

A look in to the healing of Lyme Disease, Lyme borreliosis with the help of
Dipsacus fullonum / sativus



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Contents.

- 1 Introduction...5
- 2 Classification...7
 - 2.1 *D.fullonum / sativus* Morphology...7
- 3 Types of *Dipsacus*...8
 - 3.1 *D. laciniatus*...8
 - 3.2 *D. pilosus*...8
 - 3.3 *D. strigosus*...8
 - 3.4 *D. asperoides*...9
- 4 Etymology...9
 - 4.1 Old Greek...9
 - 4.2 Species names...9
 - 4.3 German name...9
 - 4.4 Other historical names...9
 - 4.5 The Asian *Dipsacus asperoides*...9
- 5 Ethnomedicinal history...10
 - 5.1 Pedanius Dioscorides...10
 - 5.2 Hildegart from Bingen...10
 - 5.3 Leonhard Fuchs...10
 - 5.4 Nicholas Culpeper...10
- 6 Ethnomedicinal history of the Xu Duan...11
- 7 Ethnobotanical history...11
 - 7.1 Palaeo-environments and cultural landscapes of the last 2000 years reconstructed from pollen and Coleopteran records in the Lower Rhone Valley, southern France...11

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- 7.2 an investigation of early medieval sites in Switzerland (5th-7th century ad)...12
 - 7.3 Toy Figures...12
 - 8 Why is *Dipsacus* thought to help against Lyme disease?...13
 - 9 Other documented herbal medicines for Lyme borreliosis...13
 - 9.1 List of herbal medicines used against Lyme Disease...14
 - 10 Self-experimentation...18
 - 11 Interviews...20
 - 11.1 Interview with Edgar Schöpfer. Founder of the Kardenshop.de...20
 - 11.2 Interview at Ceres Heilmittel AG in Kesswil. With Hildegard Kalbermatten co-founder and Matthias Plath Productions manager...21
 - 12 Analytic, research and a hypothetic drug development from *Dipsacus* species...22
 - 12.1 An interview with Alexander Schenk, head of analytic and analytical development at Zeller...22
 - 12.2 What we already know...22
 - 12.3 Extraction...22
 - 12.4 Spectroscopy techniques, finding new chemical entities NCE`s, Characterizing and documenting...23
 - 12.5 Tests and the rest...24
 - 13 Known Active Pharmaceutical ingredients of *Dipsacus fullonum / sativa* and their possible medicinal function in relation to Lyme boreliosis...24
 - 13.1 Iridoids...24
 - 13.2 Saponins...24
 - 13.3 Scabioside (glycoside)...24
 - 13.4 Caffeic acid...25
 - 13.5 β -Sitosterol or beta Sitosterol...25

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- 13.6 Daucasterol...25
 - 13.7 Potash salt...26
 - 13.8 Bitters...26
 - 13.9 Glucoside...26
 - 13.10 Organic acids...26
 - 13.11 Inulin...27
 - 14 Scientific studies related to the use of *Dipsacus* sp. as a medicine...27
 - 14.1 *Dipsacus Sylvestris* and its effects on *Borrelia burgdorferi* sensu stricto In vitro...27
 - 14.2 Effects of the Dichloromethane fraction of *Dipsacus Radix* on the Osteoblastic Differentiation of Human Alveolar Bone Marrow-derived Mesenchymal stem cells...27
 - 14.3 The effects of injectable calcium silicate-based composites with the Chinese herb *Xu Duan* on an osteogenic accelerator in vitro...28
 - 14.4 The Effect of Crude Extract from *Radix Dipsaci* on Bone in Mice...28
 - 14.5 *Dipsacus asperoides* (*Xue Duan*) inhibits spinal cord injury-induced inflammatory responses in rats...29
 - 14.6 The herbal medicine *Dipsacus asper* extract reduces the cognitive deficits and overexpression of β -amyloid protein induced by aluminium exposure...29
 - 14.7 Procoagulant and prothrombotic effects of the herbal medicine, *Dipsacus asper* and its active ingredient, *dipsacus saponin C*, on human platelets...30
 - 14.8 Multi-Component HPLC Analysis and Antioxidant Activity Characterization of Extracts from *Dipsacus sativus*...31
 - 15 Conclusion...32
 - 16 Bibliography...33

1 Introduction.

In June of 2014 whilst hiding in undergrowth trying to take photographs of woodpeckers, I was unlucky enough to get bitten by a tick *Ixodes ricinus*. A week later I developed what I thought was a heat rash due to the hot weather at that time. This strange reddening of the skin grew to a considerable size covering most of my thigh. After a quick google search it was clear that it was *Erythema migrans* the first visual sign of Lyme borreliosis caused by a type of extremely clever bacteria called *Borrelia burgdorferi* which is spread by ticks. A strong treatment of antibiotics followed which left me feeling worse. Some friends of mine gave me a CD with a recorded lecture made by anthropologist, ethnologist and ethnobotanist Wolf Dieter Storl¹ in which he explains his quest for a natural cure for this disease and writes avidly over the Teasle plant *Dipsacus*. It is through this inspiration and my own interest in the healing power of nature coupled with my mistrust in conventional medicine especially antibiotics, that brought me to this subject. Antibiotics do not totally kill, but instead send these bacteria into a sort of dormancy where they lie within a biofilm, protecting them and giving them scope to re-emerge sometime later². While active, they are also masters of camouflage. Spirochete bacteria hide largely undetectable from our immune system behind a veil of altering proteins shielding them as they move freely within our bodies. Some people carry these bacteria without realizing it and may never develop any significantly noticeable symptoms. The first definitive sign is the *Erythema migrans*⁴. This only shows itself in 20% of cases, hence the remaining 80% often go unnoticed until maybe later when they suffer from one or more of the variable changeable symptoms. Tests are also not failsafe and Lyme disease is often falsely diagnosed as something else.

Lyme disease is a new disease which is reaching epidemic proportions¹ especially in southern Germany and northern Switzerland and with antibiotics not always being so effective it seems to me logical to look further into possible alternative therapies. The Teasle *Dipsacus fullonum* has certainly won itself a reputation as a reliable folk medicine against borreliosis. Somewhat naive and curious as to what it would involve to bring out a Phytomedicine specifically for the disease I informed myself and wrote a chapter on just that. Also, when reading the many articles about the Teasle, I was never sure exactly what all the Active

ingredients meant. This is why I did a fairly in depth study into what properties each of these phytochemicals could possess as a function in battling the disease.

Interviews were carried out with two companies who produce a Teasle root extract to try and paint a better picture as to how one produces and markets such a medicine, what limits are involved and to get more of an idea if this medicine is working.

Note: for the citation of certain information I have given numbers ^{in small text} which refer to the source in the bibliography.



Figure 1 The European goldfinch De. Distelfink (Carduelis carduelis) feeding on a Teasle Photo James Pollard.

2 Classification.

The Teasle is in the order, the *Dipsacales* and depending on what source one reads is either in its own family, *Dipsacaceae* or is a member of the Honeysuckle family *Caprifoliaceae* with a sub-family of *Dipsacaceae*. The Genus name is *Dipsacus* and the Species in question is *fullonum*.

There is however some dispute over the true origin of the Fullers Teasle. *D. fullonum* L. and *D. sativus* L. Honk. (*sativus* meaning cultivated) are often named as separate species but are actually the same thing (the cultivar group being *Dipsacus fullonum Sativus Group; syn. D. sativus*)¹³. This Teasle was bred for its use by Fullers (weavers) because its seed heads were regarded as superior to the wild teasle due to the longer, more flexible, slightly curved hooked bracts. Either way, I suspect through the long and historical importance of this plant throughout Europe there would have been a few supsp.



