plants, which will not be used soon for food. Remarks presented herein refer to soil drench (aqueous suspensions of the material applied to the soil surface) treatments.

Schradan (8 lbs./gal.) 1¼ fluid ounces and Systox (4 lbs./gal.) 2½ fluid ounces per tree were applied in five gallons of water to the soil about lime trees, *Citrus aurantifolia* (Christm.) Swingle, infested with the Florida red scale *Chrysomphalis aonidium* (L.). No living scale was found on leaf samples from trees with chemical treatments a month after treatment. After two years the trees that had had chemical treatments were lightly infested. Thirty months after the treatments, however, scale populations on chemical and check treatments were not significantly different.

Systox has been used on various species of house plants in the home of the author for a period of years for control of scale insects and also mealybugs. One teaspoonful of Systox formulation (2 lbs./gal.) per gallon of water is the rate usually applied. It is applied as a soil drench (during) watering the plants. One teaspoon per gallon is 1:768, or is a little more concentrated than is 1 pint per 100 gallons of water. Two to three applications per year control scale insects and mealybugs.

Further Remarks on Systemic Insecticides.— Soil drenches appear more effective for insect control than foliar applications. More toxicant is required for soil drench than foliar application methods. Some of the material is taken into the plant, some is undoubtedly lost. Systemic insecticides have been more effective in reducing insects with sucking mouthparts than with chewing mouthparts.

Systemic insecticides are toxicants or produce toxicity when taken into the plants. Insects which feed on plants "conditioned" with systemic insecticides are injured, repelled or killed. The length of time plants remain conditioned undoubtedly varies considerably, with much remaining to be learned. An obvious question concerns toxicants in food from treated plants. Fruits and vegetables from treated plants do contain the systemic material, depending a great deal on the method of treatment, amount of material used, length of time after application and perhaps other factors. Residue analyses results have not shown, however, that dangerous amounts of materials remained when reasonable amounts were used.

Water in the soil drenches is presumed to transport systemic materials to the root system. Too much water may transport much of the ingredients away from the roots; too little water may fail to carry the material to the roots. Control of the water at and soon after application of the materials appears very essential. Improper use of water may account in part for erratic results in tests with the systemic insecticides and may have prevented general recommendation and use of these insecticides.

Too small an amount of toxicant fails to give control; too much toxicant kills plants. Repeated applications of smaller amounts have been effective without injury to plants.

Summary. — Some caterpillars commonly feeding on leaves of various ornamental plants were listed and control measures were suggested. Recent tests and developments in control measures for aphids, Cuban laurel thrips, the serpentine leaf miner and scale insects were discussed. Details were given concerning results from soil drench experiments with the systemic insecticides.

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ORNAMENTAL PLANTS WITH POISONOUS PROPERTIES

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In discussing "Ornamental Plants with Poisonous Properties", it is necessary to include some plants that are among the most popular in South Florida landscaping, as well as others that are quite commonly planted. It is not a happy topic, nor one that is always well-received. It has been suggested that discussion of this subject might be harmful to real estate values in South Florida, that it might antagonize nurserymen, or that it might tend to

make people afraid to venture out-of-doors. Newspaper accounts of plant-poisoning have been referred to as undue sensationalism. Many people are sure that there are insufficient grounds for concern.

However, one cannot spend as many years as we have in the Morton Collectanea, searching the literature on economic plants and assembling and classifying data according to their characteristics, without knowing that such views are unenlightened. Some five years ago, I undertook, with Dr. Edward Larson, to prepare a manuscript on the principal toxic plants of the world for the Biological Handbook of the National Research Council. On completion of this work, I felt that I should concentrate attention on the surprisingly large number of plants that are poisonous to people in Florida. To date, I have catalogued 157 species and most are cultivated ornamentals. Public references to this activity, through the Press and otherwise, have brought so many calls, so many inquiries from doctors, hospitals and private individuals, that I have grown more and more aware of the problem that exists here and of the need for information.

I am not an alarmist. It is not my intent to detract unnecessarily from the pleasure that these ornamental plants provide, nor do I wish to be interpreted as recommending the wholesale banishment of such plants from our gardens. Only an extremist would advocate extermination of all plants capable of poisoning. I do feel that it is well for everyone to know which plants are apt to produce undesirable reactions, externally or internally, or both.

