

# THE MEDICINE AND MEDICINAL PLANTS OF C. S. RAFINESQUE<sup>1</sup>

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**Flannery, Michael A.** (*Library Director, Lloyd Library and Museum, Cincinnati, OH 45202, Department of American History, Northern Kentucky University, Highland Heights, KY 41099*). THE MEDICINE AND MEDICINAL PLANTS OF C. S. RAFINESQUE. *Economic Botany* 52(1)27–43, 1998. *This paper pursues the lead of Bart K. Holland in utilizing classic literature as a guide to the pharmacologic potentialities of natural products. Instead of focusing on European texts, however, American medicinal plants are examined through the work of the influential naturalist Constantine S. Rafinesque (1783–1840). Rafinesque is discussed with special attention to his activities as a medical botanist. In particular, the plant species monographed in the main section of his Medical Flora of the United States (1828–1830) are studied for their historical and current use as medicinal agents. The results are tabulated and presented in a bar graph. The study concludes that Rafinesque was a progressive therapist whose Medical Flora is a promising guide for phytopharmaceutical prospecting with North American plants.*

Die Medizin und medizinische Pflanzen von C. S. Rafinesque *Dieses Referat folgt dem Beispiel von Bart K. Holland, indem es die klassische Literatur als Anhaltspunkt zu den pharmakologischen Möglichkeiten von natürlichen Produkte nutzt. Statt sich auf europäische Texte zu konzentrieren, werden amerikanische medizinische Pflanzen durch die Arbeiten von dem einflußreichen Naturforscher Constantine S. Rafinesque (1783–1840) untersucht. Rafinesque wird mit besonderer Aufmerksamkeit auf seine Tätigkeiten als medizinischer Botaniker besprochen. Insbesondere, die Einzeldarstellung der Pflanzenspezies, die im Hauptabschnitt seines Buches Medical Flora ist, wird wegen ihres historischen und aktuellen Nutzen als medizinisches Mittel studiert. Die Ergebnisse sind tabellarisch angeordnet und graphisch dargestellt. Die Studie kommt zu dem Schluß, daß Rafinesque ein progressiver Therapeut war, dessen Medical Flora ein vielversprechender Führer für phytopharmazeutische Untersuchungen von nordamerikanischen Pflanzen ist.*

**Key Words:** Medicinal plants, pharmacology, pharmacopeia; Rafinesque.

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Bart K. Holland of the New Jersey Medical School has recently assembled a team of scholars to pursue the provocative theme of utilizing classic and traditional literature as a guide to pharmacological discovery (Holland 1996). While such an integrated approach is bound to be fruitful, it can by its very nature only address the examination of European medicinal plants. Patient and persistent inquiry has uncovered indigenous species with therapeutic promise from every part of the globe, but it has been suggested that the plant drugs historically used in the United States may hold greater phytomedicinal promise than rare species from the rain forest and other distant climes (Tyler 1996). While Holland and his colleagues study the texts of Theophrastus, Dioscorides, Galen, Paracelsus,

and others, surviving texts in New World medicinal plant investigation are suggested in Johann David Schoepf's *Materia Medica Americana* (1787), William P. C. Barton's *Vegetable Materia Medica of the United States* (1817), C. S. Rafinesque's *Medical Flora* (1828–1830), and Wooster Beach's *American Practice of Medicine* (1833).

By far one of the most colorful representatives of this group is Constantine Rafinesque (1783–1840). This "erratic genius" presents himself as an especially interesting and valuable study in the history of medical botany for three basic reasons: 1) because of a well-defined (albeit controversial) medical career that comes together in one major work, Rafinesque is relatively easy to bring into sharp historical focus; 2) because he was considered a maverick by the medical establishment, he became *ipso facto* a seminal figure within the American botanico-

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medical movement; and 3) because of his importance to these sectarians, inquiry into the validity and endurance of his work will also shed equal light on the materia medica of nineteenth-century American medicine and perhaps the future of some North American plant species in pharmacognostic inquiry.

### RAFINESQUE AND MEDICINE

The importance of Rafinesque as a medical botanist has long been recognized (Berman 1952; Weaks 1945; Wilder 1904), a point made self evident by his work in the healing arts and his close relationship with some of America's leading medical men of the age. In Sicily as early as 1808 he engaged profitably in the drug trade, having "established a manufacture of prepared dry Squills [i.e. the bulb of a sea onion, *Urginea maritima* (L.) Baker] on a large scale" (Rafinesque [1836] 1944: 307). Upon his arrival in America he met the Congregational minister-turned-botanist/physician Manasseh Cutler (1742–1823) and was promoted and supported by Dr. Samuel Latham Mitchell (1764–1831), co-founder of the *United States Pharmacopeia* in 1820 (hereafter *USP*). In 1819 he began teaching at the progressive Transylvania University in Lexington, Kentucky, until strained relations forced his departure early in 1826. Despite detractors like the botanist Ludwig Schweinitz (1780–1834), who called Rafinesque "crack-brained" (Schweinitz [1832] 1921) and others who characterized him as a ne'er-do-well eccentric quack (Drake [1830] 1970: 198; Hanley 1977: 140–141), he did have a strong background in botany and medicine.

It is largely on three fronts that Rafinesque's work in medicine must be examined: 1) his relationship to the early botanico-medical movement, specifically through Wooster Beach (1794–1868) and Alexander Wilder (1823–1908) who attempted to link the naturalist with the eclectic medical movement; 2) his invention of Pulmel, an alleged cure for tuberculosis; and 3) his publication of the two-volume *Medical Flora*.

The first of these issues has been previously examined, and despite the strained efforts of eclectics (the best organized and most enduring of the nineteenth-century botanical cults) to tie Rafinesque to the early movement, little direct relationship can be demonstrated (Berman 1956). While Rafinesque may have generally

supported Wooster Beach's ideas and his new medical sect, he was never actively affiliated with it despite claims of Alexander Wilder that this medical botanist "gave his adhesion" to Beach's medical practices (Wilder 1904: 438).

The second important component of Rafinesque's work in medicine relates to his theories on the diagnosis and treatment of consumption (tuberculosis) and the development, promotion, and sale of his product called Pulmel. Believing that he had contracted the disease, Rafinesque claimed in his tract titled *The Pulmist* that his "previous skill in practical and medical botany" enabled him to compound a mixture of "some active medical plants" that restored him "to perfect health and sound constitution" (1829: 7). This botanical preparation which he called Pulmel was made into several different dosage forms: most commonly as a syrup for internal use, but also as a lotion for external use and as a balm for inhalation. Each dosage form had a prescribed use under certain conditions.

Rafinesque's treatment included not only Pulmel but a restorative therapy that included lifestyle change and careful attention to diet (1829: 48–59). Compared with the harsh heroic measures of the regular physicians and their preference for blistering, bleeding, and dosing with calomel (mercurous chloride), it is easy to concur with one twentieth-century analyst that "Rafinesque was in advance of his period" (Weaks 1945). Unfortunately, the ingredients of his Pulmel are not known and so it is impossible to assay it or to conduct the clinical trials necessary to determine its efficacy. Although Rafinesque had no idea he was battling *Mycobacterium tuberculosis*, it is conceivable that one or more of his botanicals contained antibacterial or immune-stimulant properties that acted against a variety of respiratory ailments. A potentially valuable phytopharmaceutical may lurk within the long-lost Pulmel preparation, if so it is likely to be found in his major work in medicine—the primary focus of this paper—the *Medical Flora, or Manual of the Medical Botany of the United States of North America*, a two-volume work first published in 1828.

### THE MEDICAL FLORA

Reviews were mixed. While modern analysts readily admit the importance of the *Medical Flora* (Berman 1952; Merrill 1949: 38–39; Packard 1931, 2: 1229), Rafinesque's contemporaries, es-

pecially physicians, were less appreciative. Dr. A. Clapp insisted that Rafinesque "was not a physician, and is not entitled to much confidence in regard to the properties of plants" (Berman 1952). Likewise, Dr. R. Eglesfeld Griffith (1798–1850) called the *Medical Flora* "so mingled with wild hypothesis and unsubstantiated assertions, as to render it an unsafe guide . . ." (1832). Another view was held by Dietrich Franz Leonhard von Schlechtendal (1794–1866), the famous German botanist at the University of Halle. Schlechtendal devoted five pages to the *Medical Flora* in his *Litteratur-Bericht zur Linnaea für das Jahr 1834*, extracting a large portion of the monograph on *Aristolochia serpentaria* L. for his readers. He found the green woodcut illustrations adequate and called the work "a very convenient handbook" (1835).

