Reef-building corals possess an extraordinary ability to regenerate, restoring damaged tissue and skeleton following various disturbances such as predation, storms, and bleaching events. This remarkable capacity for self-repair is exemplified by rapid regeneration of *Acropora* corals following major bleaching events (Dias et al., 2018) and by rapid regeneration across different lesion types (Bak, 1983). However, there can be significant energetic costs associated with tissue repair and skeletal regrowth. Therefore, energy spent on regeneration can lead to tradeoffs with growth or reproduction (Henry & Hart, 2005; Rinkevich, 1996).

Suboptimal environment conditions where energy acquisition is inefficient and stored resources are exhausted can exacerbate tradeoffs, decreasing coral performance. For example, heat stress in corals can decouple the essential nutrient acquisition by algal symbionts (Symbiodinaceae) that are essential to fueling repair and regeneration. Rising global temperatures and increased prevalence of marine heatwaves may significantly affect the innate regenerative capacity of corals (Meesters & Bak, 1993; Bonesso et al., 2017). Tropical stony corals are unlikely to meet energetic demand through heterotrophy because they rely heavily on photosynthate derived from algal endosymbionts (Symbiodinaceae) as their primary energy source (Muscatine et al. 1981). Research on the temperate coral *Astrangia poculata* suggests that the presence of Symbiodinaceae can significantly increase healing capacity even when corals have access to additional food sources, emphasizing the potential role of symbiosis in facilitating coral recovery (Burmester et al., 2017; DeFilippo et al., 2016). If heat stress results in a breakdown of the coral-algal symbiosis, also known as bleaching, the capacity for acquiring new energy will be limited. Understanding how temperature influences the delicate balance between energy acquisition, allocation, and utilization during regeneration is vital for predicting the future of coral reefs.

Previous studies on coral regeneration reveal a complex picture, with the impacts of temperature on healing and associated costs varying across species and environmental contexts. Research on *Acropora* species, known for their rapid growth, suggests that exposure to high temperatures can hinder lesion recovery and skeletal regrowth (Bonesso et al., 2017, Kaufman et al., 2021), potentially due to resource limitations and trade-offs with growth (Denis et al., 2013). This can be the case for some *Pocillopora* species, where healing is constrained by elevated temperature, but growth is maintained (Rice et al., 2019). However, *Pocillopora* healing rates can be unaffected even when growth is promoted by injury. For *Porites sp*ecies, healing is also not constrained by elevated temperature, but enhanced growth elicited by injury is dependent on temperature (Edmunds and Lenihan 2009). Conversely, elevated temperature may facilitate recovery in other species by enhancing regeneration rates. Several Indo-Pacific coral species regenerated faster with elevated temperature at the expense of slower growth (Dias et al. 2018). These conflicting findings highlight the importance of species-specific responses and the need for further investigation into the mechanisms fueling regeneration and growth at elevated temperature.

The relationship between temperature and coral regeneration is further complicated by the diverse types of injuries corals can experience. Differences in lesion characteristics such as wound size, perimeter to surface area ratio, location on colony (Bak 1993, Meesters et al. 1997), or depth can result in variable healing outcomes (Meesters et al. 1997). Therefore, superficial wounds, such as those caused by scraping by fish or mild abrasion by algae, may have different healing dynamics compared to more extensive injuries, such as those inflicted by excavating predators or storm damage (Hall, 1997; Meesters et al., 1997). Previous studies suggest that incomplete repair of larger wounds (Bak and Stward-Van Es 1980) and decreasing regeneration rate through time (Meesters et al.1997; Lirman, 2000) underscore the energetic constraints associated with regeneration. Consequently, superficial wounds may regenerate more rapidly from residual tissue and be less impacted by temperature changes. In contrast, extensive wounds that remove tissue and skeleton may exhibit slower healing rates, especially under elevated temperatures.

To investigate the interplay between temperature and regeneration, we conducted a controlled mesocosm experiment in Moorea, French Polynesia with the branching coral *Acropora pulchra*. We subjected coral fragments to two distinct types of injuries: 1) superficial tissue abrasions and 2) fragmentation involving skeletal removal to simulate damage caused by different types of disturbances. These injured corals were then exposed to either ambient or elevated temperature treatments to assess the impact of thermal stress on regeneration and associated tradeoffs. Throughout the experiment, we monitored various metrics of coral health and performance, including regenerative capacity, growth rate, coral metabolism, symbiont productivity and efficiency, and survival. We hypothesize that elevated temperature will create an energetic tradeoff between growth and wound regeneration in *A. pulchra* by increasing coral metabolism and decreasing symbiont productivity (Paradis et al. 2018). By examining these response variables in conjunction with wound type and temperature, we aim to gain a deeper understanding of the factors influencing coral regeneration and the potential consequences of rising ocean temperatures for the resilience of coral reefs.