With a few exceptions, the toxic plants in this area have been introduced from foreign countries. In most cases, their toxic characteristics are well known in their countries of origin and other tropical countries where they are cultivated. They are employed for medicinal and sometimes lethal purposes as well as ornament, and they are included in the literature on medicinal and poisonous plants of those countries. Nevertheless, these same plants are, through lack of knowledge or through disbelief, casually planted in South Florida within easy reach of infants and others susceptible to injury. And newcomers to this area, naturally follow our example, having no reason to be suspicious of plants that they see commonly accepted. Thus the population of hazardous plants is increased.

In view of this situation, it is wise to inform ourselves and others of the possible pitfalls and to be alert for them. It is not necessary to become agitated or excited. The principal hazard is not so much in the plants, themselves, but in our unfamiliarity with their properties. The advisability of maintaining these plants can best be determined by their accessibility to children, our ability to educate children and others to distinguish between harmful plants and harmless ones, and the extent to which the property owner is prepared to keep control over his plants and their discarded portions, such as fallen fruits and trimmings.

Often, when some baffling skin irritation occurs and persists, one is able to trace its origin to one of these plants with which one has had contact. This possibility should not be underestimated. I am informed by dermatologists that plants play a major role in the cases of dermatitis, often of a very serious nature, that arise in this area and many such cases have come to my personal attention. Frequently it has been impossible to discover which plant is responsible, because few people are familiar with the possible sources of poisoning. Furthermore, a day or two may elapse before the symptoms of poisoning appear.

There are other factors which make the study of plant poisoning a difficult one. Susceptibility of individuals varies greatly; some may be highly susceptible, others less so and others immune. But even immunity may be only temporary and may depend on the physical condition of the individual.

In cases of internal poisoning, children and persons of small stature are more likely to be seriously affected than larger people, for the potency of a toxic dose is in ratio to bodily weight. A full stomach can make a great deal of difference. A poisonous substance taken after a heavy meal may be relatively harmless since it will be diluted by the contents of the stomach and less readily absorbed into the system.

Among four-footed animals, there is a great difference in their tolerance of toxic substances. For example, the Jumbie Bean or Lead Tree (*Leucaena glauca* Benth.) is widely

cultivated as a fodder for cattle, sheep and goats, but is definitely poisonous to horses, mules, donkeys and pigs. Rabbits can withstand large quantities of belladonna. The hedgehog is resistant to most of the better-known poisons, but succumbs to strychnine.

Then, too, the toxicity of poisonous plants themselves varies with the season of the year and also with the stage of growth, the content of young leaves, for instance, differing greatly from that of mature leaves. A plant product may be harmless and nutritious at one stage and poisonous at another. The ordinary potato can be poisonous when green or when sprouting. Flowers contain the highest concentration of active principles before or at the time of pollination. The constituents of plants vary also with their environment, especially the soil in which they are grown. It is a troublesome fact that certain medicinal plants produce the desired chemical substances in some regions but are lacking in these properties when cultivated in other areas. Cultivated plants are often found less toxic than wild plants of the same species, though it has been said that the tobacco plant has lost none of its nicotine content through centuries of cultivation. For these and other reasons, one cannot safely generalize.

It is often stated that one should beware of plants with milky juice, and it is true that a great number of poisonous plants have milky juice, or sap, or latex, in abundance. However, the very basis of chewing gum is the milky latex of the tree which also produces the delectable sapodilla. In South America, natives tap the cow tree (*Brosimum galactodendron* D. Don) for its milky sap which they drink as we drink cow's milk. Milky sap is, therefore, not necessarily an indication of toxicity.

Bitterness of flavor is also suggested as a clue to the presence of toxic substances, yet bitterness is found in many edible plants and characterizes some very beneficial plant products such as the fleshy interior of the leaves of the aloe plant which is commonly taken internally.

Neither can one safely judge a plant by its relatives. The yams, which are staple foods in many areas, belong to the genus *Dioscorea,* which also includes some highly poisonous species. The cultivated lima bean (*Phaseolus limensis* Macf.) has as a very close relative the poisonous wild sieva bean (*Phaseolus lunatus* L.)