Whatever the opinions of his contemporaries, larger historical developments in medicine destined Rafinesque's book for temporary obscurity. The steady decline of the botanico-medical movement following a peak of activity among the eclectics in the late 1860s and 1870s saw a general waning of medicinal plant interest among the medical community. Concomitant with this was the emergence of more sophisticated laboratory techniques and the rise of synthetic drugs, causing a dramatic and progressive shrinkage of vegetable products with official USP status (Boyle 1991: 57). When medical botany was discussed at all in the opening decades of the twentieth century, the unorthodox Rafinesque was often forgotten.

Nevertheless, this century has seen a gradual reawakening of interest in Rafinesque's *Medical Flora*. The centennial symposium that convened at Transylvania College on October 30, 1940, honoring their former faculty member did much to revive this American medical classic. It was also an opportunity to call for a broader approach to medicine, one that went beyond the professional fascination with the magic bullet synthetics dominating the day's research projects (Haag 1941).

Rafinesque's own view of medical progress was multidisciplinary, resting upon rather sophisticated ideas about the interplay of taxonomic botany, medical botany, ethnobotany, phytochemistry, and pharmacy. He acknowledged the previous work of his contemporaries Jacob Bigelow (1787–1879) and William P. C. Barton (1786–1856) and called their books on medical

botany "imperfect" but "useful assistants to those who can afford them." Rafinesque's qualifications for writing his *Medical Flora* included "fifteen years of botanical and medical observations and researches, and 8000 miles of botanical travels, wherein he diligently enquired and elicited from the learned and the illiterate, the result of their practical experience" (Rafinesque 1828: viii). Taking his cues from any and all sources showing merit, he was unmistakably attuned to the ethnobotanical uses of New World plants by Native Americans. His appreciation of Native American medicinal-plant use in particular has been noted by modern analysts (Mignone 1975). Daniel Drake (1785–1852), who ridiculed Rafinesque for "inquiring into the arts and sciences of these savage hordes" (Horine 1961: 234), strikes today's reader as narrow, eurocentric, and anachronistic.

Interest in the *Medical Flora* today has been invigorated since Rafinesque's centennial symposium. Recently the book has been deemed of enough significance to be microfilmed as part of the American Institute of the History of Pharmacy's ambitious facsimile editions project (King 1987: 42). The reasons for this change in attitude reflect a broader shift in contemporary medicine itself. A recent study revealed that in a national survey over one-third of those sampled used herbal medicines or other alternative therapy (Eisenberg 1993). The popularity of herbal products prompted the passage of the Dietary Supplement Health and Education Act (DSHEA) in 1994 which permits some limited structure and function claims for herbals and requires that the Food and Drug Administration submit proof that the product is unsafe before removing it from over-the-counter sale. Thus the renewed interest in medicinal plants and their growing prominence in the American health care scene suggest this present appraisal.

## METHODOLOGY

Two questions underpin this examination of the *Medical Flora*: 1) What was the character of the *Medical Flora* within its own historical context?; and 2) How many of the plants selected therein are used therapeutically today? I have used a summary analysis to address these issues. Each plant entry is first listed under the original monograph number with its family and binomial. (I have reduced Rafinesque's 100 monographs to 99 because his split of the *Vitis* spp.

in two separate numbers is inexplicable and inconsistent with the rest of the work.) If there is no variance between Rafinesque's name and the current name a distinction is not necessary and the binomial is simply given with the common name. If there is a difference between the Rafinesque name and the current name, both are given. In either case a common name is provided followed by its inclusion in the *United States Pharmacopeia* (defined in the summary as "USP status"), and finally whether or not the plant has had any past or present medicinal use.

Rafinesque's notorious penchant for altering the names of plants and the sheer passage of time has caused many taxonomic changes since his writing. While many of the binomial names need updating, most of the species in the *Medical Flora* are readily identifiable through the accompanying illustrations in each monograph. I sought the assistance of various taxonomists in the few cases of those species whose identification was uncertain (see acknowledgments). In some cases Rafinesque's name is synonymous with the current name, in others they are Rafinesque inventions, in still others a current name more in keeping with the taxonomic description and illustration provided by Rafinesque has been provided. In addition, numerous authoritative sources have been used as guides to the nomenclature (Fernald 1950; Kartesz 1994; Merrill 1949; Torkelson 1996). The common names for Rafinesque's *Medical Flora* are taken from the *USP* or from *Gray's Manual of Botany* (Fernald).

The *USP* status contains inclusive dates for each plant described in Rafinesque's *Medical Flora* that appeared in either the primary or secondary lists of the *USP*'s various editions (exclusive of the *National Formulary*). These dates were largely taken from earlier studies (Boyle 1991; Hershenson 1964).

The last entry in the summary shows the medicinal use of each plant in the *Medical Flora*. It is very important to point out that medicinal use should *not* be considered synonymous with efficacy. This study is a synthesis of secondary literature and seeks only to point the way toward some of the more promising candidates for phytomedicinal inquiry; it in no way presumes to be more than a summary account of each plant listed. In reporting references to the current medicinal use of each plant certain authoritative benchmarks were used as a guide (British Herb-

al Medicine Association 1992; British Pharmacopoeia Commission 1990, 1993; Bruneton 1995; Duke 1985; Foster and Duke 1990; Lawrence Review; Martindale 1996; Merck 1996; Tyler 1993, 1994; United States Pharmacopoeial Convention 1995; Werbach and Murray 1994; Wichtl 1994). Multiple references to the medicinal use or uses of one plant may indeed be relying upon only one primary source, but the fact that these several citations exist serve to underscore its designation as a plant in "current use." To delineate the medicinal use of each plant a code has been devised: CU = current medicinal use; HU = historical medicinal use; and NUR = no medicinal use reported. For a plant to be coded CU it had to appear in *at least one* of the benchmark authorities. Furthermore, that use has to be in the context of current scientific research and/or known pharmacological activity; folk usage alone was insufficient for a plant to earn a CU designation. A plant coded HU means that it appears to have been used in the past by virtue of its inclusion in former editions of the *USP* or other compendia but is no longer to be found in any of the benchmark literature used in this study. In cases of HU plants without *USP* status a brief description of its use and the authority for it are given. The "no use reported" designation goes to those plants showing no indications of past or present medicinal use. Although some of these NUR plants may have been accorded some medicinal use ethnobotanically, there is no indication that any of these specific species have been given serious consideration by the medical community past or present. Since the emphasis of this summary is to serve as a guide to those plants showing the most therapeutic promise and space is an ever present consideration, only extended discussion is given to those plants designated CU.

Finally, as will be apparent to anyone familiar with the *Medical Flora*, the present study only examines Rafinesque's full monographs not his fairly sizeable compilation of "medical equivalents" (1830: 181-276). Plants in this category represent those "omitted" from the main list and contain much briefer descriptions and analyses. It is hard to determine Rafinesque's criteria for inclusion in this section because some (e.g., *Salix* spp. the bark of which he notes is used as a febrifuge and "6 grains of Salicine [the active constituent] have cured agues") seem well founded, while others (e.g., "wild chervil" he

simply lists as "Roots eaten like Chervil [an herbaceous plant of the parsley family] in Canada") seem like mere filler (1830: 260; 211). Overall, the impression is that Rafinesque added this "equivalents" section as an afterthought and that he spent little time on these entries.

