Urtica chamaedryoides Pursh: a Stinging Nettle, or Fireweed and Some Related Species[1]

Nancy C. Coile[2]

INTRODUCTION: Recently, several persons have brought for identification carefully handled plants and complained that the plants, when touched, had caused intense pain that persisted for several hours. The stinging plants were *Urtica chamaedryoides* Pursh, called 'heartleaf nettle' by Wunderlin (1998). Until physical contact was made, the nondescript plants had not been noticed by the person. When the identity name was supplied and the information given that this is a member of the nettle family, invariably the person would say, "No, this is not stinging nettle, because I know stinging nettle and this hurts much worse than that does." They were referring to another plant with stinging hairs (=stinging trichomes): *Cnidoscolus stimulosus* (Michaux) Engelm. & A. Gray, a member of the family Euphorbiaceae. This circular will provide information on *Urtica* and will distinguish it from *Cnidoscolus*.

SYSTEMATICS: Family Urticaceae (nettle family), a part of the larger group Order Urticales, is mostly tropical and subtropical in both hemispheres (Miller 1971; Cronquist 1981; Zomlefer 1994). Mabberley (1997) lists 48 genera with 1050 species for Urticaceae. Mabberley follows Cronquist (1981) who characterizes the family as being wind-pollinated, with simple leaves, usually without milky sap, a solitary seed, and often with stinging hairs. Cystoliths are intercellular concretions usually of calcium carbonate (Lawrence 1951) and shape varies from spherical, bacilliform, fusiform, stellate and vermiform, but these are usually visible only in dried material (Miller 1971). Cystoliths, a peculiarity found in many Urticales, are present in stems and leaves, and sometimes can be diagnostic (Cronquist 1981). There is an excellent illustration of a cystolith in Zomlefer (1994) showing the structure suspended by a cellulose stalk and present in a specialized cell called a lythocyst. Acanthaceae (a member of Scrophulariales) also has cystoliths.

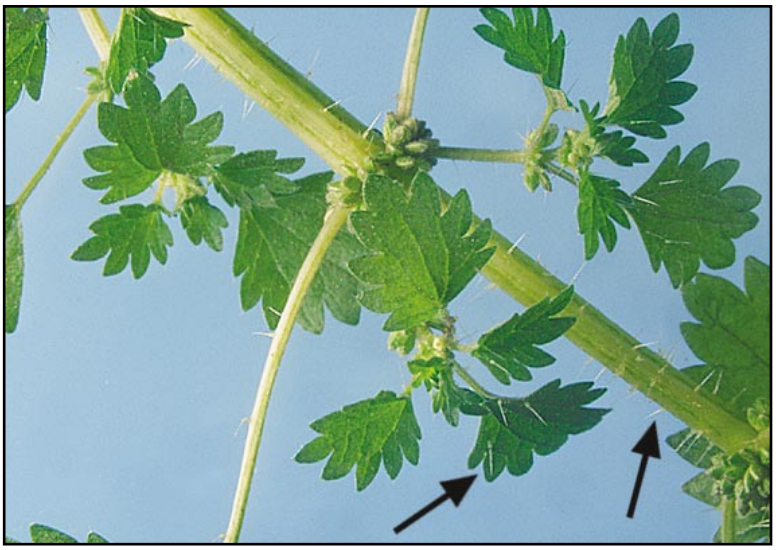

Figure 1. Portion of Urtica chamaedryoides stem. Stems and leaves opposite. Insignificant inflorescence axillary. Note stinging trichomes (arrows) on stem and leaves. Photo by Jeffrey W. Lotz.

Cronquist (1988) defines his Subclass Hamamelidae as consisting of 11 Orders (Trochodendrales, Hamamelidales, Daphniphyllales, Didymelales, Eucommiales, Urticales, Leitneriales, Juglandales, Myricales, Fagales and Casuarinales) and with two-thirds of the species in order Urticales. Included in that Subclass are several familiar groups: sycamores, marijuana, figs, elms, nettles, corkwood, hickories, walnuts, wax myrtles, oaks, chestnuts and Australian pines. This Subclass is a group of wind-pollinated families and is considered by Cronquist to be very ancient.

Thorne (1992) differs somewhat from Cronquist's classification and places Ulmaceae (elm family), Acanthaceae (acanthus family) and the Urticaceae in his Order Urticales, under Superorder Malvanae, which also includes Order Malvales [Malvaceae (hibiscus family), Bombacaceae (kapok family), Sterculiaceae (chocolate family), and Tiliaceae (linden

[1]Contribution No. 39, Bureau of Entomology, Nematology & Plant Pathology; Nematology Section.