There are reportedly more species of poisonous plants in tropical regions than there are in colder climates. But people of all climes and all races have learned to live with poisonous plants and to use them to their advantage. Much has been written about the utilization of poisonous plants by aboriginals, by Orientals, and by Europeans in the Middle Ages. We haven't time to dwell on any of this interesting history. From a present-day standpoint, let us say that, without poisonous plants, the world would be deprived of many of its lifesaving drugs and useful insecticides, and would not have a number of popular food products.

Poisonous and beneficial substances are very closely associated in nature. Often the poisonous property is sealed-off in a separate compartment; sometimes it must be separated by artificial means. The presence of a poisonous principle has seldom been sufficient to deter humans once they have discovered that a plant or plant product can be utilized for a given purpose. Primitive people found that certain poisonous principles could be destroyed by heat or removed by pounding roots or seeds to a pulp in running water.

Thus the Indians and early settlers in Florida made starch from the roots of our native coontie. (*Zamia floridana DC.*). Likewise, tapioca is obtained from the poisonous root of the bitter cassava plant, *Manihot esculenta* Crantz. Many plants used for greens are toxic until boiled and the water discarded. Some Europeans even persist in eating the poisonous fly amanita mushroom after removing the gills and soaking the rest in salted water and vinegar to draw out the harmful substances.

The kernel of the well-known peach contains hydrocyanic acid, one of the most potent poisons, and the Egyptians used to extract this from peach kernels for homicidal purposes. The flowers of the peach, administered to children as a vermifuge, have had fatal consequences. The seeds of one of the popular fruits of the tropics, the sugar apple (*Annona squamosa* L.) are ground to a powder which is used as an insecticide and, if this powder is brought into contact with the eyes, it can produce total blindness.

The classification of a plant as either an outright poison or as a food is, as you can

see, exceedingly difficult. While most people can handle mangos, limes and carrot tops with no ill effects, other people contract severe dermatitis, or even worse, from these sources. So, as we have said, the world cannot get along without plants that have toxic properties. The important thing is to understand them rather than fear them.

In the United States as a whole, and in Florida, the attention of toxicologists is largely focused on the numerous plants which present a hazard to grazing animals. From the standpoint of human poisoning, poison ivy and its relatives, poison oak and poison sumac, have held the limelight and understandably, for it is estimated that three out of every four people are sensitive to these plants. Fortunately, most people have been taught to recognize and avoid them. Poison ivy is quite commonly found in South Florida but we have here also other equally poisonous plants which present a greater peril because they are less well-known and frequently unsuspected.

In regard to the plants causing internal poisoning, many of them can truly be referred to as fatally toxic. However, there is every possibility of avoiding fatality if treatment is given without delay. In some very recent cases, there is reason to believe that lives were saved by prompt treatment. Time is the most important factor in removing a toxic substance from the system before it is absorbed. How to know when to take action is the prime question.

There is a general rule to follow: If a person, child or adult, seemingly in good health, suddenly evidences distress and is known to have been handling plants or to have had the opportunity to do so, his actions immediately prior to the illness should be quickly investigated. This may require some very efficient detective work. If a certain plant is suspected, it should be identified and a specimen of it supplied to the attending physician. Any assistance of this kind can be very important in aiding diagnosis, for the symptoms of most poisons cannot by themselves be distinguished from symptoms of disease. Cases of plant poisoning may evidence symptoms seemingly identical with acute indigestion, appendicitis, epilepsy, meningitis, cerebral hemorrhage, tetanus or cholera.

In presenting the following abbreviated comments on a few of the hazardous species that are commonly met with in South Florida, I have grouped some that are related or which have similar toxic properties, others that possess some common character in their attractiveness to or effect upon humans.

DIGITALIS-LIKE POISONS:

Nerium oleander L. OLEANDER. All parts contain toxic glycosides *neriin* and *oleandrin*, resembling digitalis in action. Symptoms of oleander poisoning resemble those of cholera. Children have died from eating the flowers or chewing leaves, twigs or cuttings. Horses and cattle have been fatally poisoned by grazing on the leaves. Meat roasted on skewers of oleander wood is deadly, as is any food stirred with a stick of oleander. Smoke from the burning plants is highly toxic. In some Florida communities, the burning of oleander trimmings is prohibited. Honey made from the nectar of the flowers is poisonous, and sensitive individuals contract dermatitis from contact with the plant.

