wood, 607	128
yellow, 608	128
Sour grass, 340	97
sop, 86	67
Sow thistle, 257, 799	86, 150.
Spanish bayonet, 861, 862	157, 158
needles, 167	76
Spearmint, 542	121
Speedwell, 849	156
Spike lavender, 472	113
Spikenard, 569	124
California, 98	68
Spruce, Douglas, 698	138
fir, 698	138
Spurge, 356	100
caper, 361	100
ipecac, 360	100
large flowering, 358	100
olive, 285	91
Squill, 839	155
Stavesacre, 303	92
St. Barnaby's thistle, 212	80
St. John's bread, 217	81
wart, 439, 440	108, 109
Stager bush, 518	118
Star anise, 446	109
grass, 789	149
Stink apple, 288	91
Storax, 497	116
Stone crop, 776	147
Strawberry, 370	101
Styrax, 497	116
Sugar beet, 164	75
cane, 753	145
maple, 13	57
pine, 648	133
Sumac, 731	142
poison, 734	142
red-fruited, 733	142

	Page.
Sunflower, 156, 856	75, 157
Sundew, 314	94
Surlinam cherry, 352	99
Swamp orchid, 491	115
Sweet alyssum, 59, 271	63, 89
basil, 586	126
bay laurel, 470	112
cicely, 604	128
clover, 538	120
flag, 21	58
gum, 497	116
scented pond lily, 585	125
verbena, 496	116
vernal-grass, 89	67
Tag alder, 54	62
Tall larkspur, 298	92
Tallow tree, 762	146
Tamarind, 810	151
Tan oak bark, 711	139
Tansy, 811	151
mustard, 790	149
Tar weed, 826	153
weeds, 427, 521	107, 118
Tassel tree, silk, 385	103
Tea, 817	152
Japanese, 816	152
Labrador, 477, 478	114
marsh, 479	114
Mexican, 222	81
mountain rush, 325	95
Paraguay, 445	109
Thistle, Canada, 241	84
hedgehog, 319	94
milk, 799	150
sow, 799	150
yellow star, 212	80
St. Barnaby's, 212	80
Thorn apple, 288	91
tree, 266	88
Thus, 463	111
Thyme, 820	152
Timbo, 619	130
Toadstool, 33, 60,	59, 63
Toadstools, 563	123
"edible," 563	123
Tobacco, 574-578	124, 125
Indian, 848	156
tree, 577	125
Tolu balsam, 463	111
Torrey pine, 652	133
Toyon, 429	107
Tree mallow, 471	113
moss, 485	115
of heaven, 45	61
poppy, California, 739	143
Tule, flag, 834	154
Tulip, tree, 498	116
Tumble weeds, 63	64
Turkey mullein, 332	96
Uva ursi, 113	70
Valerian, 845	155
Vanilla, 846	155
grass, 434	108

	Page.
Vegetable pear , 775	147
sponge, 506	58
Venus's hair fern , 27	58
Verbena , 4	55
lemon, 496	116
sweet, 496	116
Vernal amanita , 62	64
Vernal-grass , 89	67
Vetch , 476	113
loco, 104	69
low milk, 601	127
white, 475	113
Villela , 789	149
Vinegar weed , 826	153
Vino mescal , 37	60
Violet , dog tooth, 348	98
Violets , 851	156
Virginia creeper , 71	65
Walnuts , 457	111
Water ash , 702	138
Water cress , 570	124
fennel, 183	77
hemlock, 231	82
California, 237	83
large, 232	83
Oregon, 236	83
Wyoming, 235	83
hoarhound, 516	118
lily, 583	125
parsnip, 90, 791	67, 149
pepper, 670	135
starwort, 183	77
Wattle gum , 10	56
Wax berry , California, 566	124
Western larkspur , 299	92
spice bush, 177	77
Wheat , Indian, 857	157
White fir , 1	55
lilac, 211	80
loco weed, 105	69
sweet clover, 538	120
vetch, 475	113
walnut, 457	111
zapate, 200	79
Witchhazel , 418	106
Wild black cherry , 695	138
buckwheat, 337	97
caraway, 197	78
carrot, 290	91
cherry, 691, 695	137, 138
cucumber, 321	95
damiana, 452	110
date, 861	157
geranium, 394	103
ginger, 133	72
hyacinth, 186, 482	77, 114
licorice, 5, 403	55, 104
onion, 50	62
parsnip, 259	87
pie plant, 749	144
portulacca, 181	77
radish, 271	88
rye grass, 245	85
sunflower, 156	75

	Page.
Willow, button, 213	80
herb, 329	96
red, 262	87
Willows, 756	145
Wind flower, 80, 81	66
red, 80	66
Wing seed, 702	138
Winter cherry, 641	122
sage, 364	100
Wintergreen, 387	103
Wistaria, 853	156
Wolf's-bane, 20	57
Wolf's moss, 365	100
Wood sorrel, 608	128
Wooly blue-curl, 825	153
loco weed, 104, 149	69, 73
Wormseed, 222	81
Wormwood, 124, 128	71
Roman, 66	64
Wyoming water hemlock, 235	83
Yam root, 310	93
Yard grass, 669	135
Yarrow, 14	57
Yeast, 824	153
Yellow dock, 748	144
pine, 650	133
pond lily, 582	125
sand, verbena, 4	55
star thistle, 212	80
sweet clover, 539	120
Yerba buena, 550	122
del golpo, 143	73
de India, 785	148
del Pasmo, 26	58
mansa, 79	66
reuma, 371	101
santa, 336	97
Yew, 813	151
Pacific, 813	152
Ylang-ylang, 122	70
Yucca, 860	157
Zapate, 554	122
white, 200	79