### SUMMARY ANALYSIS

1. Acoraceae. Rafinesque's name: *Acorus calamus* L. Current name: *Acorus americanus* (Raf.) Raf. Common name: calamus/sweet-flag. USP Status: 1820–1900. CU. *A. calamus* and *A. americanus* are synonymous. Rafinesque lists calamus as "stomachic, tonic, corroborant [i.e., invigorating] and carminative [i.e., antifatulent]." Modern uses also consider it as stomachic and carminative (Duke 1985: 14–15). There is some evidence that calamus lowers serum cholesterol in rabbits (Foster and Duke 1990: 86); and "The oil has a strong sedative and antispasmodic action . . ." (Lawrence review, s.v. "Calamus," March 1996). A "bitter and carminative" widely used in Europe (Martindale 1996: 1682).
2. Adiantaceae. *Adiantum pedatum* L. Common name: maidenhair-fern. USP status: none. HU. Used in "chronic catarrhs and other pectoral affections" (Wood and Bache 1880: 1565).
3. Rosaceae. *Agrimonia eupatoria* L. Common name: agrimony. USP status: none. CU. Rafinesque lists agrimony as "A mild astringent, tonic and corroborant. Useful in coughs and bowel complaints." Modern usage accords with that of Rafinesque (Foster and Duke, 1990: 108; Lawrence review, s.v. "Agrimony," August 1995; Wicht 1994: 49). "Plant is gargled for inflammation of the throat and mouth. Mixed with fat, it is used as a poultice to draw out indolent ulcers" (Duke 1985: p. 23).
4. Liliaceae. *Aletris farinosa* L. Common name: aletris/unicorn-root. USP status: 1820–1880. CU. Rafinesque lists aletris as "tonic, stomachic, narcotic and repercussive [i.e., a reduction of swelling or tumor]." Steroidal compounds may underlie the estrogenic activity of aletris (Lawrence review, s.v. "Aletris," October 1993). It is also considered an antifatulent (Merck 1996: 234).
5. Ericaceae. Rafinesque's name: *Andromeda arborea*. Current name: *Oxydendrum arboreum* (L.) DC. Common name: sorrel-tree. USP status: none. HU. Used topically in foot ulcerations and internally as a febrifuge (Wood and Bache 1880: 1577).
6. Asteraceae. *Anthemis cotula* L. Common name: mayweed. USP status: 1820–1870. HU.
7. Apocynaceae. *Apocynum androsemifolium* L. Common name: dogbane. USP status: 1820–1870. HU.
8. Araliaceae. *Aralia nudcaulis* L. Common name: false sarsaparilla. USP status: 1820–1870. HU.
9. Ericaceae. Rafinesque's name: *Arbutus uva-ursi*. Current name: *Arctostaphylos uva-ursi* (L.) Spreng. Common name: bearberry. USP status: 1820–1920. CU. Rafinesque lists bearberry as "Astringent, tonic and diuretic." Bearberry is used in urinary tract infections (Bruneton 1995: p. 217; Merck 1996: 1688; Wichtl 1994: 51) and is an ingredient in over 80 preparations (Martindale 1996: 1678). Diuretic effect has been demonstrated in rats (Bruneton 1995: 217).
10. Aristolochiaceae. *Aristolochia serpentaria* L. Common name: Virginia snakeroot. USP status: 1820–1930. CU. Rafinesque describes the active properties of Virginia snakeroot as "diaphoretic, tonic, anodyne [i.e., analgesic], antispasmodic, cordial, antiseptic, vermifuge, exanthematic [i.e., ameliorates skin eruptions], alexitere [i.e., antitidal (esp. snakebites)]. He also writes that it is an "excellent auxiliary to Peruvian Bark." Today this plant is used for fevers, indigestion, suppressed menses, and snakebite (Foster and Duke, p. 224). *Aristolochia* spp. appear in the Chinese pharmacopoeia and are commonly employed as bitters (Martindale 1996: 1750).
11. Araceae. Rafinesque's name: *Arum triphyllum*. Current name: *Arisaema triphyllum* (L.) Schott. Common name: arum root. USP status: 1820–1860. HU.
12. Aristolochiaceae. *Asarum canadense* L. Common name: wild ginger. USP status: 1820–1870. HU.
13. Asclepiadaceae. *Asclepias tuberosa* L. Common name: butterfly-weed/pleurisy root. USP status: 1820–1890. CU. Rafinesque's uses for pleurisy root are listed as a "diaphoretic, expectorant, diuretic, laxative, es-

- carotic [i.e., escharotic or caustic], carminative, antispasmodic, & c. It is a valuable popular remedy, and a mild sudorific [diaphoretic causing perspiration], acting safely without stimulating the body." Currently used as a poultice for bruises, swellings, and rheumatism (Foster and Duke 1990: 136.). *A. tuberosa* contains glycosides used in treating cardiac insufficiency (Bruneton 1995: 573–574).
14. Fabaceae. *Baptisia tinctoria* (L.) R. Br. Common name: wild indigo. USP status: 1830. CU. Rafinesque lists wild indigo as an "astringent, antiseptic, febrifuge, diaphoretic, purgative, emetic and stimulant." This plant was extremely popular among the eclectic practitioners. The historical uses for this plant largely accord with Rafinesque's, and modern studies suggest that wild indigo stimulates the immune system, thus explaining its "antiseptic" reputation (Foster and Duke 1990: 116). Wild indigo is an ingredient of Esberitox N, Ojad, and Toxi-loges C (tonics made in Germany); and Galium Complex (a tonic made in Australia) (Martindale 1996: 1970, 2171, 2339, 2002).
  15. Berberidaceae. *Berberis canadensis* P. Mill. Common name: American barberry. USP status: none. HU. Listed as similar to *B. vulgaris* and used as a tonic or cathartic depending on dosage and "formerly given in jaundice" (Wood and Bache 1880: 177–179; Millspaugh 1887: 15–2)
  16. Ranunculaceae. Rafinesque's name: *Botrophus serpentaria*. Current name: *Cimifuga racemosa* (L.) Nutt. USP status: 1820–1920. CU. Rafinesque describes the properties of black cohosh as "astringent, diuretic, sudorific, anodyne, repellent, emmenagogue, subtonic [i.e., mild tonic?], & c." He also recommends the plant in the treatment of "acute and chronic rheumatism." Current European uses of black cohosh are found in premenstrual syndrome, dysmenorrhea, and menopause (Tyler 1993: 46; Tyler 1994: 136–137). Studies show estrogenic, hypoglycemic, sedative, and anti-inflammatory activity. The root extract has a strengthening effect in the female organs of rats (Bruneton 1995: 607; Foster and Duke 1990: 56; Werbach and Murray 1994: 236).
  17. Cabombaceae. Rafinesque's name: *Brasenia hypopeltis*. Current name: *Brasenia schreberi* J. F. Gmel. Common name: water shield/ purple wen-dock. USP status: none. NUR.
  18. Fabaceae. *Cassia marilandica* L. Common name: American senna. USP status: 1820–1870. CU. Rafinesque writes, "All the Sennas are simple cathartics . . . They may enter into compound laxatives and cathartics, &c." Sennas' use as a cathartic are due to their dianthrone glycosides (1.5 to 3.0 %); it is an anthraquinone-containing laxative (Tyler 1994: 298). Senna is a common part of both African and Indian materia medicas (Foster and Duke 1990: 118). *C. acutifolia* and *C. angustifolia* are official in the USP (1995: 1407).
  19. Berberidaceae. *Caulophyllum thalictroides* (L.) Michx. Common name: blue cohosh. USP status: 1880–1890. CU. Rafinesque describes the therapeutic properties of blue cohosh as "demulcent, antispasmodic, emmenagogue, sudorific, & c . . . It appears to be particularly suitable for female diseases . . ." Blue cohosh is a uterine stimulant and emmenagogue, but the glycoside caulosaponin has a toxic effect on the cardiac muscle, making it a plant of questionable safety (Tyler 1993: 47–48). "Powdered rhizomes sold in limited quantities in U.S. herb stores, for use in uterine disorders" (Duke 1985: 108).
  20. Rubiaceae. *Cephalanthus occidentalis* L. Common name: button bush. USP status: none. HU. Used in decoction or infusion as a laxative, tonic, and in periodic fevers (Wood and Bache 1880: 1611)
  21. Chenopodiaceae. Rafinesque's name: *Chenopodium anthelminthicum*. Current name: *Chenopodium ambrosioides* L. Common name: wormseed. USP status: 1820–1940. CU. Rafinesque calls wormseed "a powerful vermifuge." The essential oil of wormseed is highly toxic and can cause dermatitis or allergic reactions (Foster and Duke 1990: 216). Despite the dangers associated with its use, chenopodium oil is still listed in the pharmacopoeia of Italy.
  22. Apiaceae. *Cicuta maculata* L. Common name: spotted cowbane. USP status: none. CU. Rafinesque describes spotted cowbane as "a strong narcotic." He also notes that "A few grains of the dried leaves or extract have been given in schirrose [i.e., scirrhus

