# Natural Variation in Temperature-Modulated Immunity of *Arabidopsis thaliana*

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## INTRODUCTION

Climate change threatens food security worldwide as rising global temperatures worsen plant disease prevalence (Savary et al., 2019). Previous studies on the model plant-pathosystem *Arabidopsis thaliana* (*A. thaliana*)-*Pseudomonas syringae* pv. *tomato* (P. syringae) showed that **host salicylic acid (SA) production is suppressed at elevated temperatures** (Huot et al., 2017). These studies investigating Arabidopsis immunity at elevated temperatures have only focused on the reference Arabidopsis accession Columbia-0 (Col-0). However, it has been well-established that there is a **profound intraspecific and pangenomic variation** within the >1000 accessions of *A. thaliana* (Sanchez-Bermejo & Balasubramanian, 2015; Box et al., 2015; Sanchez-Bermejo et al., 2014; Alonso-Blanco et al., 2016; Gangappa, Berriri, & Kumar, 2017; Prinzenber et al., 2020; Bruessow et al., 2021).

As the natural variation of *Arabidopsis* immune responses at ET has not been fully investigated, I will test various *Arabidopsis* accessions from diverse regions/climates and identify those with greater resistance to *P. syringae* infection when grown at elevated temperatures.

## OBJECTIVES & ANTICIPATED OUTCOMES

### OBJECTIVE 1

**Objective:** Determine how temperature-regulated immunity (local and systemic) varies in selected *A. thaliana* accessions

**Anticipated Outcome:** One or more accessions may exhibit temperature-resilient immunity

### OBJECTIVE 2

**Objective:** Determine if sequence polymorphisms and structural variation in *CBP60g*, *SARD1*, and other key immunity genes correlate with variation in temperature-sensitive plant immunity

**Anticipated Outcome:** *A. thaliana* accessions will cluster similarly based on their sequence and structural variation and temperature-sensitivity phenotype

### OBJECTIVE 3

**Objective:** Characterize the functional role of *CBP60g* and *SARD1* in controlling natural variation of temperature-regulated immunity

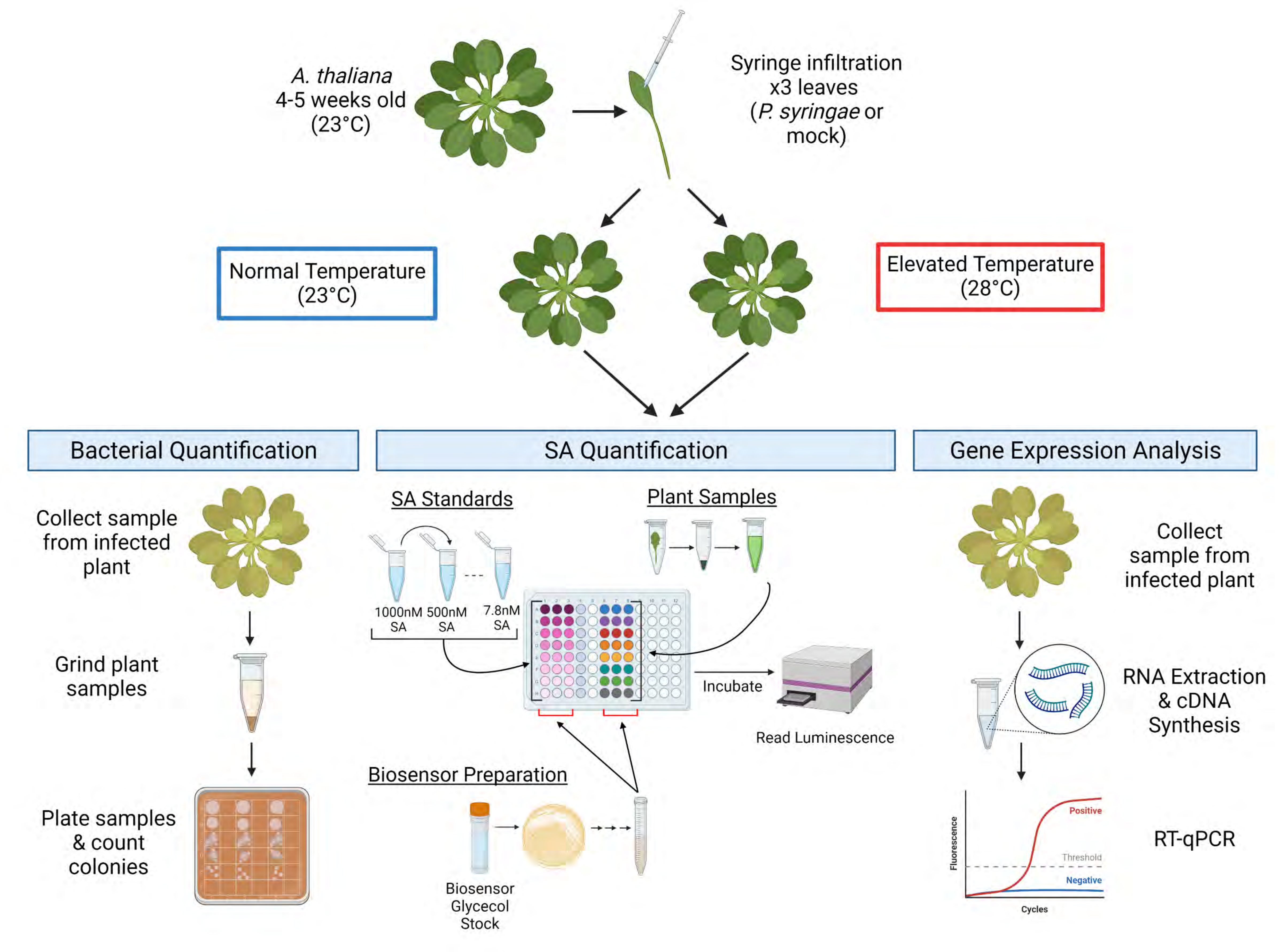
**Anticipated Outcome:** Knocking out *CBP60g* and *SARD1* in temperature-resilient accessions will make them hypersusceptible to pathogen infection