Figure 2 *Dipsacus fullonum / sativus* Photo J. Pollard

which would have been used and regarded as superior. *D. sativus/fullonum* is most likely to have been derived from *D. Ferox* or *D. Sylvestris* the common or wild Teasle.

2.1 D.fullonum / sativus Morphology

The biannual plant which grows as a basal rosette in the first year whilst developing strong slender cream white tap roots, first starts to grow skywards in the March / April of the following year. Prickly branching stems with large basal sessile crenate cup forming leaves which catch the rain and dew are formed and in June, the plant produces on long stalks multiple ovoid conical flowerheads with lilac inflorescences. At this stage the plant has reached its total height often more than 2 m. Flowers start to form a band from the middle of the combe which then divides into two rings, each ring continues flowering and as old flowers fade and new ones open the flowering rings wander in opposite poles. By august the

plants start to fade as basal leaves wither and die shortly followed by the upper most parts. Throughout September the plants turn from light to dark brown and in October the first seeds are ripe and ready for dispersal which comes about from wind or passing animals that shake the plant and the seeds are thus catapulted away. Not all seeds however are so freely released. The plant holds some seeds back which through the action of frost and feeding birds (Figure 1) are later released throughout the winter. Sometimes a single plant may be found away from any other possible mother plant. This can be explained by bird droppings containing the still intact seed which through the process has in a way been stratified. A point to be made about the so-called “Venus`s cups” made by the forming leaves is that they have a function to prevent potential sap and leaf eating insects from climbing the stem (Figure15). It has also been documented that nutrients from decaying matter caught in these pools can be absorbed by the plant²⁹.

3 Types of Dipsacus

There are over 15 types of *Dipsacus* which spread from west Europe and northern Africa through the Middle East, Russia, Asia and Japan. European forms have also naturalized in N. America to the point where they are becoming a Neophyte¹.

Other common forms include:

3.1 *D. Laciniatus* Another similar form that has cut leaves and white flowers. (right)

3.2 *D. Pilosus*, the Hairy teasle, a smaller woodland plant with white flowers which once flowered become woolly in appearance.

3.3 *D. strigosus*, the thin teasle, similar to the hairy teasle but with denser spherical flower heads and green anthers giving it a greener appearance.



Figure 3 *Dipsacus Laciniatus*. Photo Lewis O`brien

3.4 D. *Asperoides*, Xu Duan common in Asia, Himalayas, Tibet, China, Korea and Japan. This slightly messy low growing plant with small rounded white flowers is well documented for its medicinal uses⁸.

4 Etymology

We can understand a lot about plants just from their names. Many cultural, medicinal and religious uses of plants are reflected within local plant names.

4.1 The old Greek *Dipsào* means thirst or I thirst or *Dipsan* = thirsty and comes from the way the plant uniquely catches water in its sessile leaves. Many common names too refer to this characteristic but with an added meaning coming from the belief that when the water is drunk or washed with, it will have purifying qualities. Names such as Venus's cup, Venus's bath, lady's wash basin, Freckle Herb, and holy water sprinklers make it clear to understand its various proposed uses. Such similar names can be found throughout Europe^{1,3,7}.

4.2 The species names are as follows: *sylvestis* = of the woods. *sativus* = cultivated and *fullonum* comes from the Latin *fullo* = cloth maker^{1,7}.

4.3 The German name "Karde" comes from "Cardus" which is Latin for Thistle. This is also most likely to be where the term carding comes from, as in the practise of carding wool.

4.4 Other names like Clothiers brush, drapers teasle, Wolfs combs, Bottle Cleaners, Finches burdock, Sparrows combe, Gypsies combe or Johnny prick thy finger are all fairly descriptive which help paint furthermore a clearer picture of its uses. It was my idea to try and find more information on African and Middle eastern and Indian nomenclature and uses of *Dipsacus* but the few herbals that I could find either had no *Dipsacus* species listed or were not written in English.

4.5 The Asian *Dipsacus asperoides*, (*asper* = rough *oides* = resembling) has a very powerful common name, so powerful in fact that it has crossed seas, vast tracts of land, mountains and cultural barriers. The *Xu Duan* has found itself a name due to its culturally and historically proven medicinal qualities. The name *Xu* = Successive, join or add and *Duan* = break or fracture, thus meaning fixing what is broken or fracture healer⁸. In Mandarin, it is sometimes called *Chuan Xu Duan* named after the province of Sichuan because for a long time, Sichuan was regarded as producing the best *Xu Duan*. In Korea, it is called *Sokdan* or *Cheon* (Sichuan) *Sok Dan*, in Japan they call the medicine *Zokudan* and the plant *Tau nabela*.

5 Ethno-medicinal History.

5.1 The oldest known western text which includes Dipsacus is from Pedanius Dioscorides's *Materia Medica* which was probably written about 64 AD. Here, the teasle root is said to be ground and mixed with wine or vinegar to make a waxy paste used to heal broken skin around the anus as well as internal haemorrhoids and "stalked" warts. He also mentions the use of worms found in the old teasle flower heads which could be collected and worn in a sack around the throat or arm to heal the four-day fever (malaria).



Figure 4 Teasle from the *Materia Medica*

5.2 Hildegard of Bingen 1098-1179 wrote about teasle in her book the *Physica* also called *Liber simplicis medicinae* written between 1150 and 1160. Here she describes the plants qualities as warm and dry with a detoxifying effect that will drive poisons from the body. She also wrote that problems such as rashes could also be treated with the powdered plant mixed with fresh lard.



Figure 5 Teasle from *Das Kreuterbuch* Loenhart Fuchs 1543

5.3 Leonhart Fuchs 1501-1566 like Dioscorides also writes in his *New herbal* book 1543 about the haemorrhoid healing properties of the teasle as well as the use of worms collected from the "marrow" of the plant to cure four-day fever. Otherwise he wrote of the use of the rain water or dew collected in the leaves as being used as a rinse that can be extremely useful for cleansing unclear eyes and for ridding spots, blemishes, freckles and sun spots below the eyes.

Nicolas Culpepper 1616-1654 goes further in explaining this cleansing phenomena in his 1653 book *The Complete Herbal*. He wrote, "the water found in the hollow of the leaves is commended as a collyrium to cool inflammation of the eyes and as a cosmetic to render the face fair". For the herb itself, he states that the roots are the only part used and also have a cleansing faculty. He, as an astrologer attributed the virtues

of this plant and the plant itself under the dominion of Venus encompassing love, beauty, sex, fertility, prosperity, victory, and desire.

6 Ethno-medicinal history of the Xu Duan *Dipsacus asperoides /aspera /asper*

The text in which Xu Duan first appeared was in the so called *Divine Husbandman's / Farmers classic of the Materia Medica*, in Chinese, *Shen Nong Ben Cao Jing* is a Chinese book on agricultural and medicinal plants and is one of the most preeminent Chinese medical classics. Its origin has been attributed to the mythical Chinese sovereign Shennong, who was said to have lived around 2800 BC. Researchers believe the text is a compilation of oral traditions, written between 200 and 250 AD. Its Uses throughout history are consistent and are mostly to do with lower back and joint pain, stimulating the liver and calming the foetus.