- or hard tumors] and scrofulous [i.e., glandular] tumors and ulcers, with equal advantage." Interestingly, Takao Konoshima and Kuo-Hsiung Lee conclude that "*C. maculata* was found to show significant in vitro cytotoxicity in the 9 KB (human nasopharyngeal carcinoma) cell structure assay" (1986).
23. Lamiaceae. *Collinsonia canadensis* L. Common name: richweed/horse balm. USP status: none. HU. Described as useful in "catarrh of the bladder, leucorrhœa [vaginal discharge], gravel [kidney stones], dropsy, and other complaints" (Wood and Bache 1880: 1626).
  24. Myricaceae. Rafinesque's name: *Comptonia asplenifolia*. Current name: *Comptonia peregrina* (L.) Coult. Common name: sweet-fern. USP status: none. HU. Used as a tonic and astringent (Wood and Bache 1880: 1626).
  25. Apiaceae. *Conium maculatum* L. Common name: hemlock. USP status: 1820–1900. CU. "A powerful acrid narcotic and resolvent," writes Rafinesque, "but the uncertainty of its action lessens its value." He further observes that it primarily "acts only as a palliation to pain, like opium, to which it is often preferable, as less constipating." Folk uses for poison-hemlock largely concur with Rafinesque's (Foster and Duke 1990: 58). *Conium* fruit is described as having "antispasmodic activity" (Merck 1996: 424).
  26. Convolvulaceae. Rafinesque's name. *Convolvulus panduratus*. Current name: *Ipomoea pandurata* (L.) G. F. W. Mey. Common name: wild potato-vine. USP status: 1820–1850. CU. Rafinesque admits, "The genera of this family had not been well fixed, and *Ipomea* particularly was so little distinguished from *Convolvulus* that many species were considered as belonging to both!" He refers to the medicinal properties of the plant as "cathartic, diuretic and pectoral." The root of this plant has been used in teas as a diuretic, laxative, and expectorant (Foster and Duke: 20). *Ipomea* is used today as a cathartic, especially *I. orizabensis* which yields 15% ipomea resin (Merck 1996: 5088–5089).
  27. Ranunculaceae. Rafinesque's name: *Coptis trifolia*. Current name: *Coptis groenlandica* (Oeder) Fern. USP status: 1820–1870. CU. Rafinesque lists the properties of goldthread as "tonic and stomachic, promoting digestion, strengthening the viscera, useful in dyspepsia, debility, convalescence from fevers, and whenever a pure bitter is required . . ." A very astringent member of the buttercup family. The plant contains berberine, thus giving it "anti-inflammatory and antibacterial effects" (Foster and Duke 1990: 38). It is currently listed therapeutically as a "bitter tonic" (Merck 1996: 427).
  28. Cornaceae. *Cornus florida* L. Common name: flowering dogwood. USP status: 1820–1880. CU. The flowering dogwood, according to Rafinesque, is useful as a "tonic, astringent, antiseptic, corroborant and stimulant." He also describes it as useful "in intermittent and remittent fevers also, typhus and all febrile disorders." Dogwood was a common substitute for quinine during the Civil War (Foster and Duke 1990: 270). At present it has found use in homeopathic tinctures for dyspepsia, intermittent fevers, and pneumonia (Duke 1985: 145).
  29. Lamiaceae. *Cunila mariana* L. Common name: dittany. USP status: none. HU. Used in "flatulent colic" and in colds and fevers (Wood and Bache 1880: 1636).
  30. Orchidaceae. Rafinesque's name: *Cypripedium luteum*. Current name: *Cypripedium pubescens* (Willd.) Correll. Common name: yellow lady's-slipper. USP status: 1860–1900. CU. Rafinesque lists this member of the orchid family as "sedative, nervine, antispasmodic, & c. and the best American substitute for Valerian in almost all cases." Rafinesque's claim for this plant as a sedative accords with its common usage throughout nineteenth-century American medical practice (Foster and Duke 1990: 94). *Cypripedium* is currently an ingredient in a homeopathic preparation made by Pfluger of Germany. *C. pubescens* is listed under the therapeutic category of sedatives (Merck 1996: 468).
  31. Solanaceae. *Datura Stramonium* L. Common name: jimson weed/thorn apple. USP status: 1820–1945. CU. Rafinesque treats "this loathsome weed" with therapeutic caution. He suggests that jimson weed is psychotropic and can be used "to lessen sensibility and pain," but when "taken in-

- ternally in too great quantity" it can be lethal. Modern analysis accords with Rafinesque's findings. One of the nightshades, this plant contains atropine and other alkaloids (Foster and Duke, p. 20). It is listed among the tropane alkaloids of belladonna (*A. belladonna*) and henbane (*Hyoscyamus niger*) (Bruneton 1995: 653–665). It is official in the Australian, Belgium, British, European, French, German, Hungarian, Italian, Dutch, Portuguese and Swiss pharmacopoeias (Martindale 1996: 507).
32. Ebenaceae. *Diospyros virginiana* L. Common name: persimmon. USP status: 1820–1870. HU.
  33. Thymelaeaceae. *Dirca palustris* L. Common name: leatherwood/moosewood. USP status: none. HU. A strong emetic (Wood and Bache 1880: 1640).
  34. Asteraceae. Rafinesque's name: *Erigeron philadelphicum*. Current name: *Erigeron philadelphicus* L. Common name: Philadelphia flea-bane. USP status: 1840–1870. HU.
  35. Liliaceae. Rafinesque's name: *Erythronium flavum*. Current name: *Erythronium americanum* Ker-Gawl. Common name: adder's tongue/trout-lily. USP status: 1820–1850. HU.
  36. Asteraceae. *Eupatorium perfoliatum* L. Common name: boneset. USP status: 1820–1900. CU. Rafinesque calls boneset "a valuable sudorific, tonic, alterative, antiseptic, cathartic, emetic, febrifuge, corroborant, diuretic, astrigent, deobstruent and stimulant." It is still used by herbalists as a cold remedy and febrifuge and was carried in the U.S. *National Formulary* until 1950 (Tyler 1993: 49–40). "German research suggests nonspecific immune system-stimulating properties, perhaps vindicating historical use in flu epidemics" (Foster and Duke 1990: 78). Boneset is an ingredient in several different preparations marketed in Britain and Australia (Martindale 1996: 1866, 1989, 2339).
  37. Euphorbiaceae. *Euphorbia corollata* L. Common name: flowering spurge. USP status: 1820–1900. HU.
  38. Rosaceae. *Fragaria vesca* L. Common name: woodland strawberry. USP status: none. CU. Besides noting their food value, Rafinesque writes that wild strawberries "are useful in fevers" and "give relief in diseases of the bladder and kidneys." Related species such as *F. vesca* and *F. virginiana* have been used to make a tea as a diuretic and for kidney stones (Foster and Duke 1990: 38). *F. vesca* is an ingredient in several British, German, and French preparations (Martindale 1996: 1998, 2027, 2107).
  39. Gentianaceae. Rafinesque's name: *Frasera verticillata*. Current name: *Swertia carolinensis* (Walt.) Ktze. Common name: American columbo. USP status: 1820–1870. HU.
  40. Ericaceae. Rafinesque's name: *Gaultheria repens*. Current name: *Gaultheria procumbens* L. Common name: teaberry/wintergreen. USP status: 1820–1900. CU. Rafinesque lists the medicinal properties of wintergreen or teaberry as "stimulant, anodyne, astringent, menagogue [i.e., promotes menstruation], antispasmodic, diaphoretic, lacteal [i.e., enhances lactation], cordial, & c." It has been shown to be "experimentally analgesic, carminative, anti-inflammatory, antiseptic," and "small amounts have delayed the onset of tumors" (Foster and Duke 1990: 28). Methyl salicylate, the essential oil found in the leaves of wintergreen, "is applied topically as a counterirritant in the form of liniments, gels, lotions, or ointments containing concentrations of 10 to 60 percent" (Tyler 1994: 147). Oil of wintergreen is currently listed in the *National Formulary* and numerous European pharmacopoeias (USNF XVIII 1995: 2266; Martindale 1996: 62).
  41. Gentianaceae. Rafinesque's name: *Gentiana catesbei*. Current name: *Gentiana catesbaei* Walt. Common name: blue gentian. USP status: 1840–1870. CU. Rafinesque states that blue gentian is "very little inferior to the officinal Gentian [*Gentiana lutea*] in strength and efficacy, it invigorates the stomach . . ." *Gentiana* spp. have found wide use as "bitters" for the stomach and were a common ingredient in nineteenth-century proprietary medicines (Tyler 1994: 145–146; Merck 1996: 745). Gentian has pharmacopoeial status in 13 countries (Martindale 1996: 1709).
  42. Geraniaceae. *Geranium maculatum* L. Common name: wild geranium/cranesbill. USP status: 1820–1900. CU. Rafinesque lists the wild or spotted geranium as a "powerful as-