Thevetia peruviana Schum. (syn. *T. Nereifolia* Juss.) YELLOW OLEANDER. LUCKY NUT. All parts contain the toxic glycoside, *thevetin*, which resembles digitalis in action. The seeds are exported from Hawaii as source of *thevetin* for medicinal use. The eating of a single seed has caused the death of a three-year-old child and the seeds have been employed for suicide and murder and as fish poison. The attractive brown stone enclosing the seeds is carried as a good luck charm by natives of the West Indies. Dermatitis may arise from contact with the milky sap.

Cryptostegia grandiflora R. Br. PALAY RUBBER-VINE. All parts contain a toxic principle, as yet unidentified, but possibly similar to digitalis. A circus monkey died from eating a small portion of the plant. Ground-up leaves in water, taken as a supposedly medicinal potion, caused a man's death in fifteen hours. Dried trimmings give off a dust that is exceedingly irritating to the eyes, nose and throat.

DANGEROUS PURGATIVES AND TOXALBUMINS:

Jatropha curcas L. PHYSIC NUT. BARBADOS NUT. Erroneously called "pistachio" and "Chinese peanut tree". All parts contain the toxic property *curcin*, or *jatrophin*, classed as a toxalbumin since it tends to agglutinate

the red blood corpuscles; in addition, the seeds contain irritant and purgative properties. The fruit, yellow when ripe, dehydrates on the tree, turning black and splitting open, revealing three seeds, which have an agreeable flavor. Toxicity apparently varies from tree to tree, some bearing seemingly harmless seeds but the seeds of most trees cause violent vomiting and purging which may be fatal to children or weak adults. Roasting may reduce toxicity but some individuals who have made a practice of eating the roasted seeds from the reportedly "harmless" strain have developed sores in the mouth. Hell oil, derived from the seeds, has been employed medicinally as a purgative though it is considered dangerous. The sap of the tree is used as a fish poison and is occasionally a source of dermatitis.

Jatropha multifida L. CORAL PLANT. The attractive, normally 3-cornered but variable, yellow fruits contain one to three seeds possessing the same toxic properties as those of *J. curcas*. The seeds are a common cause of poisoning of children and adults. The fruits do not split but fall when ripe and should not be left on the ground as a temptation but properly discarded.

Jatropha integerrima Jacq. (syn. *J. hastata* Jacq.; *J. panduraefolia* A. Rich.), the PEREGRINA, and *Jatropha gossypifolia* L., the BELLYACHE BUSH. The fruits of these shrubs split open when ripe. The seeds, while much smaller than those of the two preceding species, contain the same principles. Those of the bellyache bush are so potent that twenty, after roasting, are considered a dangerously purgative dose for an adult. They are also reported as causing insanity.

Ricinus communis L. CASTOR BEAN. All parts contain *ricin*, a toxalbumin, and, in addition, the seeds have drastically purgative properties. Eating of the pleasant-tasting seeds is a common cause of violent illness among children. Many people believe the seeds, as the well-known source of castor oil, to be harmlessly purgative only, not realizing that the poisonous *ricin* is not extracted with the oil but remains in the press cake which must be heat-treated to render it fit for cattle feed.

Abrus precatorius L. ROSARY PEA, CRABS EYES, JEQUIRITY BEAN. The bright-red, black-tipped seeds contain the toxalbumin, *abrin*, and the tetanic glycoside, *abric acid*. They are commonly used in pea-shooters and, when dried on the vine, are so hard that they can be swallowed and pass through the system without harm. However, if chewed and swallowed, as little as a half of a seed may have fatal effects. Symptoms of poisoning resemble tetanus or typhoid but may be delayed several hours or two or three days, which makes detection of the source of the illness difficult or impossible, especially with very young children who may be unable to associate or reveal the cause. Necklaces and other novelties, fashioned with the seeds, are brought home from foreign countries by tourists and thus distribute the hazards. Two ounces of the seeds, given orally, will kill a horse. Toxicity is multiplied one hundred times if the substance of the seeds is injected subcutaneously and it is accordingly dangerous to prick the fingers when stringing the seeds as beads. "Needles" made from powdered seeds are inserted under the skin of cattle to kill them so that thieves may steal the hides. The boiled seeds are sometimes eaten in tropical countries but, in quantity, produce severe headache. The root, called Indian licorice, is sometimes eaten as a licorice-substitute though it is suspected of being somewhat harmful.