[2]Botanist, FDACS, Division of Plant Industry, P.O. Box 147100 Gainesville, FL 32614-7100.

family)] and Order Rhamnales (ziziphus family). Thorne's family Urticaceae includes Moraceae (mulberry or fig family) which is defined mainly by possessing several-seeded fruits, having many woody members, by having milky sap, not strictly wind-pollinated, some having the receptacle forming a fleshy synconium (fig), and lacking the basal ovule of Urticaceae (*sensu* Cronquist). Cronquist (1981, 1988) notes that Moraceae and Urticaceae are very closely related and probably had a common ancestor.

Since the members of family Urticaceae are wind pollinated, there is no need to attract insects by a colorful corolla, and there is no corolla at all. Flowers are either male or female and occur in leaf axils on the same plant. In the male flowers, there are five stamens with explosive anthers (Jones and Luchsinger 1979). The female flowers have a one carpellelate ovary subtended by four to five sepals. These tiny flowers are not noticeable (Fig. 1), but the arrangement of the flowers is diagnostic for species (see Key below). Five of the six genera of Urticaceae in Florida are herbaceous; *Pouzolzia* is somewhat shrubby. *Boehmeria* may have either opposite or alternate leaves and lacks stinging hairs; *Pilea* lacks stinging hairs, has opposite leaves, and is an annual. Two genera have stinging hairs: *Laportea* has alternate leaves, while *Urtica* has opposite leaves.

KEY TO FLORIDA's *URTICA* SPECIES*:

Perennial; plant erect; inflorescence compound and longer than petioles (over 2 cm long).....*U. dioca*
Annual; plant sprawling; inflorescence simple and shorter than petioles.
  Upper leaves much reduced; flower clusters roundish (sometimes short spicate);
    achenes 1-1.5 mm long; leaves crenate-dentate .....*U. chamaedryoides*
  Upper leaves not much smaller than lower ones; flower clusters elongated; achenes
    1.5-2.5 mm long; leaves with sharply incised margins .....*U. urens*

* Wunderlin (1998); Clewell (1985), Radford *et al.* (1964), and Small (1933) were used to construct this key.

Urtica dioica L., stinging nettle, is native to the Old World, but has naturalized throughout much of temperate America (Gleason and Cronquist 1991). This perennial plant is listed in Wunderlin (1998) for Alachua County, but Woodland (1982) shows *U. dioica* as ranging from Canada south only to northern Georgia. However, Jones and Coile (1988) show the species from two counties in Georgia, a northern county (Habersham) and the other bordering on Florida (Lowndes Co., where Valdosta is located). This species is utilized by man as a food, for fiber, as a wool dye, as a source for chlorophyll and medicinally, with over 23,000 ha cultivated in Germany by 1918 (Mitich 1992). When checking the database AGRICOLA for abstracts, numerous foreign language articles in eastern Europe indicate that *U. dioica* is a weed of fields, pastures and waste places and that it is also utilized as a food, as medicine, and as a reservoir for insect parasitoids.

Figure 2. Urtica chamaedryoides under wooden fence of horse corral. Erect and sprawling stems. Photo by Jeffrey W. Lotz.

Urtica urens L., burning nettle or dwarf nettle, is native to Europe and in Florida is found in cultivated fields and disturbed sites (Wunderlin 1998). Wunderlin lists it for three counties in central Florida and one county in the Panhandle.

Urtica chamaedryoides (fireweed, heartleaf nettle, weak nettle, or ortiguilla) is a native species which is more widespread in Florida than the two above. The range is southern Ohio, Kentucky, southern Illinois west to southeastern Kansas, south to central Florida, Texas, Louisiana and Mexico (Woodland *et al.* 1976); disjunct in Argentina (Miller 1971) and Cuba (Geltman 1995). This nondescript species is very green (remember *U. dioica* is a commercial chlorophyll source), with small (1-6 cm x 1-4 cm) opposite leaves on long petioles (about same length as blade) (Fig. 1). The leaves are reminiscent of strawberries, according to Edwards and Remer (1983), but actually the leaves are much

smaller than strawberry leaves. Occasionally, the leaves will have a purple underside. Plants may reach 1 m, with most plants about 30 cm (= 12 inches) in height (Fig. 2). Dr. John H. Nelson, University of South Carolina, notes (personal communication) that plants overwinter as a low bushy clump, but with long-arching stems to almost a meter when flowering. The axillary flower clusters (Fig. 1) are small (3-6 mm across), with tiny apetalous flowers to 1 mm wide (Woodland *et al.* 1976). The cystoliths are usually bacilliform, but some Texas plants are punctiform (Miller 1971).