## SIGNIFICANCE & IMPACT

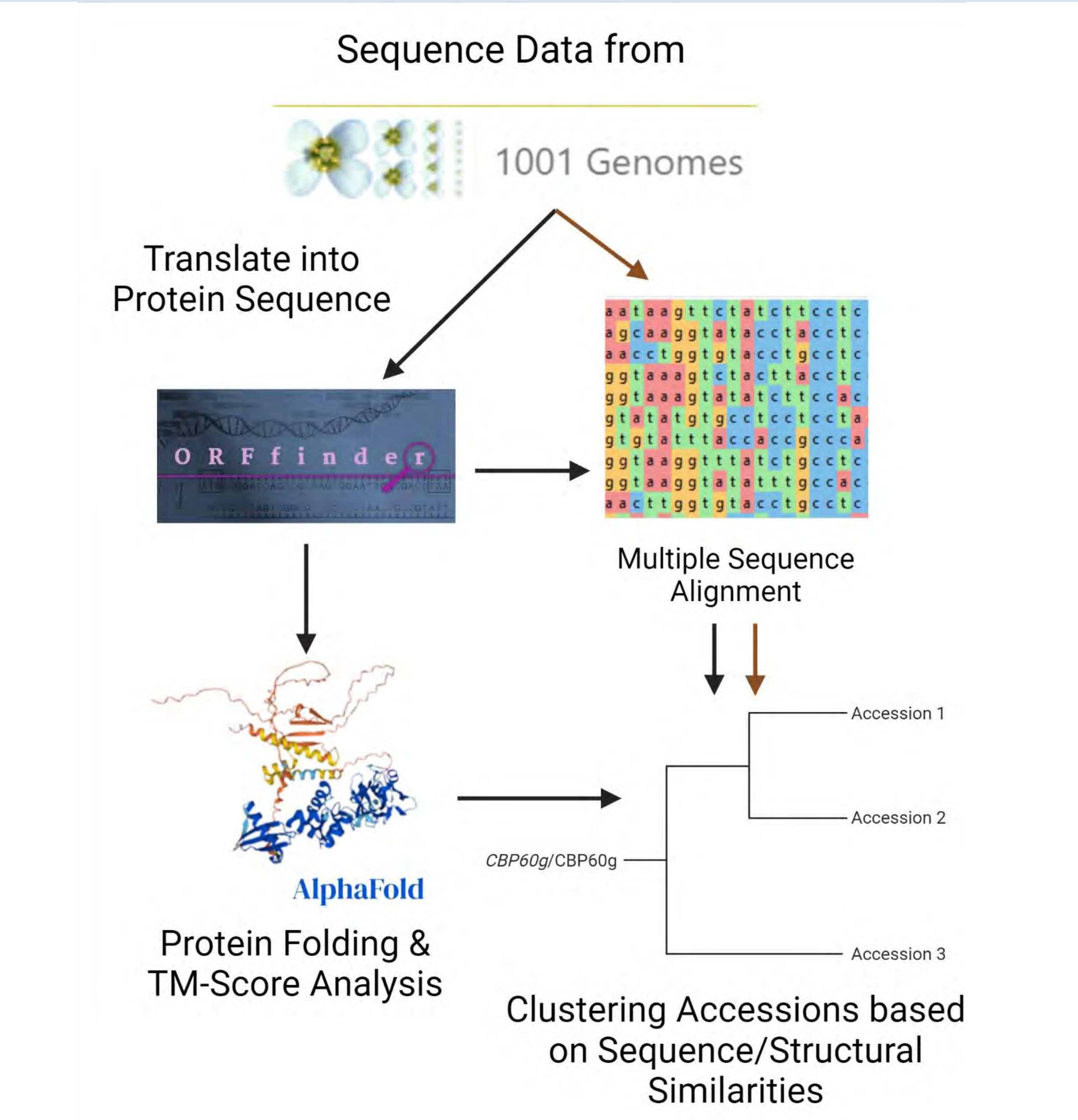
| | |
|---|---|
| Help | Help us predict plant responses to global climate change and better manage crop diseases in a warming world. |
| Advance | Advance our understanding of the pan-genomic diversity of this species at higher temperatures. |
| Uncover | Uncover genetic and molecular clues into engineering a climate-resilient plant immune system. |