7 Ethno-botanical history.

The word Teasle and the german word Karde both have the same origin, to card or tease wool. The use of the spiny dry seed heads to tease out woollen fibres before they were spun have been used in Europe since Neolithic times, a process known as carding, and in raising the nap of finished woolen cloth. While the conical heads of wild or common teasel (*Dipsacus sylvestris*) may once have been employed in wool carding (some authorities question this) and are sometimes used on a small scale by hand-spinners, they are of no use in raising nap, as the spines are too straight and weak to be effective^{1,32}. The curved cylindrical seed heads of the later cultivated form (*D. fullonum / sativus*) were and still are considered to be superior to any other instrument for that purpose. The hooked spines of this form, when they are drawn over the cloth, smooth it rather than snagging and ripping it. In the Middle Ages, teasel heads were fitted into wooden frames. In the nineteenth century, the frames might have been placed onto rotating drums over which the cloth was passed. Although teasel heads began to be replaced with steel brushes in English woollen mills in Victorian times, the very finest finish, especially that of the baize used for high-quality billiard tables, is still produced with teasel³².

In my search for more information I discovered two cited Papers from the Web of Knowledge.

7.1 The first, published by the Holocene magazine vol 10, in 2000: titled, Palaeo-environments and cultural landscapes of the last 2000 years reconstructed from pollen and

Coleopteran records in the Lower Rhone Valley, southern France. Here, For the first time, C-14 carbon dating was used on a high-resolution pollen/Coleoptera joint analysis which was performed on a late Holocene sedimentary sequence located in the Lower Rhone Valley. Three agricultural phases reflecting a growing level of human activities were identified and could be used to paint a picture of the changing landscape. Phase 1 is contemporaneous with Celto-ligurian, Greek and Roman civilizations. At this time the forest cover was already largely destroyed, and cultivation of cereals, vines and walnuts, was practised. Phase 2 is contemporaneous with a period spanning the Merovingian time and the Upper Middle Ages. It is characterized by increased agro-pastoral activities, probably related to the establishment of a monastic community at the Montmajour Abbey and to the settlement of farmers on the nearby Castellet hill. Interestingly the major characteristic of agriculture at the third phase is the very high pollen percentages of *Dipsacus fullonum / sativus*, which was formerly extensively cultivated for cloth teasing. This early cultivation of an industrial plant at La Calade is dated to the twelfth century. This high pollen count of *Dipsacus* is probably to do with craft industries performed by monks at Montmajour Abbey.

7.2 The other Paper I found regarding teasle`s historical use was in the, IWGP Journal, Vegetation History and Archaeobotany Vol 24. Here, an investigation of early medieval sites in Switzerland (5th-7th century ad) was carried out and the plant macro-remains from three Merovingian settlements in the Canton Jura were analysed. At Develier-Court, with its partially waterlogged sediments, finds of dyeing and carding plants such as *Reseda luteola*, *Xanthium strumarium* and *Dipsacus sativum/fullonum*. This underlines an early importance of textile production and the use of the teasle.

Another ethnobotanical use is as the folk name “gypsy`s combe” suggests, that it was indeed used to combe hair and probably to clean and groom furs and clothing.

7.3 One last point not to be over looked is the use of teasle heads to make toys. A large variety of prickly hedgehogs owls and deer figures etc. can be made. (Right)



Figure 5 My attempt at making some Teasle figures ☺

8 Why is *Dipsacus* thought to help against Lyme disease?

Lyme Borreliosis is a modern disease and since the first outbreak of Lyme disease in 1975 it has now spread far and wide and is reaching epidemic proportions. An SRF report from the 1st of July this year explains that already in July 2016 a staggering 14`600 people had visited their Dr regarding tick bites, and already by this, “the middle of the season point” over 5000 people were newly infected with Lyme disease in Switzerland alone.

It is through the realization of this epidemic and the fact that the conventional medicinal approach is not always so adept in dealing with the disease that Dr`s, Herbalists, alternative practitioners as well as People suffering from Borreliosis sought out “new” possible cures or as the case may be, looked to find answers from the past. The Asian Teasle that has been documented for thousands of years for its far-reaching therapeutic uses is thought to be a possible useful herb for lyme disease. This combined with the European history of our own native plant helped shine even more light on the subject.

Soon patients and practitioners alike started experimenting and before long, similar results were being noticed. In the late 90`s the first information on the subject was being published by the likes of Matthew Wood an herbalist and author. Later works followed by Stephan Harrold Buhner, a so-called earth poet, herbalist and Author and Later in 2007 anthropologist Wolf Dieter Storl published his book *Healing Lyme Disease Naturally*. Such publications came to generate some controversy. Nonetheless there is a logic to the use of this herb and to boot an undeniable proof which can be found in the thousands of testimonials from people that now swear this plant has great healing effects on Borreliosis.

9 Other documented herbal medicines for Lyme borreliosis

There are many other plants which can be used to help against Lyme disease, and not wanting to give the impression that the Teasle can heal Lyme disease alone, I would rather like to highlight the large portrait of Symptoms included within this disease. Many of these symptoms have specific alleviating or curing herbal remedies.

Lyme Borreliosis is a bacterial disease caused by highly specialized Spirochaetes called, in this case *Borrelia burgdorferi*. Similar bacteria are also the cause of other deseases such as Syphilis. This disease has a far longer history and hence there are a lot more herbal medicines that are associated with it, some of these because of their similar antibacterial

effects are now regarded as helpful in the treatment of Lyme disease. Other herbs are specifically used because they have a specific effect on one or more of the Borreliosis's many symptoms, mostly inflammation and joint pain. Lyme disease has great diversity of symptoms and to write a list containing all herbs that could be useful in combating Lyme disease could easily turn this small dissertation into PhD study. For this reason, I am focusing only on the known herbs that have had proven the test of time and can be found in literature which is specifically to do with this matter. I have gathered here information written by Dr med. Dietrich Klinghard, Dr. James A. Duke, Dr Nicola Mc Fadzean and Jason Elias amongst others.

9.1 List of herbal medicines used against Lyme Disease.

Allium sativus, Garlic is said to help break down the Biofilm. should be used fresh or freeze dried. Large quantities are recommended.

Andrographis paniculata, also known in China as Chuan Xin Lian. TCM has used Andrographis for centuries as a powerful anti-inflammatory and antiparasitic herb. Beneficial for infections of all kinds, it is particularly effective for Lyme disease when Heat signs are present.

Artemisia annua, Sweet wormwood or Qing Hao. Through the dissolving of iron this plant can be used indirectly to help break down the bio films of the borreliosis and disable the building process of new pathogenic structures. It has also been described as antiparasitic and antimicrobial.

Artemisia absinthium, Wormwood also known as Common Wormwood. like its Asian relative, Sweet Wormwood, has been used throughout the ages for its antiparasitic actions hence the name, Wormwood. Its bitter qualities have been used to support digestion and liver functions.

Astragalus membranaceus, also known as Huáng Qí used for thousands of years in TCM to revitalize the Kidney energy and to provide powerful support for the immune system. In treating Lyme disease, astragalus additionally supports digestion and mental functioning and helps against fatigue.

Berberis vulgaris, Barberry. Used for more than 2,500 years in both Chinese and Ayurvedic medicine. Berberis also a European native, contains berberine alkaloids that have

demonstrated antimicrobial and antibiotic activity against bacteria, viruses, fungi, protozoans, chlamydia, and intestinal parasite infections.

