

5-2010

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Research in Natural Product Chemistry

Nathan Krause

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Introduction

Natural product chemistry is a branch of chemistry that deals with the isolation, identification, and study of the chemical characteristics of chemical substances produced by living organisms (Liang, & Fang, 2006). The southwestern United States has a variety of indigenous plants many of which have not been investigated for their chemical compounds but have Native American herbal uses (Moerman, 2003). The aim of this summer internship was to do extractions on plants and test them for medical potential.

Summer Objectives

- Back ground research (Literature work):
 1. Establish if other researchers have already done research on the plants of interests.
 2. Finding information on the different plant species.
- Extraction of compounds from plant parts.
- Sending plant extracts to laboratories to be tested for medical application.

Methods

Extraction:

Dry samples of plant materials were ground into powder and were extracted in a Soxhlex apparatus with hexane or dichloromethane for 4-8 hours. The solid samples were extracted 3 times using methanol. The solution was then concentrated using a rotarvapor.

ANTI-TB DATA*

ITR code	Sample ID	Stock (mg/ml)	MABA* MIC [ug/ml]	LORA* MIC [ug/ml]
ONU-1	NP-2-31-1	10	> 100	> 100
ONU-2	NP-2-48-1	10	> 100	> 100
ONU-3	NP-2-48-2	10	> 100	> 100
ONU-4	* NP-2-50-1	5	> 100	> 100
ONU-5	* NP-2-50-6	5	> 100	> 100
ONU-6	NP-2-54-1	10	24.6	41.9
ONU-7	NP-2-54-2	10	> 100	> 100
ONU-8	NP-2-56-3	10	> 100	> 100
ONU-9	* NP-2-56-4	5	> 100	> 100
ONU-10	NP-2-59-3	10	> 100	> 100
ONU-11	NP-2-60-1	10	> 100	> 100
ONU-12	NP-2-62-3	10	> 100	> 100
ONU-13	NP-2-62-4	10	> 100	> 100
ONU-14	* NP-2-64-2	5	> 100	> 100
ONU-15	NP-2-64-3	10	> 100	> 100
ONU-16	NP-2-66-2	10	> 100	> 100
ONU-17	NP-2-66-3	10	> 100	> 100
ONU-18	NP-2-68-3	10	> 100	> 100
ONU-19	NP-2-68-5	10	> 100	> 100
			MIC [uM]	MIC [uM]
	RMP		0.04	0.76
	INH		0.45	> 128
	PA824		0.91	1.57

*Institute of Tuberculosis Research, College of Pharmacy,
University of Illinois at Chicago

*MABA (Microplate Alamar Blue Assay)

*LORA (Low Oxygen Recovery Assay)

Plant Species



Accomplishments

Dr. Armstrong and I extracted 10 of the 17 plant samples of different species which he had received from Richard Spjut, who collected them from the southwestern part of the United States. We did online literature searching, and located information on each species, including medical potential. We sent most of our extracts to the Institute for Tuberculosis Research, College of Pharmacy, University of Illinois at Chicago, where they were tested for anti-tuberculosis activity.

Results and Conclusion

As indicated in the table at the left, one of our samples, ONU-6, has anti-TB activity. Although its MIC values (minimum inhibitory concentration) were, in most cases, appreciably above those of known anti-TB compounds (RMP, INH, and PA824) used for comparisons, we kept in mind that since all of our samples(including ONU-6) are extracts, and not pure compounds, considerably lower MIC values may be obtained, if we can separate ONU-6 into its individual compounds, and then have each compound tested individually. Of course, the lower a given MIC value, the more potent it is. Also, with this in mind, one or more of the rest of our samples (with MIC values >100) could possibly have anti-TB activity if we can separate them into individual compounds.

Future Research

- Extract the rest of the plant species from Richard Spjut.
- Start the process of separating the different compounds in ONU-6 to find out which compound(s) has/have Anti-TB activity.

References

- Moerman, D. (2003). Unpublished raw data, University of Michigan-Dearborn, Dearborn, Michigan. Retrieved from <http://herb.umd.umich.edu/>
- Xiao-Tian Liang, Wei-Shuo Fang (editors), Medicinal Chemistry of Bioactive Natural Products (2006), Wiley-Interscience.