Preliminary Research on *Aster tataricus*

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Aster tataricus L., Asteraceae; purple aster

Aster tataricus is native to Siberia. It can be grown in zones 3-9, but must have full sun and moist soil. It is a perennial that flowers in the late summer, growing to 6 feet tall. It is harvested in the spring or the fall.

The root is known in traditional Chinese medicine as *zi wan* or *Radix Asteris Tatarici*. Bensky (1993) states that the root is bitter and slightly warm. Its main actions and indications are to relieve cough and expel phlegm. Caution is advised in yin deficiency with heat signs. Long-term use is not recommended, perhaps due to creating a constitutional imbalance, contrary to the therapeutic strategy of TCM. *Zi wan* counteracts the action of *yin chen hao* (*Artemisia capillaris*), which has bitter, acrid, and cool properties. Bensky lists the dose of *zi wan* as 3-9 grams, suggesting that frying the root "in honey will strengthen its action of moistening the Lungs…" The root has been shown to inhibit the growth of pathogenic, gram-positive bacteria *in vitro*.

Compiled from many sources, the known chemical compounds found are: epifriedelinol, friedelin, friedel-3-ene, astersaponin, quercetin (flavonoid), lachnophyllol, lachnophyllol acetate, aurantiamide acetate, anethole, astersaponins (A, B, C, D, E, F, G), asterprosaponin, hederasaponin (shionosides A, B), asterin, cyclochloro-tine, (astin A, B, C), astertarone (a triterpenoid), pentapeptides (likely antibacterial), beta-amyrin (possibly sedative), oleic acid, an aromatic acid, carotene, oleic acid (an omega-9 fatty acid), stigmasterol, beta-sitosterol, spinasterol (triterpenes similar to cholesterol, but unsaturated), shionone (triterpene), suberone (ketone of suberic acid; peppermint fragrance).

Good quality root should have a purplish-red color. This color is likely due to the presence of phenolic compounds such as quercetin. Research has found that *A. tataricus* relieves respiratory spasms possibly by inhibiting histamine. This activity is likely due to flavonoids and other antiinflammatory compounds in the root.

In the spring of 2006, I had the opportunity to engage in my own modest, thin-layer chromatography project. I had become very interested in phytoecdysteroids, which are plant compounds that mimic insect hormones and have adaptogenic properties such as: radioprotection, memory enhancement, stress relief, and muscle growth (Klein, 2004). The phytoecdysteroids with the most active properties in humans and animals are 20-hydroxyecdysone, ecdysone, ponasterone, and makisterone. Plants high in these compounds, such as *Rhaponticum carthamoides*, are grown and manufactured for some 200 dietary supplement products found primarily in body-building supplements, not herb supplements. Most clinical herbalists are unaware of the bioactivity of these plant compounds, which may be involved in the activity of many medicinal plants.

Ecdysteroid-positive species are known to cluster in certain plant families such as the Asteraceae, especially the Cardueae (thistle) tribe. While the *Aster* species are not in this tribe, I nonetheless checked the Ecdysone Handbook (Lafont et al., 2004) and found that of the *Aster* species tested, *A. conspicuous, A. nataalensis, A. pyrenaeus* were not found to contain any phytoecdysteroids (Dinan, et al., 2001). However, *A. acaber* (sic, *A. scaber*) and *A. conspicuous* seed were positive for the presence (84 ng in the latter) of phytoecdysteroids (Chou and Lu, 1980; Dinan, et al., 2001).

Thin-layer chromatography provides a quick and simple analytical method to test for the presence of phytoecdysteroids. There are over 200 known phytoecdysteroids; 20-hydroxyecdysone (20E) is one of the most common. The pure chemical can be purchased to use as a comparison standard. 20E is a very polar compound. It does not fluoresce in long wave (365 nm), but does fluoresce darkly in short wave (254 nm). After spraying with a reagent mixture, the 20E clearly fluoresces at 365 nm in a yellow-peach color.

In this preliminary work, *Aster tataricus* did not evidence presence of 20E. However, other spots that fluoresced in the same yellow-peach color on TLC plates suggest that *Aster tataricus* may produce other phytoecdysteroids. As my budget was severely limited, I was only able to purchase 20E. Thus, I was not able to identify other spots that fluoresced similarly. To my knowledge, *Aster tataricus* has never been tested for phytoecdysteroids.

