



COLLEGE of  
BIOLOGICAL SCIENCE

DEPARTMENT OF MOLECULAR  
AND CELLULAR BIOLOGY

**Announcement:**

All interested members of the university community are invited to attend the Final Oral Examination for the degree of **Master of Science** of

**JUSTIN GUTIERREZ**

On Monday, December 13, 2021 at 1:30 p.m. (online)

**Thesis Title:** Flavonoids as antimicrobials against *Streptomyces scabies*: a causative agent of common scab in potatoes

**Examination Committee:**

Dr. Marc Coppelino, Dept. of Molecular and Cellular Biology (Exam Chair)

Dr. Rod Merrill, Dept. of Molecular and Cellular Biology

Dr. Tariq Akhtar, Dept. of Molecular and Cellular Biology

Dr. Stephen Seah, Dept. of Molecular and Cellular Biology

**Advisory Committee:**

Dr. Rod Merrill (Co-advisor)

Dr. Steffen Graether (Co-advisor)

Dr. Tariq Akhtar

Dr. Ian Tetlow

**Abstract:** Common scab disease (CS), caused by *Streptomyces scabies*, is an economically important disease of potatoes characterized by lesion and scab formation on the surface of potato tubers, resulting in large economic losses globally. The lack of effective treatments against this disease accounts for its global spread and negative impact. Recently, plant extracts were shown to effectively inhibit the growth of *S. scabies* in culture. To identify the antimicrobial agent in plant extracts, *S. scabies* was grown in the presence of a selected library of 20 flavonoids. The flavonoids that showed the greatest inhibition of *S. scabies* growth were sophoraflavanone G (SG), jaceosidin, baicalein, and quercetin. Minimum inhibitory concentrations (MICs) for the effective flavonoids were calculated to be 6.8  $\mu\text{M}$ , 100.0  $\mu\text{M}$ , 202.9  $\mu\text{M}$  and 285.2  $\mu\text{M}$ , respectively. A live/dead assay showed complete cell death in the presence of SG. SEM imaging also showed significant cell membrane damage when *S. scabies* was exposed to these flavonoids suggesting that these plant compounds act on *S. scabies* through a bactericidal mechanism

**Curriculum Vitae:** Justin completed his Bachelor of Science (Hons.) in Biochemistry in Winter 2018. He began his M.Sc. the following year, Fall 2019, in Dr. Rod Merrill's lab.