NARCOTICS:

Datura suaveolens Humb. & Bonpl. (in Florida, long erroneously called *D. arborea*) ANGEL'S TRUMPET (white). All parts of the plant contain the toxic alkaloids, *scopolamine*, *hyoscyamine* and *atropine*. The plant does not produce its smooth, somewhat cylindrical seed pods in Florida. However, children have been gravely poisoned by putting the flowers in their mouths, pretending that they are trumpets. While scientists state that none of the toxic properties are volatile, the flowers, which are exceedingly fragrant at night, often cause much distress to persons in their vicinity, giving rise to intense headache, nausea, dizziness, weakness in the knees, etc. A boy sleeping in a hammock beneath the overhanging flowers was awakened with great difficulty and for some hours thereafter behaved as though drugged. *Datura mollis* Safford. ANGEL'S TRUMPET (peach). Possesses same characteristics.

Datura stramonium L. JIMSON WEED, THORN APPLE, DEVIL'S TRUMPET,

(white-flowered) also its variety, called *D. tatula*, with purple stems and double, violet flowers. These shrubs contain the same toxic properties as the foregoing and present the additional hazard of seed pods, round and spiny, the eating of which has caused many cases of poisoning, some fatal. The seeds have been employed for deliberate poisoning and are important in medical practice, having an effect like that of belladonna. Smoke from the burning leaves is inhaled for asthma. Cattle may be fatally poisoned by eating less than one pound of the plant.

Datura metel L. is represented in Florida gardens by the horticultural variety, "Golden Queen", sometimes designated *D. chlorantha*. This plant has lovely, double or triple yellow blooms and round, spiny seed pods and is as dangerously toxic as the foregoing species. In fact, *D. metel* has been called the favorite plant of the criminal because of its employment for murder and stupefying the intended victims of robbery. Dr. J. J. Ochse says that the pollen and powdered flowers are blown into bedroom windows at night, in Java, to drug the sleeping occupants so that the house may be easily burglarized. Contact with *Datura* plants may irritate the skin of sensitive persons.

Solandra longiflora Tussac, BUGLE CHALICE VINE, and *S. nitida* Zucc. (syn. *S. hartwegii* N. E. Br.). MILKYCUP CHALICE VINE. The leaves, sap and especially the flowers contain *solandrine*, a potent narcotic. Children have suffered delirium, hallucinations and other symptoms of severe poisoning by eating only a small portion of a flower. Death may result without prompt treatment. In the eyes, the sap can cause temporary blindness.

Gelsemium sempervirens Ait.f. CAROLINA YELLOW JESSAMINE. All parts contain the alkaloids *gelsemine, gelseminine* and *gelsemoidine* which paralyze the motor nerve endings and cause death by respiratory paralysis. Children have died from sucking the fragrant yellow flowers; cattle, horses and other animals, from grazing on the plant. The root is used in medicine as a sedative but overdoses are dangerous.

Cestrum nocturnum L. NIGHT-BLOOMING JESSAMINE. POISON-BERRY. The heavily fragrant, nocturnal exudation of the flowers causes intense headache, nausea, dizziness, etc. The white fruit is poisonous internally, and the plant is toxic to grazing animals. *Cestrum diurnum* L., the DAY CESTRUM, which bears dark-purple, nearly black, fruits, has not been reported as a source of poisoning.*

TEMPTING OR CURIOUSLY ATTRACTIVE FRUITS WITH HAZARDOUS PROPERTIES:

Anacardium occidentale L. CASHEW NUT. The yellow or red pseudo-fruit (actually a swollen pedicel) is edible, contains no harmful properties, though astringent until ripe. The true fruit, the cashew nut, contains a caustic oil, *cardol*, and anacardic acid within the layers of its shell. This oil, which will blister the skin on contact, must be driven off by heat before the shells are cracked and the wholesome kernels freed for eating. Open-fire roasting of the nuts is being replaced by safer methods as the smoke is highly irritating. The oil has long been used as an insect-repellant and now, as one of the few natural phenols, plays an important role in plastics and heavy-duty varnishes and protective coatings for machinery. A gummy exudation from the tree also is caustic.