Ceanothus americanus, New Jersey Tea or Red Root. Used for cleansing the lymph system, effective as a tincture for pain or swollenness in the spleen and liver area.

Chlorella vulgaris, Chlorella green algae, is a fresh water single-celled algae, containing about 38 times the protein of soybeans, as well as amino acids, vitamins and minerals, including the natural anti-depressant magnesium. It has proven immune strengthening, antiviral, anti-inflammatory qualities and can strengthen the function of the liver and be good for bone health. Double-blind studies demonstrate its effectiveness in heavy metal chelation³⁰. A 2010 study found that Chlorella contains a peptide, known as Chlorella-11, that actually inhibits the inflammation caused by lipopolysaccharides from Gram-negative bacteria¹¹. It is also said to be an oxygenator and detoxify of blood and other organs. Lastly it is said to help reduce the impact of Herxheimer reactions in Lyme patients.

Chrysosplenium alternifolium, Golden Saxifrage. Used fresh or dried as a tea, it alleviates spleen, urinary tract and liver ailments. It also stimulates bile secretion of the liver.

Cistus creticus/incanus, The Hoary Rock Rose. Known as a medicinal plant in the Mediterranean the resin (Labdanum) was used as an ingredient for incense, and medicinally to treat colds, coughs, menstrual problems and rheumatism. Many reports claim *Cistus creticus* extract as a miracle cure for Borreliosis. Research carried out at the university of Leipzig by Prof. Dr. Hans Wilhelm Rauwald show that lipophilic leaf extracts of *C. creticus* exert antimicrobial activity against *Borreliosis burgdorffii sensu stricto* in vitro³¹.

Citrus × aurantium also *Citrus paradise*, Grapefruit seed extract. To be used only shortly to help with the breaking down of biofilm.

Colchicum autumnale, Meadow saffron. This extremely toxic herb can be prescribed to treat a borreliosis co-infection *ehrlichiosis*. This should not however be used without serious advice from a qualified herbalist

Coriander sativum, also called Cilantro, According to Klinghard ², tea from the fresh herb or crushed dried seeds can be used to help as a heavy metal detox. Long-term consumption of the tea combined with Chlorella algae is recommended because coriander alone is not able to take the heavy metals out of the body. Therefore, it is recommended to always take the

Chlorella algae half an hour after drinking the Cilantro tea and with at least an hour between meals to stop the Chlorella fixing to food. Coriander is not to be recommended for patients who are pregnant or who are trying for children.

Eleutherococcus senticosus, Siberian ginseng. has been used as a tonic and immune-enhancing herb for thousands of years in China and Russia. It has also been used to improve mental functioning and enhance both mental and physical performance a useful help in dealing with the mental and cognitive symptoms associated with Lyme disease. Contains a possibly relevant active ingredient *Eleutheroside A or Daucasterol*. (see under Scientific studies related to the use of *Dipsacus sp.* as a medicine. Daucasterol Page 25).

Equisetum arvense, Mares tail. Silica rich, Strengthens the immune resistance and strengthens vascular walls.

Eupatorium cannabinum, Hemp agrimony. A bitter tea made from this plant activates the immune cells and has a diuretic and diaphoretic action and activates bile secretion.

Eupatorium perfoliatum, Bonestet. Also, a bitter tea is made which was traditionally drunk by Native Americans when suffering from flu and fevers. It is thought to be a Parasitic and anti-inflammatory. It is said to be the polysaccharides that are responsible for the immune-resistant effect of this herb. These in turn have a stimulating activity of the B and T lymphocyte cells. Interferon, a protein produced by endogenous cells help block the multiplication of viruses, tumours, bacteria and protozoa¹.

Fallopia japonica, Japanese knotweed. Another “wonder cure” this plant shares many parallels with the Teasle. Used to strengthen the immune function and support blood circulation. The extract containing resveratrol which is considered a powerful antioxidant. In-vitro studies of resveratrol found in Japanese knotweed have shown that the herb has significant anti-inflammatory, anti-mutation, and DNA protective actions^{11.1}. For co-infections with *bartonella*, tea and tinctures made from the root are to be recommended.

Fallopia sachalinensis, giant knotweed or Sakhalin knotweed. This is a close relative to the Japanese knotweed and can be used similarly.

Galium aparine, Cleavers also known as goosegrass. Have been used for millennia for the treatment of swollen glands and urinary infections. Known in many cultures as a blood cleanser, cleavers help to remove toxins from the bloodstream, reducing heat and

inflammation. Traditionally it has been used to treat arthritis, gout, and skin disorders. As a diuretic, it helps the body effectively eliminate toxins through the urine

Guaiacum sanctum, Guaiac. Storl writes in his book of this tree as a good possible medicine for Borreliosis¹. It was well known as a remedy for syphilis which has a very similar Spirochaete type of bacteria. It was also used to treat arthritis, rheumatism skin diseases and is known to cleanse the blood. Tea can be made by cooking the resinous wood for 20 minutes or by using the pure resin. It is not often listed as an available Borreliosis cure largely due to the fact that the tree is on the IUCN red list and all trade is controlled by CITES.

Mimosa pudica, Sensitive mimosa. Is an anti-parasital and neuro-regenerative

Olea europaea, Olive. The leaf extract from the olive tree is germicidal and is said to stimulate the endogenous immune system.

Rhodiola rosea, Siberian Rhodiola known as Rosavin or golden root, Aaron's rod, and arctic root. This has been used for thousands of years in Russia and Siberia as a general tonic to reduce stress. It is now used extensively for its benefit in promoting general energy levels, and for its antidepressant actions. A very effective natural remedy to clear up "brain fog" and help restore cognitive functions.

Scrophularia nodosa, Common figwort. As the signature of this plant suggests with the nodule roots and hard knotty flowers. It is used to relieve knots in the body such as swollen lymph nodes, tonsils and scrofula. It can aggravate the kidneys therefore it is best used homeopathically.

Silybum marianum, Milk thistle, used as a liver tonic, supports the liver in its strenuous task of helping detoxify the system from the bodily debris created by the Lyme spirochetes.

Smilax sarsaparilla, as it is commonly known, Sarsaparilla has immune enhancing properties, anti-spirochete actions, and ability to bind endotoxins and purify the bloodstream, sarsaparilla is another well-rounded, beneficial herb in the treatment and prevention of Lyme disease.

Sorbus aucuparia, Rowan or Mountain Ash. The fruit of the tree can be made into juice, jams, vinegar, and alcoholic tinctures, all of which can be used, but tea is best recommended to help with swollen lymph nodes or lymph Edema.

Stevia rebaudiana, Sweet leaf. A study published in the European journal of microbiology and immunology has highlighted Effectiveness of *Stevia rebaudiana* Whole Leaf Extract Against the Various Morphological Forms of *Borrelia Burgdorferi* in Vitro.

Uncaria tomentosa, Cat's Claw also known as Uña de Gato, is a woody vine that grows wild in the Amazon rainforest. Its use dates back to the Inca civilization for treatment of a variety of debilitating diseases including inflammatory conditions such as arthritis, infections of the genitourinary tract and skin, digestive complaints, gastric ulcers, and asthma. The Asháninka Indian priests in Perú used Cat's claw to regulate disturbances between a person's body and spirit. Cat's Claw has also been shown to have multiple anti-microbial qualities making it a valuable ally in dealing with Lyme disease.

Urtica dioica, Stinging Nettle. For Lyme disease, nettles play an important role in supporting the immune system, and also for their broad-spectrum anti-inflammatory qualities.