ECOLOGICAL ASPECTS: All three of Florida's *Urtica* species are troublesome because of the stinging hairs. However, *U. chamaedryoides* is the species which in the past few years has come to notice for causing discomfort and distress. This species is native and its habitats are listed as thickets, rich woods in circumneutral soil, calcareous hammocks and mesic hammocks (Radford *et al*.; Clewell 1985; Wunderlin 1998). *Urtica* is well-known for its preference to rich soils (Mitich 1992). John B. Nelson notes (personal communication) its presence at the species-rich Stevens Creek, McCormick County, SC, which is also the site of the federally endangered Miccosukee gooseberry [*Ribes echinellum* (Coville) Rehder], and in Calhoun Co, SC, on bluffs of the Congaree River, but has no reports of it as a pasture or lawn weed in South Carolina.

Why has *U. chamaedryoides* become a problem weed of fence rows, pastures and lawns in Florida? Movement from shady natural areas to these disturbed open areas seems a very big jump. However, the enriched soils of these man-made sites mimic the rich soils of the original habitat. Once introduced into the artificially enriched areas, the plants thrive. The question is: how did it move from natural habitats to these disturbed ones? Kevin Morgan, Florida Farm Bureau, in a personal communication notes that *U. chamaedryoides* "came out of nowhere" and he does not know how it arrived at his farm. No outside hay was brought onto site, since all hay is produced at the farm. Miller (1971) provides line drawings of *U. chamaedryoides*, including a drawing of a "wet achene (with) mucilage halo." Could the achenes' mucilage halos stick onto animals (including man) and receive transport from natural areas?

Mowing does not cause destruction of the plants, they just become more diminutive (possibly resulting in a 'lawn race'). In fact, mowing probably helps to scatter the seeds and ensure a larger population in the future. Once incorporated into hay, the plants could easily be spread into previously unaffected areas.

SPECIAL FEATURES: The genus *Urtica* is characterized by the stinging hairs which have brittle, rigid shafts and bulb-like bases (Thurston and Lersten 1969). The base of the stinging hair, a multicellular pedestal embedded into the epidermis, produces the urticating substance (Thurston 1974). As far back as 1886, Haberlandt disputed the commonly held belief that the urticating substance was formic acid (Potterton 1983). Thurston (1974) reported that the substance contained histamine, acetylcholine and 5-hydroxtryptamine (=serotinin) plus some other compounds that were difficult to characterize. Using RP-HPLC (reverse phase high pressure liquid chromotography) and RIA (radioimmunoassay), Czarnetzki *et al.* (1990) were able to show high levels of leukotriene B4 and leukotriene C4 and histimine in the urticating fluid of *U. urens*. Budavari (1996) describes the leukotrienes as potent bronchoconstrictors with a role in immediate hypersensitive reactions and some as potent chemotactic agents. It is the chemotactic role of the leukotrienes that gives a slap to the nettles. Budavari (1996) characterizes histamine as a potent vasodilator involved in allergic reactions. Czarnetzki *et al.* (1990) suggest that the urticating substances in *Urtica urens* resembles insect venoms in its actions.

The urticating hair or trichome has a bulbous and very fragile tip which breaks off at an angle and results in a perfect tool for piercing skin. Basically, the shaft of the hair resembles a glass tube due to the deposition of silica in the cell wall during formation (Thurston 1974). When the urticating hair tip is broken, it has the action of a hypodermic needle and injects the urticating substances which cause the intense pain and result in irritated skin rashes.

Thurston and Lersten (1969) describe hairs of this type from four dicotyledonous families: Urticaceae, Euphorbiaceae, Loasaceae and Hydrophyllaceae. These families are not closely related (Cronquist 1994). All four families are listed by Wunderlin (1998), but only the first two in our area have species with stinging hairs. Urticaceae in Florida contains two genera with stinging hairs: *Urtica* and *Laportea*. We have three species of *Urtica* in Florida and two species of *Laportea* (Wunderlin 1998), and each of the species has stinging hairs. Euphorbiaceae has two genera with stinging hairs: *Cnidoscolus* and *Tragia*. Neither Small (1933) nor Wunderlin (1998) indicate that *Tragia* possesses stinging trichomes, but personal experience tells me that at least *T. urens* and *T. urticifolia* do have stinging hairs; and the specific epithets indicate the same. The pain from *Tragia* is not nearly as intense as that from *Urtica*, *Laportea* or *Cnidoscolus* and the hairs are not as abundant on the plants. Unwary plant collectors do become wary after an encounter.