Blighia sapida Kon. AKEE. The black seeds, poisonous at all times, contain two crystalline polypeptides, *hypoglycin A* and *B*. The cream-colored arils, poisonous in the unripe fruit, contain hypoglycin A, only. When the fruit has "yawned" naturally, the fresh arils are non-toxic and may be safely eaten raw or cooked. They should not be eaten if softened, overripe or approaching decay. One should also avoid arils attached to underdeveloped or only partly emerged seeds as these, even in ripe fruits, may share some of the toxic constituents of the seeds.

* In the two weeks following presentation of this paper, three cases of poisoning by Day Cestrum fruits were brought to the author's attention. A small girl who had been observed eating the fruits was hospitalized (on Oct. 30) with symptoms similar to those of atropine poisoning including hallucinations, muscular and nervous irritability and tachycardia. A pet coati which, for several days, had been eating Day Cestrum fruits overhanging its cage, was (on Nov. 8) taken to an animal hospital in partial paralysis and evidencing labored respiration, tachycardia, salivation and high temperature. The veterinarian had, some time previously, treated a dog which was panting and nauseated as a result of having been fed Day Cestrum fruits by children. In all three cases, there was good response to symptomatic treatment and complete recovery. It is interesting to note that the poisoning symptoms corresponded to those described in the literature under **Cestrum nocturnum.**

Cycas circinalis L. CROZIER CYCAS. FERN PALM. FALSE SAGO PALM. The mealy, white kernels of the seeds are highly toxic, containing the glycoside *pakoein* and also *physosterine*. Eating the kernels can result in paralysis and death. An edible starch is made from the seeds in the Pacific islands by macerating and repeated washing, the poison being carried off in the water. Prolonged consumption of the starch causes intestinal distress.

Momordica charantia L. BALSAM PEAR. BITTER GOURD. Red aril surrounding seeds is edible but the orange body of the fruit is unwholesome and the seeds, containing the bitter principle, *momordicin*, are drastically purgative. A small child was ill for two months after eating a whole fruit. Orientals cultivate the species as a vegetable, cook and eat the unripe fruit (much larger than in the wild state) after removing the seeds. The young leaves, while bitter, are also cooked as greens.

Hura crepitans L. SAND-BOX TREE. The sap and seeds contain *hurin*, or *crepitin*, which resembles some snake venoms in action. Two or three seeds may cause violent purging and vomiting. Seeds are used for killing coyotes and other pestiferous animals. Sap is employed as a fish poison and is very irritating to human skin. The segments of the woody fruit, sometimes used in bracelets and necklaces, can cause dermatitis.

Aleurites moluccana Willd. CANDLENUT. Seed kernels contain saponin and may cause gastro-intestinal distress, though they are not as potent as the seeds of *A. fordii* Hemsl. and related species cultivated for tung oil. Hawaiians roast the kernels and prepare them for eating by mixing them with sea salt, red peppers or squid, but warn those unaccustomed to consuming candlenuts that even after cooking they may have ill effects.

Duranta repens L. (syn. *D. plumieri* Jacq.) GOLDEN DEWDROP. The small, yellow fruits contain saponin and have caused illness and death of children in Queensland. Symptoms of poisoning include sleepiness, fever and convulsions.

Pongamia pinnata Merr. PONGAM. The seeds and roots contain *pongamiin* which is toxic but not deadly to humans. Both parts are employed as fish poison. Oil derived from the seeds contains a curative principle, *karanjin*, and is important in tropical medicine for treatment of skin afflictions and various diseases. Children should be warned against eating the seeds from the abundant pods that accumulate beneath the tree.

Melia azedarach L. CHINABERRY. PERSIAN LILAC. The fruit, bark and flowers contain a toxic alkaloid variously termed *azadarin*, *margosine* or *mangrovin*, which attacks the central nervous system and causes death by paralysis. Toxicity variable, but there have been numerous causes of poisoning of animals and humans. The eating of six to eight fruits caused the death of a young girl. Rural people in the southeastern U. S., when drying peaches in the sun, scatter chinaberries among the fruits to repel insects and worms.