- tringent, vulnerary [i.e., a healing agent for wounds], subtonic and antiseptic." The tannin-rich root is very astringent (Foster and Duke 1990: 146). *G. maculatum* is an ingredient in Acacia Complex, a preparation for diarrhea made by Blackmores of Australia (Martindale 1996: 1770).
43. Rosaceae. *Geum virginianum* L. Common name: Virginian avens. USP status: none. HU. Listed as "tonic and astringent" (Felter and Lloyd 1909, 2: 931).
44. Rosaceae. Rafinesque's name: *Gillenea stipulacea*. Current name: *Porteranthus stipulatus* (Muhl. ex Willd.) Britt. Common name: Indian physic/western dropwort. USP status: 1820–1870. HU.
45. Hamamelidaceae. Rafinesque's name: *Hamamelis virginica*. Current name: *Hamamelis virginiana* L. Common name: witch hazel. USP status: 1880–1910, 1995. CU. The medicinal uses of witch hazel are well known. Rafinesque describes its properties as "sedative, astringent, tonic, discutient [i.e., an agent which causes dispersal of a tumor or other lesion] . . . The bark affords an excellent topical application for painful tumors and piles, external inflammations, and inflamed eyes, & c. in cataplasm or poultice or wash." This common OTC product is used in "hemorrhoids, irritations, minor pain and itching" (Foster and Duke 1990: 256). After an 85-year absence witch hazel has found its way back into the US pharmacopoeia (USP XXIII 1995: 1637).
46. Lamiaceae. *Hedeoma pulegoides* (L.) Pers. Common name: American pennyroyal. USP status: 1820–1900. CU. Rafinesque lists American pennyroyal as "carminative, resolvent, pectoral, diaphoretic, antispasmodic, menagogue, pellant [i.e., promoting discharge], stimulant, & c." He further notes that it is "a popular remedy for female complaints." Traditionally this member of the mint family has found use as an abortifacient, but its dangers are evident in its volatile oils, which contain 85 to 92% of the toxin pulegone (Tyler 1993: 243). It is also "a popular insect repellent" (Foster and Duke 1990: 190). Despite the dangers associated with ingesting pennyroyal, its continued "use in a variety of herbal self-treatment practices" make it therapeutically active (Lawrence review, s.v. "Pennyroyal," January 1992).
47. Asteraceae. *Helenium autumnale* L. Common name: sneezeweed. USP status: none. HU. Listed as "tonic, diaphoretic, and erhrine [causes sneezing]" (Felter and Lloyd 1909, 2: 979).
48. Ranunculaceae. Rafinesque's name: *Hepatica triloba*. Current name: *Hepatica nobilis* var. *obtusata* (Pursh) Steyermark. Common name: round-lobed liverwort. USP status: 1840–1870. HU.
49. Saxifragaceae. Rafinesque's name: *Heuchera acerifolia*. Current name: *Heuchera villosa* Michx. Common name: alumroot. USP status: none. NUR.
50. Cannabaceae. *Humulus lupulus* L. Common name: common hops. USP status: 1820–1910. CU. "The whole plant," writes Rafinesque, "but chiefly the Strobiles and the Lupulin are tonic, narcotic, phantastic, anodyne, sedative, alterative, astringent, antilithic [i.e., an agent preventing the formation of calculi, especially uric-acid calculi], diuretic, corroborant, & c." The sedative properties of hops have been verified experimentally in rats (Foster and Duke 1990: 204; Tyler 1993: 176). It is currently used in conditions of "excitability, restlessness and disorders of sleep; lack of appetite" (British herbal compendium 1992: 128–130; British herbal pharmacopoeia 1990: 59). It is official in the German pharmacopoeia (Martindale 1996: 1722).
51. Ranunculaceae. *Hydrastis canadensis* L. Common name: goldenseal. USP status: 1830, 1860–1920. CU. Rafinesque describes the properties of goldenseal as tonic and ophthalmic and recommends it "as a bitter tonic, in infusion or tincture in disorders of the stomach, the liver, etc." The berberine content is antibacterial (Foster and Duke 1990: 50). Experimental study shows goldenseal may be effective in the treatment of alcoholic liver disease, cancer, and infection, and in the prevention of ventricular arrhythmias caused by ischemia (Werbach and Murray 1994: 23–24, 114–115). Goldenseal is official in the French pharmacopoeia (Martindale 1996: 1714).
52. Solanaceae. Rafinesque's name: *Hyoscyamus niger*. Current name: *Hyoscyamus niger* L. Common name: black henbane/hen-

- bane. USP status: 1820–1945. CU. Rafinesque describes henbane as “narcotic, phantastic, phrenitic [i.e., causing frenzied, maniacal behavior], anodyne, antispasmodic, repellent, discutient, & c.” Henbane is official in the Austrian, Belgian, British, European, French, German, Greek, Italian, Dutch, and Portuguese pharmacopoeias. It has found use in tachycardiac arrhythmia and glaucoma (British herbal compendium 1992: 131–132; British herbal pharmacopoeia 1990: 60).
53. Aquifoliaceae. *Ilex opaca* Ait. Common name: American holly. USP status: none. HU. Said to possess the same qualities as *I. Aquifolium* L. Used in “catarrh, pleurisy, smallpox, and gout” (Wood and Bache 1880: 1670).
54. Illiciaceae. *Illicium floridanum* Ellis. Common name: purple anise/tree anise. USP status: none. HU. A possible substitute for anise (*Pimpinella anisum* L.), an aromatic carminative (Wood and Bache 1880: 1671).
55. Berberidaceae. Rafinesque’s name: *Jeffersonia bartoni*. Current name: *Jeffersonia diphylla* (L.) Pers. Common name: twinleaf. USP status: none. HU. Reported to be emetic in large doses and tonic or expectorant in small doses (Wood and Bache 1880: 1681).
56. Cupressaceae. *Juniperus communis* L. Common name: common juniper. USP status: 1820–1940. CU. Rafinesque lists the properties of the common juniper as “stimulant, diaphoretic, diuretic, carminative, eccoprotic [a mild laxative], anthelmintic, emmenagogue [sic], & c.” He also warns that “pregnant women ought never to use them [junipers]; but they are very useful in dropsical complaints, menstrual suppressions, also in rheumatism, gout, worms, & c. in powder, conserve, or tincture.” These uses (excepting “dropsy”) accord with the current literature (Foster and Duke 1990: 226). Although juniper can have a harmful effect on the kidneys, it was carried in the *National Formulary* until 1960 and is still recommended by German Commission E for indigestion (Tyler 1994: 77). Juniper is official in the Austrian, French, Hungarian, and Swiss pharmacopoeias (Martindale 1996: 1717).
57. Ericaceae. *Kalmia latifolia* L. Common name: mountain laurel. USP status: none. HU. Reportedly “antisyphilitic, sedative to the heart, and somewhat astringent (Felter and Lloyd 1909, 2: 1094).
58. Asteraceae. Rafinesque’s name: *Leontodon taraxacum*. Current name: *Taraxacum officinale* G. H. Weber ex Wiggers. USP status: none. CU. Rafinesque lists the properties of dandelion as “deobstruent, diuretic, hepatic, subtonic, corroborant, aperient [i.e., a laxative or mild cathartic], & c.” The leaves are rich in vitamins A and C. “Experimentally, [the] root is hypoglycemic, weak antibiotic against yeast infections (*Candida albicans*), stimulates flow of bile and weight loss” (Foster and Duke 1990: 130). *T. officinale* is available in four proprietary and numerous multi-ingredient preparations (Martindale 1996: 1757).
59. Scrophulariaceae. Rafinesque’s name: *Lepandra purpurea*. Current name: *Veronicastrum virginicum* (L.) Farw. Common name: Culver’s-root. USP status: 1820, 1860–1880. CU. Rafinesque writes of Culver’s root, “The root alone is medical; it is bitter and nauseous, has never been analysed [sic], and is commonly used in warm decoction as purgative and emetic . . . The safest way is to use it in weak and cold infusion. Employed also for rheumatism, spasms, and bilious complaints.” Listed currently as a cathartic (Merck 1996: 928).
60. Campanulaceae. *Lobelia inflata* L. Common name: Indian tobacco. USP status: 1820–1830. CU. Also known as puke weed, the “virtues” of this emetic plant were touted by Samuel Thomson and many of the nineteenth-century botanico-medical movement. Rafinesque referred to lobelia as a “powerful and efficient emetic, narcotic, expectorant, antispasmodic, suvorific [i.e., sudorific] diuretic, anti-asthmatic, and sialagogue [i.e., causing profuse salivation].” Experimental study suggests a bronchodilation effect in guinea pigs that might be reproducible in humans (Werbach and Murray 1994: 84–85). Official in the Austrian pharmacopoeia and available in numerous multi-ingredient preparations (Martindale 1996: 1552).
61. Lamiaceae. *Lycopus virginicus* L. Common name: bugleweed. USP status: 1830–1870. CU. Rafinesque describes bugleweed as “an excellent sedative, subtonic, subnarcotic,