Vinca major and *Vinca minor*, The greater and lesser periwinkle are recommended as a tonic to increase oxygen in the brain and improve glucose metabolism. This results in better memory, concentration, articulation and also reduces irritability, dizziness, headaches and tinnitus that can be associated with 2nd and 3rd stage Borreliosis.

Viscum album, Mistletoe Improves the lymph functions and supports the immune system.

10 Self-experimentation.

In autumn 2014 I decided to grow my own *Dipsacus fullonum/sativus* to use myself as medicine. After acquiring some seeds from a friend's garden, I sowed them in trays with a light layer of sand to allow the light to reach the seeds at the same time as creating a better contact (Teasle seeds need light to germinate). In spring after a few frosts to help break their dormancy they germinated. These were then pricked out individually into pots, 80 in total. Six weeks later they were planted with a 30 – 40 cm spacing and here they grew forming large rosettes which suppressed the weeds. While harvesting them (Dec 2015) it was made clear that many of the roots had been eaten by mice, leaving just the still green rosettes which had deceived me into thinking they were still alive and healthy. Nonetheless I had

plenty and besides, maybe the hungry mice also had Lyme disease. The roots were washed thoroughly and dried on top of a wood oven for a few days. I then used a mixer to powder them and the medicine was finished. (Figures 6-9)



Figure 6 Washed root from 1 Teasel plant



Figure 7 Dried roots from ca. 10 plants.



Figure 8 Milling



Figure 9 Final product.

Since then I have been taking a teaspoon full of this powder 3 – 4 times a week as tea or mixed in muesli. Additionally, I have been using an alcohol tincture made from the root which I take in water daily. Although it is not easy to say for sure if there is any great noticeable improvements I can be sure that there are no side effects and no progressively worsening symptoms. I also have had Borreliosis tests done (Western Blot and ELISA) before and after a 3 month period of using this medicine to see if the antibody count has changed.

According to Dr Norbert Satz my results show no great change and it is most probable that the antibodies are still measurable in the body from the reaction to the antibiotic treatment

in 2014. A third test next year will confirm if there is stability or any fluctuation in the antibody count and then I will know for sure how well the Borreliosis is being controlled.

11 Interviews.

To get a clearer idea as to the possible demand for what is still at the moment regarded a hypothetic approach to healing Lyme disease I decided to ask those who are producing Teasle products. I wanted to find out if there would be a viable market for a “Borreliosis Phyto Medicine”, and to try and understand more about the complications of doing so.

11.1 Interview with Edgar Schöpfer. Founder of the Kardenshop.de.

The kardenshop.de is an online shop which sells mainly Teasle tincture and capsules with the powdered root as well as books and supplements related to borreliosis.

As I had thought the Kardenshop is the outcome of a direct personal experience with lyme disease and the Teasle. Both Edgar and his son Jan had used this plant to heal themselves of the disease and with some homemade tincture that was surplus to requirements Edgar decided to sell it on Ebay. His son Jan, realizing that there could be certain legalities associated with this grey area of selling homemade medicine, decided to inform himself as to the best correct way to do this. In Germany, he explained it is ok to do so as long as it is not specifically sold as a medicine and instead as Dietary supplements. Sales took off and before long the business was rolling. With little or no horticultural experience Edgar went about planting a small field of *D. fullonum* which sufficed for the first few harvests. Nowadays the small productions field

from Edgar is not enough and he employs partly organic and partly Biodynamic farmers to help produce the crop needed. He explained that the farming is all done by hand to minimalize damage to the roots so no rot can set in, spoiling the quality of the end product.



Figure 10. Edgar and his 20 x 15 m Plot of Teasle which cotributes to about 10 % of the total amount needed for thier production. Back right is a perch for birds of prey to sit. This helps control the mice. Good to know!



Figure 11 Maturing tincture

The harvested roots are washed and dried in Excalibur food dehydrators for the production of root powder which then gets sent to another firm to be filled into capsules. The fresh roots are cut into centimetre pieces and then in stainless steel barrels to a ratio of 1 / 1. Left for 3 months to soak, the then finished extract is bottled and dispatched. The leaves until 2015 were also dried and sold as tea but they were told that that is no longer allowed under the German food act. So now they sell it as dried Teasle leaves that could be used as tea.



Figure 12 Finished product. Left powder from an opened capsule. Right my own powder as a comparison.

11.2 Interview at Ceres Heilmittel AG in Kesswil. With Hildegard Kalbermatten co-founder and Matthias Plath Productions manager.

Ceres produce many so-called mother tinctures, including a Teasle mother tincture and the principle is much the same as one might expect. The underlying difference has to do with the holistic way in which it is done. Plants are grown locally by Demeter certified biodynamic farmers. They are sown and harvested on root days enhancing their quality. Harvest takes place in spring which harnesses the breaking free power of the plant. Also like the Kardenshop, no machines are used while harvesting and the plant material is washed and processed by hand up to the point where the “Ceres mill” is used. This, a type of mortar helps free fine substances, reduces the loss of active and aromatic substances through oxidation and volatilization and by processing material in a closed air tight system while adding water and alcohol. The tincture is then separated from the solids and left to mature for at least two years in large glass bottles much in the same way wine improves with age. In order to sell this “medicinal” product in Switzerland Ceres sell it as homeopathic tincture with a dilution of 1/10. In accordance with Swiss medicine and the HAB, Homöopathisches Arzneibuch. Ceres are one of the few such companies that have such a refreshingly holistic approach to the quality of their medicine. Ceres also produce an *Artemisia absinthium* mother tincture which is also bought by many Borreliosis patients (see *A absinthium* P 14)

12 Analytic, research and a hypothetic drug development from *Dipsacus* species

12.1 Chemistry, phyto-chemistry and how to identify what is an “active ingredient” and what that means is all a bit of a grey area for me. To clear some things up I was lucky enough to interview Alexander Schenk, head of analytic and analytical development at Zeller, A leading phytopharmaceutical company in Switzerland

To understand more about phytomedicine, in particular in relation to the Genus *Dipsacus* I asked how one would go about bringing a new Plant based medicine (Drug) to the market and what it involves.

From my experience as a producer of medicinal plants I was already aware that such a scheme brings with it huge amounts of work with endless studies, HPLC tests to reveal existing and maybe new phytochemicals, clinical trials which can also take many years and not to mention a vast amount of money. Alexander Schenk Painted a far clearer and more realistic picture.

12.2 Firstly, he explained we would need to look closely at what is already known about the chemical make-up of the plants. This would not be a limited species specific study but a more multi-dimensional look into the Genera as a whole (*Dipsacus*), the family (*Dipsacaceae*) and possibly even other Families which are closely related such as the *Asteraceae*'s. This information would act as a starting base of knowledge to which we could build upon. On the other side one can look for potential in a plant drug from assessing its ethnomedicinal uses. This approach is based on an assumption that the active compounds isolated from such plants are likely to be safer than those derived from plant species with no history of human use not to mention that they have through the test of time already in a sense, proven their worth as a phytomedicine.

12.3 Extraction is the crucial first step in the analysis of medicinal plants. It is necessary to extract these desired chemical components from the plants for further separation and characterization. This basic operation includes steps, such as pre-washing, drying of plant materials or freeze drying and grinding or milling to obtain a homogenous sample which often improves the kinetics of analytic extraction and also increasing the contact of sample surface with the solvent used.