Ochrosia elliptica Labill. OCHROSIA PLUM. The bright-red, white-fleshed fruit has the reputation of being poisonous. Analyses in New Zealand and Australia reveal "a small amount of toxic alkaloid". No cases of poisoning in Florida have come to the writer's attention.

Solanum aculeatissimum Jacq. DEVIL'S APPLE. COCKROACH BERRY. LOVE APPLE. Plant and fruits contain *solanine*. Fruits poisonous when unripe and have had toxic effects on grazing animals. They are possibly harmless when fully ripe and dried as commonly sold by florists in autumn arrangements. *Solanine* is destroyed by heat and the fruits are cooked and eaten in Java and Siam. Apparently, they are never as toxic as the fruits of *S. pseudo-capsicum* L., commonly sold as a potted plant at Christmas. The fruits and vegetative parts of the latter species contain the alkaloid, *solanocapsine*, which slows the heart, and also *solanine* and *solanidine*, and have been responsible for deaths of humans and grazing animals.

CONTACT POISONS:

Metopium toxiferum Krug. & Urb. POISONWOOD. Contact with any part of the tree, and especially the clear, sticky sap which turns black on exposure to the air, can produce any degree of dermatitis from a mild rash to large blisters which spread from one part of the body to another. The tree is com-

mon in pinelands and oak hammocks and often grows so close to pine trees that it escapes destruction when land is cleared without removing the pines. It springs up quickly after clearing and the attractive, glossy leaves of young trees have inspired unsuspecting individuals to transplant them to their dooryards, to their subsequent sorrow. Smoke from the burning wood is very irritating.

Hippomane mancinella L. MANCHINEEL. All parts, especially milky sap and fruit, according to Dr. W. M. Lauter of the University of Florida, contain *physostigmine* or some other similar alkaloid, plus a sapogenin, and occasion acute dermatitis and, if taken internally, gradual ulceration of the intestinal tract. In the eyes, the sap causes temporary blindness. The tree has been largely eliminated in South Florida except in the Everglades National Park. Persons wishing to fish for tarpon in Bear Lake will be permitted to do so on proving to Park authorities that they can recognize manchineel trees there and avoid poisoning.

Polyscias balfouriana Bailey (syn. *Aralia balfouriana* Hort.), BALFOUR POLYSCIAS, also *P. guilfoylei* Bailey (syn. *A. guilfoylei* Bull.), GUILFOYLE POLYSCIAS, and related species, generally referred to as "aralias". All parts contain saponin and the plants, commonly cultivated as backyard hedges, are a frequent cause of dermatitis which may arise from merely brushing against the leaves or, in a more acute form, from handling cuttings.

Schinus terebinthifolius Raddi. BRAZILIAN PEPPER (erroneously called Florida Holly). All parts contain an aromatic resin which produces dermatitis, especially when plant is in bloom. Severe cases have resulted when children have squeezed the fruits, pretending to make "ink". A few fruits have been eaten by small children with no ill effects but consumption of a large number would probably result in internal inflammation. The fruits of the closely related *S. molle* L., formerly used in South America to adulterate pepper, reportedly caused hemorrhoids.

Senecio confusus Britten. MEXICAN FLAME VINE. A frequent source of dermatitis, especially when being trimmed. No part should be taken internally. The genus *Senecio* includes many species highly toxic to grazing animals as they contain several alkaloids which attack the liver. *S. lobatus* Pers. is suspected of poisoning Florida cattle.

Agave spp., especially *A. ingens* Bgr. var. *picta* Bgr. (syn. *A. picta* Salm.) In a number of instances, the sap has caused a burning rash, with numerous small, red swellings, appearing soon after contact and persisting for several days.

Euphorbia lactea Haw., CANDELABRA CACTUS, and *E. tirucalli* L., PENCIL TREE, MALABAR TREE, SPURGE TREE, or MONKEY FIDDLE. The milky sap of these plants contains *euphorbon*, will cause rash and blisters externally, intense burning and temporary blindness in the eyes, and is poisonous internally. These plants are too often planted in foundation boxes, outgrow such locations and have to be cut back, exposing the trimmer to the free-flowing sap.

Euphorbia pulcherrima Willd. POINSETTIA. All parts and especially the milky sap contain toxic *euphorbon*. The sap may cause dermatitis similar to that derived from poison ivy. Children have died from eating the showy red bracts.