## EXPERIMENTAL FRAMEWORK

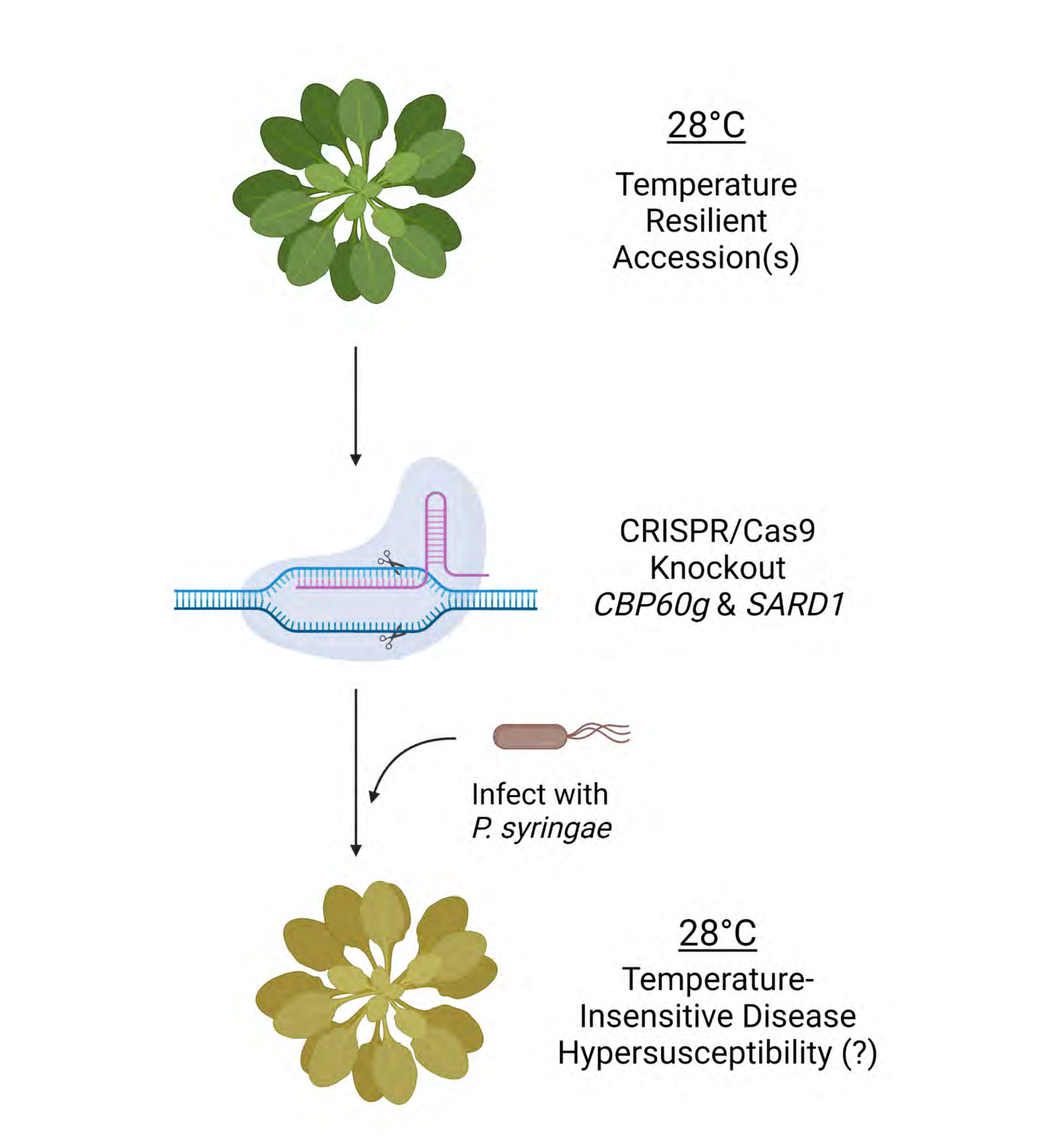
### OBJECTIVE 1




### OBJECTIVE 2




### OBJECTIVE 3

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All figures were created using BioRender (biorender.com).

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