Once this process has been done, a more detailed analysis can be carried out to see what Pharmaceutical ingredients exist. Screening to detect and isolate known substances associated with the family, genera or species can be carried out with HPLC techniques. These substances will then be further analysed and measured for their structure, biological activity, mass and stability.

12.4 The next step is to use both hydrogen and carbon HNMR and CNMR (Nuclear Magnetic Resonance) spectroscopy techniques. This type of spectroscopy determines the physical and chemical properties of atoms or the molecules in which they are contained and can provide detailed information about the structure, dynamics, reaction state, and chemical environment of molecules ⁽¹³⁾. From the perspective of a biochemist looking to investigate properties of organic molecules from plants, this is one way which can be used to determine and fractionate possible NCE's (New Chemical Entities). It is possible that completely new substances will be found, they will then need to have their chemical components characterized, named, documented and given a IUPAC number (International Union of Pure and Applied Chemistry). Who knows maybe there is a "Dipsacine" just waiting to be discovered.

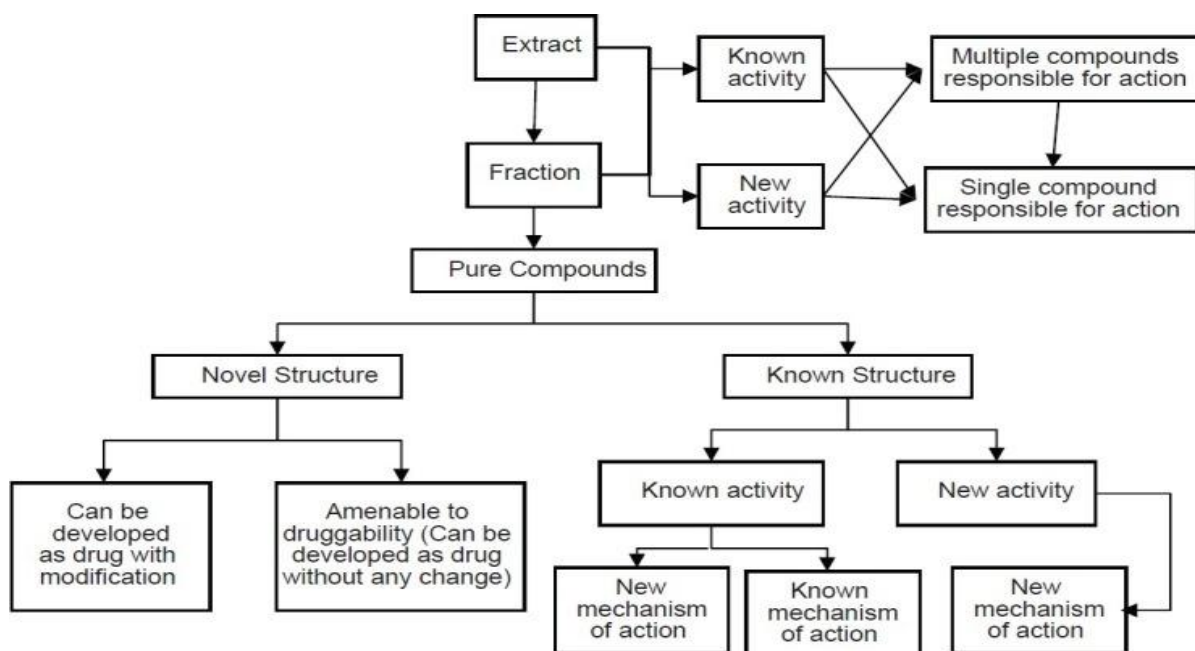


Figure 13 possible outcomes of a typical bioactivity guided fractionation in a new drug development.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3456845/figure/F4/>

12.5 From here on there will be countless tests and clinical trials needed to assess possible toxicological effects, drug stability (shelf life) and Drug efficacy. This often involves Ph.D. Studies, countless phytopharmacologists, support from experts and medical Dr's and when all of this works together and a stable effective drug has been identified it will then have a monograph listed in the European Pharmacopoeia and be open for production and use.

13 Known Active Pharmaceutical ingredients of *Dipsacus fullonum* / *sativa* and their possible medicinal function in relation to Lyme boreliosis.

13.1 Iridoids. These come in three forms simple, complex or iridoid glycosides, where they are fixed to a sugar. Storl writes of an (Pseudoindicanes) Iridoid also found under the related *Knautia arvensis* in the Lexicon der Arzneipflanzen und Drogen Hiller & Melzig⁹. Unfortunately, apart from the listing with the *Knautia*, there was no information about this particular Iridoid to be found.

Iridoids are found in a lot of medicinal plants and have been identified as having many medicinal qualities but are most acclaimed as having proven strong anti-inflammatory effects.

13.2 Saponins. Amongst the many claimed health benefits of saponins, recent studies have mostly illustrated their beneficial effects for blood cholesterol levels, bone health, cancer, and for strengthening the immune system. Plants use saponins to fight off parasitic infections. When ingested by humans Saponins also seem to help against viruses and bacteria, maybe through our blood or by boosting our immune system or both. Lyme disease comes from a parasitic bacterium delivered by another parasite, the tick. This draws interesting parallels between plants and us. The same can be said in the unusual way in which the flowers of the *Dipsacus* move out from the center in rings like how in the first stage of Lyme disease the Erythema migrans spreads over skin.

13.3 Scabioside (glycoside). It appears there are many different types of Glycosides which exhibit different health benefits. Glycosides may be categorized by different methods or according to different headings. For instance, glycosides may be classified according to the nature of glycosidic bonds as well as the "aglycone",¹² this is where the compound remaining after the glycosyl group on a glycoside is replaced by a hydrogen atom.¹³

Unfortunately, apart from learning lots about Glycosides I couldn't after considerable searches find any relevant information on this specific glycoside. Apart from this characterization of Scbiosid F¹⁴ and that Scabiosides are found also in the related genera *Scabiosa* and *Succisa*. I did however through my searching



Figure 14

for Scabiosid, come across countless, mostly German sites referring to the Teasel and its use against Borreliosis.

13.4 Caffeic acid. Caffeic acid (not to do with coffee) is a proven antioxidant in vitro and also in vivo¹⁵. It also shows immunomodulatory and anti-inflammatory activity three possibly very relevant factors in combating Lyme disease.

13.5 β -Sitosterol or beta Sitosterol. One of several phytosterols with chemical structures similar to that of cholesterol.¹⁵ In Germany, β -Stosterol is used as a main component of the substance "phytosterol" monographed in the European Pharmacopoeia, for the symptomatic treatment of early benign prostate hyperplasia (BPH). Also, although the exact mechanism of action is not fully understood β -Sitosterol helps the absorption of cholesterol from the gastrointestinal tract this in turn brings about a reduction in the blood cholesterol levels.

13.6 Daucosterol. A phytosterol like compound also known as ``*Eleutheroside A*`` because it is found in the roots of *Eleutherococcus senticosus* the Siberian ginseng an "adaptogen". This herbal medicine shares links with another powerful healing mushroom the Cordyceps *Cordyceps sinensis* which has the same Daucosterol compound. This medicinal mushroom was regarded in ancient times as being more potent than Ginseng and worth four times its weight in silver¹⁶. Being particularly interested in medicinal mushrooms I couldn't hold myself back to look further into these Cordyceps. They have many far reaching medical claims, some of the prominent uses shone out to me as being potential cures for Borreliosis, for example, the treatment of immune disorders and the fact that they are often regarded to be a remedy for weakness and fatigue, and are used as an overall rejuvenator for increased energy while recovering from a serious illness¹⁶. Yet another highly regarded TCM the "Yadanzi" *Brucea javanica* fruit is also written as containing Daucosterol and being known to clear heat, relieve Toxicity, stop dysentery and interrupt malaria⁸, it is also said to weaken

parasites. I was unable to find any more medicinal plants which shared this same ingredient and there was no significant information about this relatively little known compound but the fact that it sits as a minor constituent in the above-mentioned medicines including *Dipsacus* perhaps highlights a link to be further investigated.