- and subastringent. "Science has confirmed the potential value of this plant in treating hyperthyroidism" (Foster and Duke 1990: 70), although "the principles responsible for bugle weed's antithyrotropic function have not been identified" (Tyler 1994: 140–141).
62. Magnoliaceae. *Magnolia macrophylla* Michx. Common name: great-leaved magnolia. USP status: none. HU. Described as equivalent to the medicinal properties of other *Magnolia* spp. used as a tonic for dyspepsia and typhoid fever (Felter and Lloyd 1909, 2: 1226–1228).
63. Menyanthaceae. Rafinesque's name: *Menyanthes verna*. Current name: *Menyanthes trifoliata* L. Common name: buckbean. USP status: 1820. CU. Rafinesque describes the properties of the buckbean or bogbean as "tonic, stomachic, febrifuge, purgative, asthritic [?], diaphoretic, anthelmintic, & c." "Science confirms phenolic acids may be responsible for bile-secreting, digestive tonic, and bitter qualities" (Foster and Duke 1990: 14). It is one of the commonly encountered "minor bitter herbs" (British herbal compendium 1992: 41–42; British herbal pharmacopoeia 1990: 24–25; Tyler 1994: 45). Buckbean is official in several European pharmacopoeias (Martindale 1996: 1725).
64. Lamiaceae. Rafinesque's name: *Monarda coccinea*. Current name: *Monarda didyma* L. Common name: Oswego tea/bee-balm. USP status: none. HU. Described as related to *Monarda punctata* L. used as a "stimulant, carminative, sudorific, diuretic, and anti-emetic" (Felter and Lloyd 1909, 2: 1275).
65. Brassicaceae. Rafinesque's name: *Nasturtium plaustra*. Current name: *Rorippa palustris* (L.) Bess. Common name: yellow cress. USP status: none. HU. Used in visceral obstructions (Wood and Bache 1880: 1707).
66. Nelumbonaceae. Rafinesque's name: *Nelumbium luteum*. Current name: *Nelumbo lutea* Willd. Common name: yellow nelumbo/water-chinquapin. USP status: none. NUR.
67. Nymphaeaceae. Rafinesque's name: *Nymphaea odorata*. Current name: *Nymphaea odorata* Ait. Common name: fragrant water-lily. USP status: none. HU. Listed as "astringent, demulcent, anodyne, and antiscrofulous" (Felter and Lloyd 1909, 2: 1318)
68. Oxalidaceae. *Oxalis Acetosella* L. Common name: wood-sorrel. USP status: none. HU. Described as "cooling and diuretic. Useful in febrile diseases, hemorrhages, gonorrhœa, chronic catarrh, urinary affections, and in scurvy" (Felter and Lloyd 1909, 2: 1424)
69. Ericaceae. Rafinesque's name: *Oxycoca macrocarpa*. Current name: *Vaccinium macrocarpon* Ait. Common name: cranberry. USP status: none. CU. Among the medicinal properties of the cranberry Rafinesque lists its "anti-putrid [i.e., preservative]" qualities and its usefulness in fevers. This is undoubtedly due to its ability in urinary tract infections "to prevent the microorganisms from adhering to the epithelial cells that line the urinary tract" (Tyler 1994: 80). Clinical studies suggest that cranberry extract may be of value in treating not only urinary tract infections but also in reducing ionized calcium in the urine (Werbach and Murray 1994: 206–207, 232).
70. Polygonaceae. Rafinesque's name: *Oxyria reniformis*. Current name: *Oxyria digyna* (L.) Hill. Common name: mountain sorrel. USP status: none. NUR.
71. Araliaceae. *Panax quinquefolius* L. Common name: American ginseng. USP status: 1840–1870. CU. Rafinesque considered American ginseng to possess "nearly the same properties" as the Chinese and other varieties. He ascribed a wide range of curative and tonic properties to ginseng by indicating that "it renovates the vital spirits" and "invigorates old people" by removing "all the disorders of weakness and debility." "Research suggests it may increase mental efficiency and physical performance, aid in adapting to high or low temperatures and stress (when taken over an extended period)" (Foster and Duke 1990: 50). There are differences between various species "but in general, their effects are similar" (Tyler 1994: 172). It is considered a general tonic and is available in 15 proprietary products and in numerous multi-ingredient preparations (Merck 1996: 751–752; Martindale 1996: 1710–1711)
72. Rubiaceae. Rafinesque's name: *Pinckneya pubens*. Current name: *Pinckneya bracteata*

- (Bartr.) Raf. Common name: fever tree. USP status: none. HU. Listed among the "important medicinal plants of this family." Suggested as a possible equivalent to the cinchonas (Millspaugh 1887, 1: 76-2).
73. Berberidaceae. Rafinesque's name: *Podophyllum montanum*. Current name: *Podophyllum peltatum* L. Common name: may-apple. USP status: 1820-1940, 1960-. CU. *Podophyllum montanum* is a Rafinesque invention. The mayapple was a popular remedy with eclectics; so frequently substituted where allopathic practice indicated calomel (mercurous chloride) that it received the common name "vegetable calomel." Rafinesque considered it "one of the best native cathartics," but warned that "two ounces of the leaves in decoction killed a dog." *P. peltatum* has current official status in the U.S. (USP XXIII 1995: 1238-1239). "Etoposide, a semisynthetic derivative of this plant, is FDA-approved for testicular and small-cell lung cancers" (Foster and Duke 1990: 46).
74. Capparaceae. Rafinesque's name: *Polanisia graveolens*. Current name: *Polanisia dodecandra* (L.) DC. Common name: stinkweed/false mustard. USP status: none. NUR.
75. Polygalaceae. *Polygala paucifolia* Willd. Common name: milkwort/flowering wintergreen. USP status: 1820-1920. CU. Rafinesque lists the properties of flowering wintergreen as "similar" to seneca snakeroot (*P. senega*), describing it as "stimulant, sudorific, restorative, & c. The therapeutic equivalence of these two species has been long established (Felter and Lloyd 1909, 2: 1746). "It may be used in tea or decoction: being milder than either [wintergreen or seneca snakeroot]; it may be very useful when the Senega would be too stimulant, and it may perhaps answer all its effects in asthma, rheumatism, dropsy, &c." The methyl salicylate found in the root of *P. senega* (also a constituent of wintergreen) "suggests a rationale behind use of this plant's root to relieve pain, rheumatism, etc." (Foster and Duke 1990: 72). Official in Austrian, Belgian, British, European, French, German, Italian, Japanese, Dutch, Portuguese, and Swiss pharmacopoeias (Martindale 1996: 1074).
76. Polygonaceae. *Polygonum aviculare* L. Common name: knotweed. USP status: none. CU. Rafinesque refers to knotweed or knotgrass as "astringent, vulnerary, diuretic, subtonic, &c." *Polygonum* spp. are still put to these therapeutic uses today, but it is used especially as a remedy in upper respiratory complaints. Knotweed has active ACE (angiotensin converting enzyme) inhibitors (Wichtl 1994: 386). It is an active ingredient in Antussan-Kombi, Dr. Boether Bronchiten S., Elisir Depuativo Ambrosiano, Silphoscalin, and Tussiflorin (Martindale 1996: 1806, 1945, 1958, 2282, 2353).
77. Polypodiaceae. Rafinesque's name: *Polypodium vulgare*. Current name: *Polypodium virginianum* L. Common name: common polypody. USP status: none. HU. Used as a purgative and in upper respiratory complaints (Wood and Bache 1880: 1736).
78. Monotropaceae. *Pterospora andromedea* Nutt. Common name: giant bird's nest. USP status: none. NUR.
79. Pyrolaceae. Rafinesque's name: *Pyrola maculata*. Current name: *Chimaphila maculata* (L.) Pursh. Common name spotted pyrola/ground holly. USP status: none. HU. Described as similar to *C. umbellata* (L.) W. Bart.—"diuretic, tonic, and astringent" (Wood and Bache 1880: 265).
80. Ranunculaceae. *Ranunculus acris* L. Common name: common buttercup/crowfoot. USP status: 1820, 1840-1870. CU. Rafinesque treats *R. acris* and *R. bulbosus* (and several other species) as equivalent in therapeutic action: "They act on the skin as rubefacient [i.e., a mild counterirritant] and escharotics [i.e., caustic]." These two species have been described as "possessing similar properties" (Felter and Lloyd 1909, 2: 1638). "The plant, especially the roots, has been used for cancers, especially of the breast, cervix, etc., corns, warts, and wens, from Chile to California" (Duke 1985: 400). The plant contains protoanemonin, a toxin which produces contact dermatitis. When the plant is dried, however, it yields anemonin, a Gram-positive/Gram-negative antibacterial (Duke 1985: 400; Bruneton 1995: 597).
81. Rutaceae. *Ruta graveolens* L. Common name: common rue/garden rue. USP status: 1830-1880. CU. Rafinesque describes the properties of the common rue as "antispa-

