

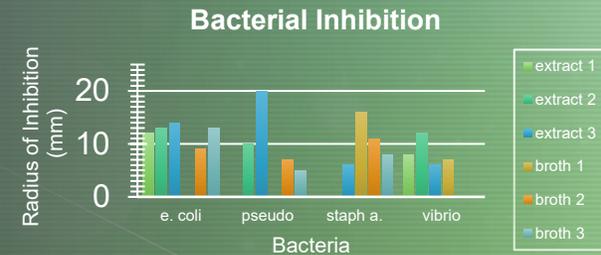
# MEDICINALLY USEFUL METABOLITES OF COMMON MULLEIN ENDOPHYTES

## Department of Chemistry and Physics

By Emma Sanger, Dr. Christine MacTaylor



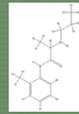
Mullein – (*Verbascum thapsus*)



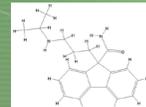
Extracts & broths 1 & 2 were derived from the white fuzz endophytes. Extract & broth 3 were made from the black fuzz species.

## LCMS Data

### Anaesthetics:

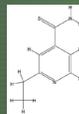


Prilocaine  
local anesthetic(3)  
black & white fuzz

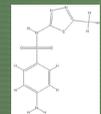


Indecainide  
antidysrhythmic,  
anesthetic(4)  
black and white fuzz

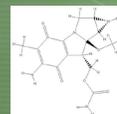
### Antibacterial/Antibiotic:



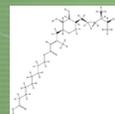
Ethionamide  
antitubercular  
antibacterial(5)  
black and white  
fuzz



Sulfamethizole  
antibiotic effective  
against gram  
negative and gram  
positive bacteria(6)  
black and white fuzz

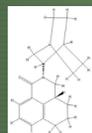


Mitomycin  
antibiotic,  
anticancer  
(stomach/  
pancreas)(7)  
black and white fuzz



Mupirocin/  
Bactroban  
antibiotic(skin),  
antibacterial(8)  
black and white  
fuzz

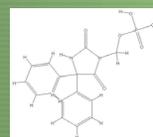
### Anti-Spasm:



Trihexyphenidyl  
hydrochloride  
anti-Parkinson's,  
antimuscarinic(9)  
black and white fuzz

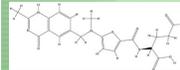


Ropinrole  
anti-Parkinson's, treats  
restless leg  
syndrome(10)  
black and white fuzz

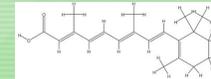


Fosphenytoin  
prevents seizures(11)  
black and white fuzz

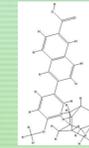
### Anti-Cancer:



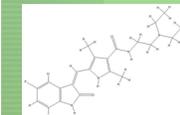
Raltitrexed  
treats bowel cancer(12)  
black and white fuzz



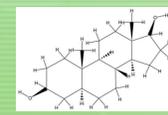
Retinoic Acid/  
Tretinoin  
skin care/  
anti-cancer(13)  
black and white fuzz



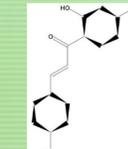
Adapalene  
treats acne, anti-  
inflammatory/  
anticancer(14)  
black and white fuzz



Sunitinib  
anti-cancer(15)  
black and white fuzz

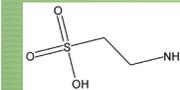


3beta-androstane-3,  
17-diol  
anti-cancer(16)  
black and white fuzz

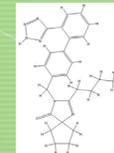


Isoliquiritigenin  
antioxidant,  
antiinflammatory,  
antiviral, antidiabetic,  
antispasmodic,  
antitumor(17)  
black and white fuzz

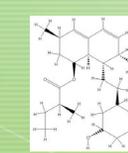
### Blood Pressure:



Taurine  
treats cystic fibrosis,  
hypertension,  
antioxidant(18)  
black and white fuzz

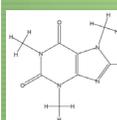


Irbesartan  
treats high blood  
pressure(19)  
black and white fuzz

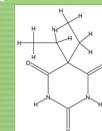


Lovastatin  
Statin: lowers  
cholesterol(20)  
black and white fuzz

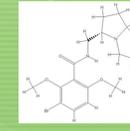
### Psychoactive:



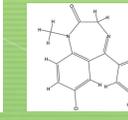
Caffeine  
Stimulant  
black and  
white fuzz



Barbitol  
hypnotic,  
sedative,  
barbiturate(21)  
black and  
white fuzz



Remoxipride  
treats  
schizophrenia(22)  
black and white  
fuzz



Diazepam  
anti-anxiety, sedative,  
hypnotic,  
anticonvulsant(23)  
black and white fuzz

## Conclusion

Mullein has been used traditionally for generations to treat a variety of ailments. Anti-rheumatism properties could be due to the prilocaine and indecainide identified in samples. The ethionamide, sulfamethizole, mitomycin, and mupirocin compounds all have antibacterial properties. These compounds were most likely the force behind the strong bioactivity against all four pathogens tested. These antibiotic compounds may also be the reason mullein was used to treat diarrhea and earaches or lung infections.

Trihexyphenidyl hydrochloride, ropinrole, and fosphenytoin would be useful in treating Parkinson's disease.

The various known medicines revealed by LCMS from the endophytes that were grown suggest that mullein's versatile uses are a product of the endophytes in the plant and not just the plant itself.

There were also compounds that showed skin rejuvenating and blood pressure lowering effects. Further studies should be conducted to explore these properties as they have not previously been reported in literature. In recent years people have begun to study the antibacterial properties of mullein (24).

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## Abstract

Mullein was procured from the Salem salt march and tested for medically useful compounds. Endophytes grown from mullein leaves and its metabolites were tested for bioactivity against four strains of bacteria. Extracts were also evaluated with LCMS to identify medically interesting components.

## Intro

Endophytes are fungal or bacterial microorganisms that live inside plants that can be isolated from surface-disinfected plant tissue which do not harm the host plant (1). Many modern medicines are derived from endophytes.

Mullein has been used since ancient Rome as a remedy for lung diseases, diarrhea, rheumatism, burns, and earaches (2). This research explores the medicinal properties of mullein.

## Experimental

Samples were picked from the marsh, washed with ethanol and bleach, and plated on potato dextrose agar. Endophytes were grown for 4 weeks in broth. Next, metabolites from endophytes were extracted from the broth and plated with 4 bacterial strains for bioactivity. The medicinal content of the extracts was assessed using LC-MS.