Aroids such as species of *Alocasia, Colocasia, Xanthosoma, Philodendron* and especially *Dieffenbachia* contain stinging juice that causes dermatitis. Nurserymen handling cuttings are often severely affected. The acrid juice will cause tongue and throat to swell and children often suffer from chewing portions of these plants. Tubers of the first three genera mentioned are wholesome after cooking and are important vegetables in tropical countries.

Lepiota morgani Pk. MORGAN'S LEPIOTA. This large, white mushroom, which occurs in ring formations during spring and fall rains, is differentiated from a similar non-toxic species by its green spores. Small amounts, eaten raw or cooked, have caused severe poisoning in South Florida, gastroenteritis being accompanied by low blood pressure and state of shock, and followed by intense thirst.

Gloriosa spp., especially *G. superba* L., MALABAR GLORY LILY, and *G. rothschildiana* O'Brien, ROTHSCHILD GLORY LILY. The stalks, leaves and especially the tubers contain *colchicine, superbine* and *gloriosine*, a newly discovered alkaloid. *Colchicine* is so po-

tent that it is dubbed by toxicologists "vegetable arsenic". Eating the tubers is a common means of suicide in India and they have caused accidental poisonings as well, yet moles plague *Gloriosa* growers by consuming the tubers and apparently thriving on them. The prime source of *colchicine*, used in medicine as a gout preventive and in plant breeding, is the Autumn crocus, *Colchicum autumnale* L., a plant of temperate zones.

To those who may be unduly alarmed, I would like to say that, while the number of plants poisonous to people in Florida is considerable, the non-poisonous plants available for home cultivation constitute an overwhelming majority; further, that many plants that are classically familiar in flower gardens and in the florist trade, such as foxglove, lily-of-the-valley, sweet pea, and English ivy, are fully as toxic as any of those cited above, yet the incidence of poisoning has not been so great as to be damaging to their popularity.

To scoffers, such as those who claim to have chewed oleander and rosary peas, I would like to point out something of a parallel in the words of Prof. D. Gordon of Queensland University who says that he is convinced that one could "find a few people who could take occasional baths in the spraying solution of Pentachlorphenol", yet the illness and death of others exposed to it prove that there is a definite risk in its use in horticulture. Plants known to have toxic properties should be treated with the same respect given common household hazards such as matches, electricity, gasoline, insecticides, the contents of the medicine cabinet and the indispensable automobile!

COLD INJURY OF ORNAMENTAL PLANTS—HOW IT OCCURS AND PROTECTION POINTS

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The winter of 1957-58 was one of the most severe that Florida has experienced in its history. Damage to plants throughout the state was extensive, resulting in serious repercussions to the financial conditions of the state's horticultural industries and government. Paradoxically, Florida's horticultural products suffer more from cold damage than do horticultural products in states having much colder climates. This is due undoubtedly to the tropical and semitropical plant materials generally grown, their relatively high critical cold temperature levels and the highly erratic nature of the state's temperature fluctuations.

The amount of damage plants receive from low temperatures depends upon several factors, including the rate of temperature drop, minimum temperature reached, length of time the temperature remains at or below the critical level and the general health of the plants.

Fundamentally there are two types of cold damage—chilling injury and freezing injury. Chilling injury occurs at temperatures above freezing. Some species and varieties of crotons, foliage plants, palms, eugenias and other tropical species (specimen) are injured at temperatures well above the freezing point. The exact physiological reasons for such injury are not fully understood, but there is evidence that low temperatures affect the permeability of cell membranes in such plants, restricting or preventing the translocation of water, nutrient elements and carbohydrates within the various tissues, and thus resulting in injury and often death.

Damage from freezing injury varies depending on whether freezing of the tissue occurs rapidly or slowly. If the temperature drop is rapid and freezing occurs quickly, ice crystals form intracellularly. Since water expands when it freezes, ice crystals formed within the cells often puncture the protoplasmic membranes internally because of this. Living plant cells are usually killed when water freezes within them and this is possibly the most usual mechanism of freezing injury.

Slow freezing caused by a relative slow drop in temperature, however, results in intercellular ice formation. Under these conditions injury can result from the withdrawal of water from the cells causing dehydration of the protoplasm and inducing various physiological disorganizing effects. Coagulation of