Other plant species tested for 20E were: *Achyranthes bidentata, Atractylodes macrocephala, Chenopodium album, Rhaponticum carthamoides, Spinacia oleraceae*, and *Ajuga reptans*. Of these, *R. carthamoides, A. reptans*, and *C. album* showed the most evidence of 20E, already known to research. It should be noted that lambsquarters (*C. album*) is one of the five most common weeds around the world, making it very attainable to large numbers of people and thus of potential medicinal use.

This preliminary work was intended to familiarize myself with the technique of thin layer chromatography of phytoecdysteroids. Such groundwork is necessary in order to gain further funding. Additional evidence using other analytical techniques is required and obliges yet more funding.

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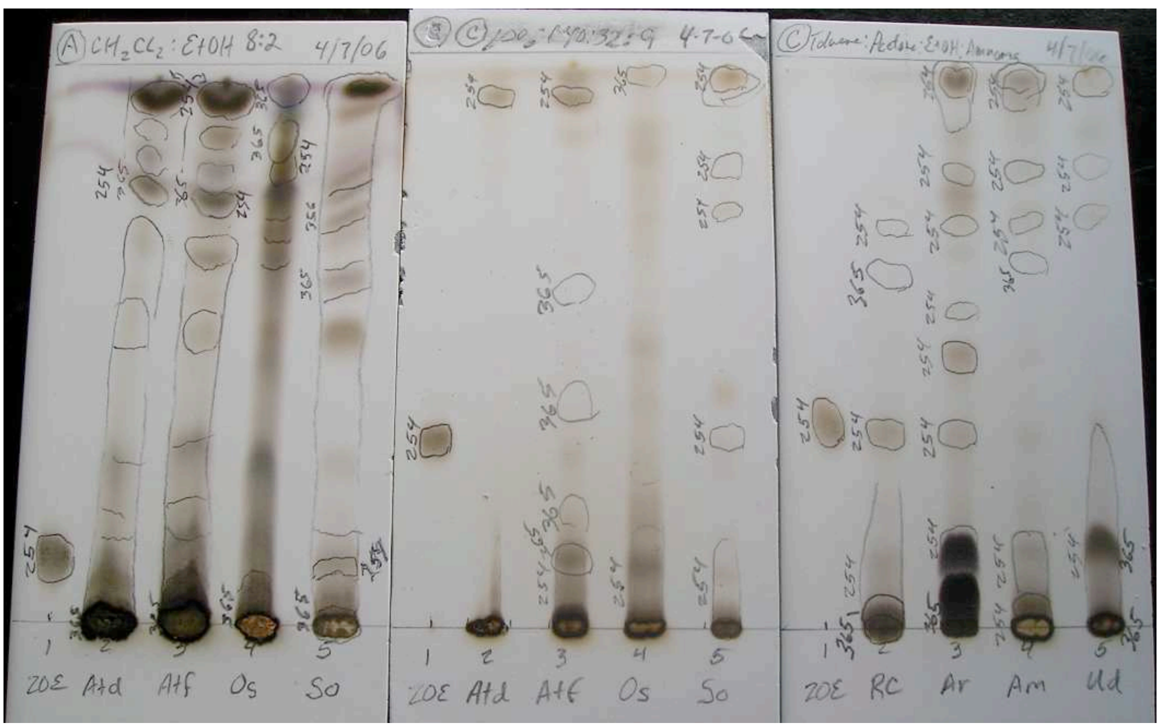

Figure 1. Three plates run in different solvent mixtures: 20-hydroxyecdysone (20E); *Aster tataricus* dried (Atd); *Aster tataricus* fresh (Atf); *Ocimum sanctum* (Os); *Spinacia oleracea* (So); *Rhaponticum carthamoides* (Rc); *Ajuga reptans* (Ar); *Atractylodes macrocephala* (Am); and *Urtica dioica* (Ud). 20E fluoresces at 254 nm. The middle plate suggests *Aster tataricus* extracts did not contain 20E. In comparison, the right plate suggests presence of 20E in *Rhaponticum carthamoides* and *Ajuga reptans* extracts (both spots fluoresced at 254 nm).