Edwards and Remer (1983) record the symptoms of nettle poisoning which affected hunting hounds in Arkansas: nausea, vomiting, clawing at the face and nose, muscle fasciculations, ataxia progressing to partial paralysis of the rear legs and hemorrhaging from the nose. The dogs became normal within 36 hours. The authors suggest that when the hounds ran through *U. chamaedryoides* they inhaled the hairs as well as getting the surficial dosage of chemicals. They note that the clinical syndrome resembles organophosphate insecticide poisoning, but cholinesterase depression was not present. Other such incidents with dogs had been reported.

Persons with nettle contact have all emphasized the burning, agonizing pain. Red, raised welts persist for several hours -- the severity depends on the part of the body affected, the length of contact, the size of the plants, and the individual response. Since the plants are becoming more prevalent in disturbed areas, it is inevitable that physical contact would be made with the resultant "Ouch!"

Ron Davis (at LaCaron, a Paso Fino horse ranch in Alachua County) reported in a personal communication that his horses' noses have shown temporary bumps due to the nettles and young foals quickly learn to avoid the plants. Kevin Morgan, Florida Farm Bureau, stated in a personal communication that in his area everyone calls the plants 'fireweed' because of the burning sensation the plants elicit. Fireweed has been an inconvenience at his farm near Lake City (Columbia County) for several years. Plants are especially prolific in the cow pens and under shade trees in the pasture. This is similar to the experience of Ron Davis, where plants are most numerous on fence lines and in shady areas of the pasture, but also invading into a side lawn. Daylily growers sometimes have problems with the weed, according to Renato Inserra (DPI Nematologist, in a personal communication). Dr. Inserra, while examining field-grown daylilies for associated nematodes, encountered *U. chamaedryoides* growing among the daylilies. The welts from stinging hairs lasted for several hours and were very uncomfortable.

Figure 3. *Cnidoscolus stimulosus*. Note bright white flower. Photo by Jeffrey W. Lotz

Pullin and Gilbert (1989) note that in *Urtica dioica* plants, the trichome (=hair) density was significantly higher in plants that were grazed or had mechanical damage. Therefore, injured plants will be even more likely to cause pain.

***CNIDOSCOLUS* CONTRASTED:** *Cnidoscolus stimulosus* (Michaux) Engelm. & A. Gray is called 'tread-softly' and 'finger-rot' in Wunderlin (1998). However, a common name that has wide usage (at least in central Florida) is 'stinging nettle.' This species has a showy petaloid calyx (Fig. 3) and the flowers are in a terminal cluster. It is ubiquitous in dry sites throughout Florida. Therefore, when I tell folks that *Urtica chamaedryoides* is a stinging nettle, it is no wonder that they think immediately of the better-known species with the showy flowers. Even when it is not flowering, *C. stimulosus* is readily distinguishable by its milky sap and its leaves which are large and lobed; fruits are 3-lobed. Some other well-known members of the family Euphorbiaceae: *Euphorbia pulcherrima* Willd. ex Klotzsch, Christmas poinsettia; *Manihot esculenta* Crantz, cassava; *Aleurites fordii* Hemsl., tung oil tree; *Ricinus communis* L., castor-oil plant; *Acalypha wilkesiana* Muell.Arg, copperleaf; *Hippomane mancinella* L., manchineel; *Sapium sebiferum* (L.) Roxb., Chinese tallowtree, a noxious weed; *Codiaeum variegatum* (L.) Blume var. *pictum*, ornamental croton; *Croton punctatus* Jacq., beach tea, a native species; *Pedilanthus tithymaloides* (L.) Poit., devil's backbone.