- modic, deobstruent, stimulant, heating, rubefacient, and blistering, useful in spasmodic affections, hysteria, hypochondria, obstructions, obstructed secretions; also in rheumatism of the joints, feet, and loins, applied externally." Rue oil is used in homeopathic preparations (Martindale 1996: 1749).
82. Gentianaceae. Rafinesque's name: *Sabbatia angularis*. Current name: *Sabatia angularis* (L.) Pursh. Common name: American centaury. USP status: 1820–1870. HU.
83. Papaveraceae. *Sanguinaria canadensis* L. Common name: bloodroot. USP status: 1820–1920. CU. Rafinesque lists the medicinal properties of bloodroot as "an acrid narcotic, emetic, deobstruent, diaphoretic, expectorant, vermifuge, escharotic, and at the same time stimulant, tonic." He considers sanguinaria "one of the most valuable medical articles of our country." This member of the poppy family has had a long history of medicinal use. Currently it is used in plaque-inhibitor toothpastes and mouthwashes such as Viadent (Bruneton 1995: 745; Foster and Duke 1990: 48; Martindale 1996: 2374). It is also an ingredient in Lexat, an Australian product for digestive disorders (Martindale 1996: 2082).
84. Lamiaceae. *Scutellaria lateriflora* L. Common name: skullcap. USP status: 1860–1910. CU. Rafinesque describes the medicinal properties of skullcap as "used chiefly of late, in all nervous diseases, convulsions, tetanus, St. Vitus' dance, tremors, & c." He refers to the plant as a proven "tonic, astringent, antispasmodic, and anti-hydrophobic [rabies]." "Recent studies indicate that it may possess anti-inflammatory activity related to its ability to inhibit the enzyme sialidase" (Lawrence review, s.v. "Scullcap," January 1993). Scutellarin, a constituent of skullcap, "has confirmed sedative and antispasmodic qualities" (Foster and Duke 1990: 186). Scutellarin is an ingredient in several herbal preparations to relieve tension and stress (Martindale 1996: 841, 2028, 2153, 2193, 2240).
85. Liliaceae. Rafinesque's name: *Sigillaria multiflora*. Current name: *Polygonatum biflorum* var. *commutatum* (J. A. & J. H. Schultes) Morong. Common name: Solomon's seal. USP status: none. HU. Used internally for piles and externally for certain skin irritations (Wood and Bache: 1627).
86. Solanaceae. *Solanum Dulcamara* L. Common name: nightshade/bittersweet. USP status: 1820–1890. CU. Rafinesque lists bitter-sweet as "depurative [purifier], deobstruent, antiherpetic [i.e., remedy for herpes], narcotic, diuretic, anodyne, repellent, & c." Today bittersweet has been shown to possess "significant anti-cancer activity" and is used as a base material for steroids (Foster and Duke 1990: 182).
87. Loganiaceae. *Spigelia marilandica* L. Common name: Carolina pink/pinkroot. USP status: 1820–1910. CU. Rafinesque describes pinkroot as "narcotic, vermifuge, sedative, cathartic, and febrifuge." *S. marilandica* is still considered anthelmintic (Merck 1996: 1496). Although it has toxic effects similar to strychnine, it continues to be used homeopathically (Duke 1985: 456).
88. Rosaceae. Rafinesque's name: *Spirea tomentosa*. Current name: *Spiraea tomentosa* L. Common name: hardtack/steplebush. USP status: none. HU. "Spirea is tonic and astringent, and may be used in diarrhoea, cholera infantum, and other complaints . . ." (Wood and Bache 1880: 869).
89. Plumbaginaceae. Rafinesque's name: *Statice tomentosa*. Current name: *Limonium nashii* Small. Common name: marshroot/marsh rosemary. USP status: 1820–1870. HU.
90. Boraginaceae. *Symphytum officinale* L. Common name: comfrey. USP status: none. CU. Rafinesque lists comfrey as "beneficial in dysentery, nephritis, haematuna [i.e. hematuria?], hemoptysis [i.e., bleeding from the lungs], strangury [i.e. difficulty and pain in urination], and many other diseases internally, while externally they are useful bruised and applied to ruptures and sprains." Rafinesque's claims for the topical application of comfrey are undoubtedly due to its allantoin content, which promotes healing (Foster and Duke 1990: 180). Despite the presence of toxic pyrrolizidine alkaloids (Tyler 1994: 158–159), comfrey is still found in several proprietary and multi-ingredient preparations (Martindale 1996: 1694).
91. Liliaceae. Rafinesque's name: *Trillium latifolium*. Current name: *Trillium flexipes* Raf. Common name: birthroot. USP status: none.