13.7 Potash Salt. Potassium (K). Again, Storl mentions in his book¹ under active pharmaceutical ingredients “Potash salt.” Potassium is mineral found in cells. It helps nerves and muscles function properly. I could find no information as to what form of Potassium there is to be found in *D. sativus / fullonum* but I think it is most likely to be Potassium Citrate, (the potassium naturally found in fruits and vegetables) which can be prescribed as an alternative to potassium chloride¹³. This is the mineral worker of the blood that forms fibrin and probably diffuses it throughout the tissues of the body¹⁰. Most commonly, Potassium citrate is used to make the urine less acidic and helps the kidneys get rid of uric acid, thereby helping to prevent gout and kidney stones¹³. It is possible, that a general bodily de-acidifying effect could be obtained by consumption of this potassium.

13.8 Bitters. Bitter substances are all chemical compounds which have a bitter taste. Bitter substances are not a chemically uniform group, but are distinguished only by the fact that they taste bitter. They increase gastric and gland secretion and thus have an appetite enhancing and digestive effect¹³. Roots of the Teasle are extremely bitter to taste. It is therefore logical to believe that like most other bitters such as *Gentiana Lutea* *Artemesia sp.* and *Silybum marianum*, it too should have a positive effect on function of the liver, digestion, appetite and improve gastrointestinal blood flow. They are also said to be spasmolytic, anti-inflammatory, antimycotic, antibacterial and reduce fever. The digestive system plays an important role in supporting the body's immune system therefore it is logical to assume that through ingesting such bitters that aid the digestive system we too help boost our immune system.

13.9 Glucoside. Common in plants a glucoside is a difficult to classify glycoside that is derived from glucose¹³. Without knowing the exact group to which this Glucoside belongs it was not possible for me to look further into any medicinal attributes.

13.10 Organic Acids. It appears relatively little is known about these acids role within plants, let alone any effect they might have medicinally.

13.11 Inulin. Inulins are a group of naturally occurring polysaccharides produced by thousands of plants some of which naturally store carbohydrates in roots and rhizomes as energy reserves such as the Jerusalem artichoke *Helianthus tuberosus*. Inulin is postulated to benefit the immune system through the direct interaction between the inulin and its metabolites with the gut-associated lymphoid tissues and especially Peyer's patches, (nodules found within the lower small intestine, though this link has only been established in tests on mice. Interestingly according to Wikipedia, Inulin enhances the growth and activities of selected beneficial bacteria and inhibits growth or activities of certain pathogenic bacteria, hence promoting colonic health. This could be extremely useful for the Lyme disease patient.

14 Scientific studies related to the use of *Dipsacus sp.* as a medicine.

This was another seemingly grey area, after several phone calls and emails made to specialists and authors of books on Borreliosis as well as countless internet searches I was still none the wiser, until that is, I spent a day searching the “Web of Knowledge”, at the library in the botanic gardens Zürich. This was also not so straight forward but some hidden gems did arise, most of which were extremely scientific and took a great deal of patience to fully understand.

Here is a brief summary of what I found out in order of relevance.

14.1 By far the most specific research I found is Titled: *Dipsacus Sylvestris* and it`s effects on *Borrelia burgdorferi sensu stricto* In vitro²¹. Tests were carried out in 2010 by Prof Dr Hans Wilhelm Rauwald of the Department of Pharmaceutical Biology, University of Leipzig¹⁷.

Here, extracts were taken from fresh roots using three chemical extractions using ethanol, ethyl acetate and dichloromethane. Results showed that in-vitro, growth inhibition of *Borrelia burgdorferi ss.* was found when the extract made with ethyl acetate was used, thus growth inhibiting activity of lipophilic extracts were shown. This is probably the first published work on this subject and is extremely well documented paving the way for hopefully more such studies.

14.2 Another pioneering in vitro experiment has been carried out in Korea titled: Effects of the Dichloromethane fraction of *Dipsacus Radix* on the Osteoblastic Differentiation of

Human Alveolar Bone Marrow-derived Mesenchymal stem cells²². In layman's terms, they took Alveolar bone marrow by means of aspiration (sucking it out with a needle) from dental patients, then cultured this "blood like" marrow substance in vitro. Next specially chromatographed, extracted fractions of *D. Asperoides* radix were used on one culture and a second culture was used as a control. The results indicated that the *D. asperoides* root extract induced significant alkaline phosphatase activity, calcium accumulation as well as osteocalcin and bone sialoprotein expression. In short it helps with bone production.

14.3 Here a Taiwanese experiment received and published in 2015 titled: The effects of injectable calcium silicate-based composites with the Chinese herb Xu Duan on an osteogenic accelerator in vitro²³. Osteogenic tissues help with bone growth or repair. This research measured the effects of calcium silicate based cements mixed together with the Chinese medicine Xu Duan (*D. asperoides*) at 0% as a control, 5% and 10% rates applied to fabricated human adipose derived stem cells (hADSCs). This proved that the calcium silicate-based substrate with the 10% *D. aspera* group showed a more significant development of osteogenic activities with sound cell proliferation and higher alkaline phosphatase (ALP) activity, as well as indicating osteogenic differentiation, greater osteocalcin protein secretion and clearly calcified tissue mineralization. Unfortunately, it was not mentioned in the published paper exactly how the the Xu Duan preparation was made.

14.4 Titled: The Effect of Crude Extract from Radix Dipsaci on Bone in Mice²⁴. The extract was made by mixing 4g of powdered *D. asperoides* root with 40ml distilled water and boiled for 4 hours with stirring and occasional added water to prevent drying. The cool solution, then amounting to 4ml was centrifuged, filtered and bottled and contained 1g/ml of Radix Dipsaci. Twenty 8-week-old male mice were divided into two groups of 10. One control group which were fed with a normal diet and distilled water for drinking. The other group were treated the same but with distilled water mixed with the extract (0.5 g Radix Dipsaci in 250 mL of water) for drinking. The dosage was estimated from the recommended human dosage from Chinese Pharmacopeia, multiplied by the mice/human body mass ratio. After keeping the mice separately for 5 weeks they were then killed and bone samples were taken from the left tibia of each mouse and analysed. The outcome was that the administration of Radix Dipsaci extract for 5 weeks increased the bone density by 4.5% in a bone volume/tissue volume ratio. This study is the first animal study to demonstrate the anabolic effect of *Dipsacus aspera* root extract on bone.