ETHNOBOTANICAL ASPECTS: Except for ramie fibers from *Boehmeria nivea* (L.) Gaudich, Urticaceae is of little economic importance (Miller 1971). A few genera are used as ornamentals: *Pilea* (clear weed and aluminum plant), *Elatostema* (=*Pellionia*), and *Soleirolia* (=*Helxine*, baby tears). *Laportea* and *Urtica* are used as potherbs (Lawrence

1951, Ryan (1975), Jones and Luchsinger 1979, Mitich 1992). Weatherbee and Bruce (1979) recommend eating nettles because they are high in vitamin C and vitamin A and they are tasty. They suggest boiling the nettle foliage for eight to 10 minutes and serving with butter and salt. Ryan (1975) warns against using older growth because of the gritty crystals (=cystoliths) which are not so prevalent in young plants. Ryan also suggest drying stalks of nettles and reconstituting them for use in teas, soups, stews or vegetables. Mitich (1992) notes that nettles are used to form a rennet to clabber milk.

Before cotton popularity, ramie was the most-used fiber plant and its use dates back "several" millennia (Miller 1979). The fiber is perhaps the longest (over 5.5 cm long) and most silky of all vegetable fibers (Albada 1927, Jones and Luchsinger 1979). In recent years, we have become accustomed to finding ramie fibers as a fabric blend in our clothing, especially sweaters.

MEDICINAL ASPECTS: Gerard's 1597 Herbal (Johnson 1633), the oldest English herbal, observes that nettles are useful in kidney diseases, kidney stones, lung aliments, pleurisy, inflammation and as a styptic. Gerard also notes that the seeds "provoke lust." Potterton (1983) in his colorized and updated version of the 1649 Culpepper's Herbal notes that the nettles are rich in vitamins and minerals. Of course, these herbals are not referring to our native *U. chamaedryoides*, but to *U. dioica*. This very old information is echoed in Bruneton (1995) who also mentions proteins and phenolics. Bruneton (1995) lists the following pharmacological properties and uses of *U. dioica*: beneficial effect of the root on prostatic adenoma; treatment of urinary tract inflammation; treatment of benign prostate hypertrophy; leaves for treatment of asthenia and anemia; for moderate acne; and symptomatic treatment of pain in the joints.

Urtica dioica and *U. urens* are listed in a table with other species as "plant with external irritant, stinging hairs or detachable needles" and photographs are provided in the AMA Handbook (Lampe and McCann 1985). Not mentioning *U. chamaedryoides* substantiates the theory that this species has been relatively rare and is spreading into areas with more human contact. Lampe and McCann describe the malady as "contact urticaria" and note that almost all persons are vulnerable to nonimmunulogic contact urticaria such as that provoked by *Urtica* or *Cnidoscolus.* Antihistamines are recommended if treatment is required, but usually the pain and swelling will subside. "Wheal and erythematous flare" is the expression used by Lewis and Elvin-Lewis (1977) to describe the inflammatory reactions of the skin to plants such as *Urtica* and *Cnidoscolus*.

CONTROL: Plants die back naturally in the hot weather season. In order to control *U. chamaedryoides* during the cooler times of the year, herbicides may be the solution. The 1998 Weed Control Manual (Meister 1998) lists MCPA® for pasturelands; MCPA® and Chipco Ronstar® for lawns and turf; and Trifluralin® for use in fallow lands. Robert H. Moore, FDACS/Division of Agricultural Environmental Services, reported MCPA-4® for use in small grains, rice, grasses, rangelands, pastures and non-crop areas; and for selective control in turf and non-crop areas. He notes that Clean Crop®, which is a 2,4-D weed killer, is listed for selective control of certain broadleaf weeds in turf and non-crop areas, but that nettles are more difficult to kill (personal communication). Mr. Moore warns that though Vanquish® and Ronstar® are effective for lawns and turf, these chemicals may be applied only by commercial and licensed personnel. Of course, one should always follow the directions for use and heed the precautions which are listed on the herbicide label. Dr. Joyce A. Tredway (University of Florida, personal communication) suggests use of Banvel® or 2,3-D amine in pastures with horses. She notes that there is no period required between treatment with Banvel® and the grazing of non-lactating animals. For 2,4-D amine: she observes that you should not graze dairy cattle in treated areas for 7 days after application, nor cut forage for hay within 30 days of application.

Use caution when mowing *Urtica chamaedryoides* since the seed have a mucilaginous coating. If the plants are seeding, the seeds may stick to the mower and be transported to other sites.

If hand removal is used, watch out for those stinging hairs.

CONCLUSIONS: Since *U. chamaedryoides* seems to be moving into habitats frequented by people, caution is advised for those likely to come into contact with the plants. One should learn to recognize the plants and avoid touching them. The pain is fierce, but in normal situations is not life threatening.

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