- HU. Virtually all the Trilliums were considered of medicinal value. Primarily used as an astringent, tonic, and antiseptic (Felter and Lloyd 1909, 2: 1997).
92. Asteraceae. Rafinesque's name: *Tussilago frigida*. Current name: *Petasites sagittatus* (Banks ex Pursh) Gray. Common name: coltsfoot. USP status: none. CU. Rafinesque fails to make clear taxonomic differentiations here. The plant he describes in this section along with the accompanying plate is clearly *Petasites sagittatus*. There is, in fact, *Tussilago petasites* or butterbur (Torkelson 1996) used as a "spasmolytic with analgesic effects" (Wichtl 1994: 367). Yet in Rafinesque's discussion of the medicinal properties of "*T. frigida* [sic]" he cites Samuel Henry's *American Family Herbal* (1814) which refers to *T. farfara*. Since Rafinesque does not make a therapeutic distinction between any of these plants, *T. farfara* (the most commonly utilized) is retained for purposes of discussion. Rafinesque states that coltsfoot is commonly used in "coughs, complaints of the breast and lungs, asthmatic affections, hooping cough, and also scrofula: either in tea or decoction, conserve or powder." It is found in several European cough remedies such as Antibrion and Médiflor Tisane Pectorale d'Alsace (Foster and Duke 1990: 130; Martindale 1996: 1803, 2107). Like comfrey, however, coltsfoot contains toxic pyrrolizidine alkaloids (Tyler 1993: 95–96).
93. Pontederiaceae. Rafinesque's name: *Unisema deltifolia*. Current name: *Pontederia cordata* L. Common name: pickerelweed. USP status: none. NUR.
94. Scrophulariaceae. *Veronica beccabunga* L. Common name: speedwell/brooklime. USP status: none. CU. Rafinesque writes, "They [*Veronica* spp.] all purify the blood and humors, act as mild stimulants, strengthen the stomach, promote diuresis, and are said to correct the secretions of the liver, so as to remove melancholy or hypochondriacal affections." *V. beccabunga* and *V. officinalis* "possess somewhat similar properties" (Felter and Lloyd 1909, 2: 2058). This member of the figwort family finds numerous uses in Europe which include its application in gout, rheumatism, jaundice, coughs, asthma, other lung ailments, and as a "blood purifier" (Foster and Duke 1990: 174).
95. Fabaceae. *Vicia faba* L. Common name: broad bean. USP status: none. NUR.
96. Rutaceae. Rafinesque's name: *Xanthoxylon fraxineum*. Current name: *Zanthoxylum americanum* P. Mill. Common name: prickley-ash. USP status: 1820–1930. CU. Rafinesque writes, "it is sialagogue, stimulant, pellant [promotes menstruation], astringent, sudorific, antisphyllitic, odontalgic [i.e., a toothache remedy], & c." *Zanthoxylum* spp. have been used for toothache, rheumatic disorders, and circulatory insufficiency and as a diaphoretic (British herbal compendium 1992: 177; British herbal pharmacopoeia 1990: 72–73; Martindale 1996: 1768).
97. Scrophulariaceae. *Chelone glabra* L. Common name: balmony/turtlehead. USP status: none. HU. Described as "tonic and aperient" (Wood and Bache 1880: 1612).
98. Rubiaceae. *Galium verum* L. Common name: true bedstraw. USP status: none. CU. Rafinesque considers *G. verum* and *G. aparine* to be therapeutically equivalent. All the Galiums possess "similar medicinal virtues," although *G. verum* contains more galitannic acid than does *G. aparine* (Felter and Lloyd 1909, 2: 909). "Externally applied in poultice," he writes, "it is a good dicutient [?] for indolent tumors, strumous [i.e., goitrous or scrofulous] swellings and tumors of the breast. Internally it is used in decoction sweetened with honey, for suppression of urine and gravelly complaints [i.e., kidney stones], in scurvy, dropsy, hysterics, epilepsy, gout, & c." It has been shown experimentally to possess hypotensive and anti-inflammatory properties (Foster and Duke 1990: 36). It is also considered a mild diuretic (British herbal compendium 1992: 61–62).
99. Vitaceae. *Vitis* spp. L. CU. Rafinesque devotes nearly 60 pages to grapes and wine. He suggests that wine be given to "temperate persons" for debility, scrofula, scurvy, rickets, anemia, vaginal discharge, digestion, and as a heart stimulant. Rafinesque's praise of wine as a medicinal is in keeping with centuries-old practice. In Biblical times Paul told Timothy, "Stop drinking only water, and use a little wine because of your stomach and your frequent illnesses." There

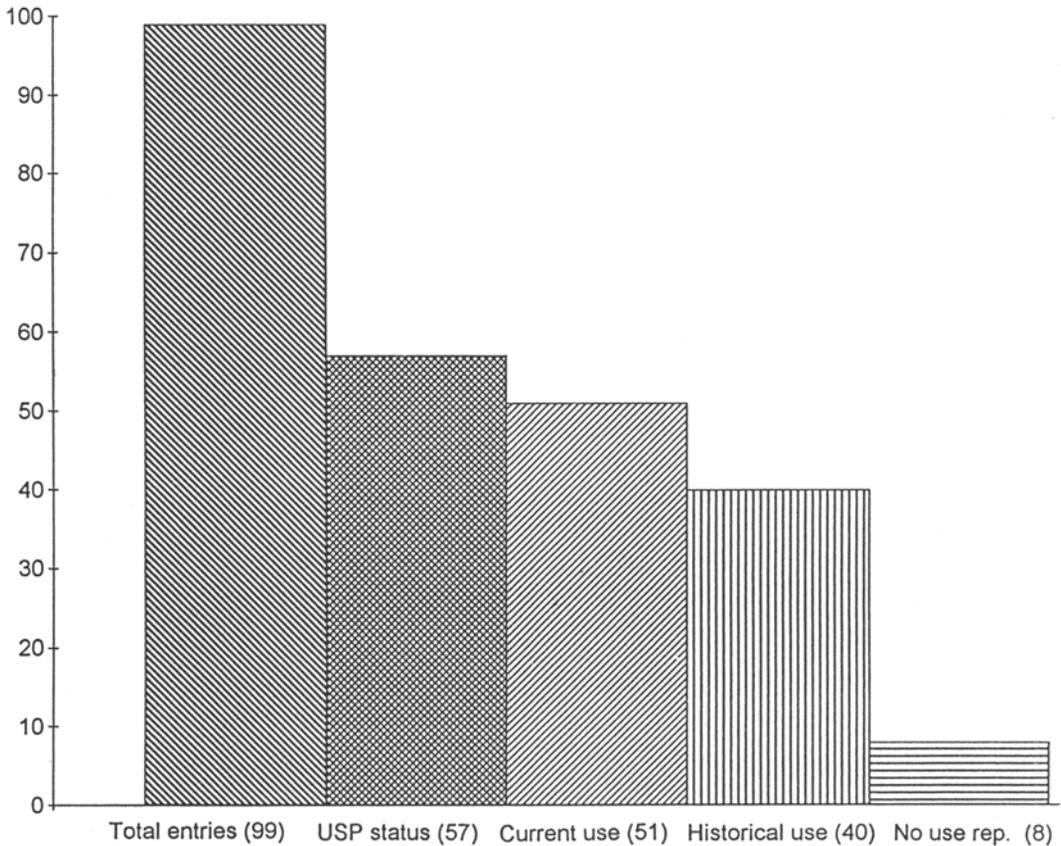


Fig. 1. Rafinesque's Medical Flora USP Status and Historical Use.

is some evidence that moderate wine intake boosts high-density lipoproteins thus improving serum lipid levels. "A large body of evidence has accumulated regarding the benefits of moderate wine intake in the management of a variety of diseases" (Lawrence review, s.v. "Wine," July, 1993).

### CONCLUSIONS

The findings of the preceding list are illustrated in Fig. 1 and suggest several conclusions. First, if Rafinesque's work was as unreliable as some of his contemporaries had insisted one would expect to find a much higher number of plants with no use reported and few with pharmacopoeial status. With the vast majority of the *Medical Flora* plants (91) showing some medicinal use at some time, this is clearly not the case. Rafinesque's list includes 48 plants which had some pharmacopoeial status in the 1820 and 1830 *USP* editions before or during his writing.

On this basis the regular physicians could hardly claim that the author was engaging in wild speculation on untried species. It is true that Rafinesque could be rather expansive in his various therapeutic claims (one of the most remarkable being that "good wines" were of such medicinal value that "they may restore to life new born and very weak children, likely to die, by merely rubbing it on their stomach[!]"); but it is also true that many of the medicinal properties that he described were in keeping with the practices of his times. A second conclusion borne out by this study is that over half of the medicinal plants (51) described by Rafinesque are still used today, a surprisingly high number that casts a more favorable light on the vegetable materia medica of Rafinesque. Finally, there clearly is no correlation between official *USP* status (past or present) and current medicinal use. Indeed many of the species monographed in the *Medical Flora* show no *USP* status but current usage.

Those who seek to prospect for phytomedicines in this old and venerable compendium are restricting themselves to a very small portion of the historic vegetable materia medica.

This does not suggest that Rafinesque's *Medical Flora* can or should be used as a therapeutic guide today. Yet, as Bart K. Holland and others have recently indicated of certain European texts, it can perhaps be used for "prospecting"—systematic phytopharmaceutical research of selected species. Rafinesque's *Medical Flora* is especially valuable for medicinal plant investigators in the United States because he primarily focused upon indigenous American species (over 80 percent of his total list) and he understood the importance of ethnobotanical considerations in delineating plants with therapeutic promise. The implication, of course, is that considerably more work needs to be done in the area of medicinal plant research. The requests of numerous scholars in the field for the establishment of a comprehensive plan for this to occur in the U.S., for the most part, remains to be filled (Foster 1993; Marderosian, Tyler, and Blumenthal 1996; Tyler 1994: 17–31). In producing a work of historical importance in medical botany, the findings of this study suggest that the *Medical Flora* still may be useful for phytomedicinal inquiry today. Indeed, based upon their past and present medicinal use, most of the plants listed in Rafinesque's compendium would make viable candidates for funded in vitro and clinical studies.

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