14.5 From the Tropical Journal of Pharmaceutical Research April 2016 I found this “Frankenstein” paper where spinal sections of rats were systematically injured then later removed while the still living rats were then further tested upon. Happily titled: Dipsacus asperoides (Xue Duan) inhibits spinal cord injury-induced inflammatory responses in rats²⁵. Here the effect of *Dipsacus asperoides* was studied in order to evaluate the inhibition of IKK (an enzyme complex that is involved in propagating the cellular response to inflammation) and NF- κ B (nuclear factor kappa-light-chain-enhancer of activated B cells¹³) a protein complex that controls transcription of DNA, cytokine production and cell survival. Over a 4-week period 40 injured female rats were divided into two groups, sub divided for further experiments and a phosphate buffered saline was used as a control whereas the others were given a Xu Duan extract. The project emphasizes two distinct phases of spinal cord injury, a primary phase which is characterized by mechanical injury and a secondary phase where inflammatory responses play their role and these two were assessed accordingly which highlighted the positive bone healing and anti-inflammatory effects of Xu Duan.

14.6 Another Xu Duan/rat experiment this time with a completely different view point. The heading of this paper is: The herbal medicine *Dipsacus asper* extract reduces the cognitive deficits and overexpression of β -amyloid protein induced by aluminium exposure²⁶. This a very long and detailed study, looked into the effects of a Xu Duan extract on excess aluminium exposure on rats. Because many studies and research suggests possible links between Aluminium exposure and Alzheimer`s disease, this study was sought to evaluate the protective effects of Xu Duan on the cognitive impairment and overexpression of the hippocampal β -amyloid protein. Amyloid beta ($A\beta$) deposits are the fundamental cause of the Alzheimer`s disease¹³. Experiments which were carried out over an 8-month period using 99 rats and a so called “passive avoidance test (PAT)” This is where rats were individually placed in a cage with a light and next to it a dark cage joined with a door, the floor of the dark cage was electrified and the unknowing rat would become a shock. Next time, if the rat`s judgement was not impaired by mind altering doses of aluminium they should remember not to go through the door. Rats were given water with 0.3% aluminium chloride for 90 days after this there was an 80% decrease in the time delay of the PAT. Then they were randomly divided into groups and some became a Xu Duan treatment and others a vitamin E treatment for 5 months respectively. After this period, the Xu Duan rats showed an improved performance in the PAT`s. Rats throughout and at the end of the experiment were

sacrificed and the hippocampal part of the brain was examined. The main findings were that long-term treatment with *Dipsacus asperoides* extract reduces the cognitive impairment and overexpression of hippocampal A β immunoreactivity induced by Aluminium exposure.

Basically, put. Xu Duan helps the rats in staying sane.

The interesting link here is that morbus alzheimer`s disease is often associated with Lyme disease. Klinghart² writes, M alzheimer`s is a chronic Borrelien infection in the brain from the hot bed of different poisons and writes further of detoxifying the lungs and brain from such metals. I am sure there can be a link but I looked into this and found no statistical evidence which corresponds similarities in the number of affected people or the spread of borreliosis and Alzheimer`s historically and goegraphcally. Maybe it has more to do with increasing exposure to aluminium in our daily lives as well as atmospheric pollution and the adverse effect on the two diseases.

14.7 Yet another extremely interesting find. This research was not aimed at proving any possible virtues of an herbal medicine but on the contrary went about to analyse specifically the possible procoagulant thrombosis inducing risks of 21 different CAM`s used commonly as herbal teas. Out of these 21, *Dipsacus asper* was found to be of notable importance.

Published in 2012 and titled: Procoagulant and prothrombotic effects of the herbal medicine, *Dipsacus asper* and its active ingredient, dipsacus saponin C, on human platelets²⁷.

Here a series of complicated hard to understand tests were carried out to ascertain possible dangers of dipsacus saponin C. Some of these included tests on rats where rats were treated intravenously with varying amounts of *D. aspera* saponin C extract. Then venous segments were excised and induced Procoagulant and prothrombotic effects of the thrombus were isolated and weighed. These tests as well as human platelet tests demonstrate a clear prothrombotic risk of phytochemicals in herbal medicine they also demonstrated that the extract of *D. asper* and its major ingredient, DSC, increases phosphatidylserine (which helps clotting) exposure and phosphatidylserine-bearing microparticle generation, ultimately resulting in the enhancement of thrombosis.

14.8 This research from China strangely focuses on the detoxifying effects of the leaf of *Dipsacus sativus* not the root and not the Chinese Xu Duan. Published in 2016 and titled: Multi-Component HPLC Analysis and Antioxidant Activity Characterization of Extracts from *Dipsacus sativus* (Linn.) Honck ²² This work focuses mainly on HPLC techniques and goes in to some detail explaining how they found eight main components, “Marker” components and possibly two main active components Saponarin and Isovitexin interestingly completely different active ingredients to the Xu Duan mentioned in Nr. 7 with its dipsacus saponin C. furthermore tests were once again carried out on mice which showed *D. sativus* leaves have significant antioxidant activities.



Figure 15 *Dipsacus fullonum / sativus* Venus`s cups. Photo James Pollard

15 Conclusion.

It seems there is undeniable proof that *Dipsacus Fullonum/sativus* has a positive effect on Lyme disease. It is also highly probable that the other *Dipsacus* species could also be used in much the same way. The Asian *Dipsacus asperoides* is an historical proven flagship to the genus and is most probably an excellent plant to use if it is available. It is also clear that there is a plethora of other phytomedicines which could support the healing /curing of the disease.

Through interviews it was obvious that there is a growing demand for “Medicine” specifically for Lyme disease. The Teasle products sold by the Kardenshop and Ceres have increased dramatically in the last few years. Ceres for example started in 2005 producing 30kg fresh mass of Teasle root. This year that figure is up to 200kg.

A look into the phytochemistry world demonstrated possible links as to how the active ingredients found in *Dipsacus* could have an effect on healing Borreliosis. This has been backed up by some scientific studies.

Through the growing demand together with countless testimonials from satisfied patients who have been using Teasle tinctures etc. coupled with the hard evidence it seems to me still a wonder that this useful medicine is not more openly available.

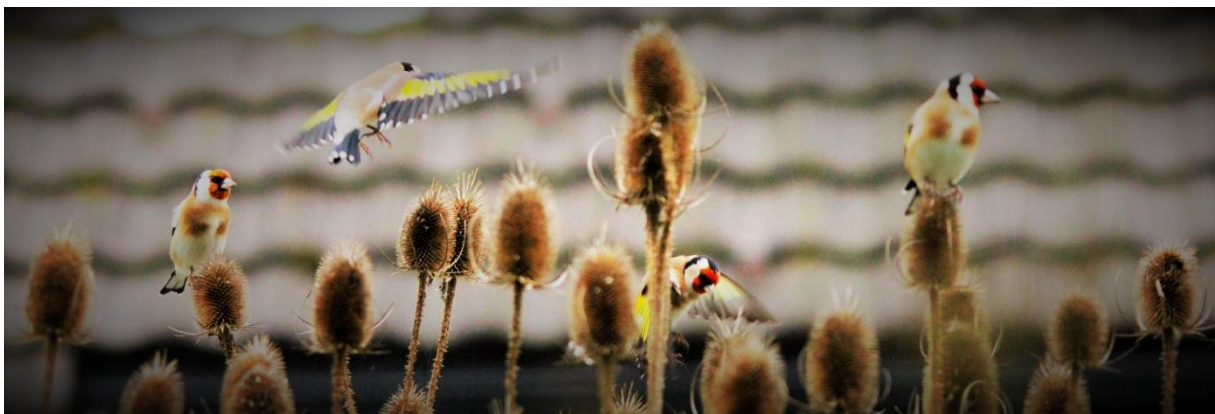


Figure 16. A flock of gold finches landing to feed on Teasle seeds. Photo James Pollard.

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