Biotechnological prospecting from the biodiversity of coastal restinga ecosystems in southern Brazil

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Abstract: Biodiversity can be defined as the variety of life forms on Earth, encompassing plants, animals, microorganisms, as well as their genes, proteins, and metabolites. The restinga ecosystem is mainly associated with the Atlantic Forest biome and occurs along 79% of the Brazilian coastline, highlighting its ecological significance for the country. It is described as sandy coastal plains or beach ridges and comprises distinct vegetation formations, ranging from herbaceous communities to shrub and arboreal assemblages. In terms of environmental richness, restingas share species with other ecosystems, display a unique floristic composition, and are influenced by several key environmental factors, such as geographic distance, geology, and particular climatic conditions. This project aims to investigate the biodiversity within the restinga coastal ecosystem, to understand its ecological and biotechnological potential, and to assess how environmental factors and public policies directly influence its conservation. Survey of the existing scientific literature, an assessment of the degradation status of coastal restingas in southern Brazil, and the analysis of light incidence as an environmental factor affecting biodiversity loss. Furthermore, native plant samples and soil microbiota will be collected and processed from ten different sites in order to isolate and evaluate their biotechnological potential concerning antimicrobial, antioxidant, and antihypertensive activities. Promising isolates will be subjected to molecular identification, and, finally, outreach activities will be conducted with the local population to raise awareness about the importance of conservation and to highlight the ecological and biotechnological potential of this ecosystem and its biodiversity. Among the 20 microorganisms initially isolated from the cities of Cidreira and Imbé, 8 exhibited inhibition against relevant pathogens (*Cryptococcus neoformans* H99 and B3501, *Cryptococcus gattii* R272, *Candida albicans*, and *Staphylococcus aureus*), while 13 presented protease activity. Regarding the native plants collected, 7 extracts have been tested for Angiotensin-Converting Enzyme (ACE) inhibition, with 4 of them showing promising results. Additionally, a preliminary assay was conducted in the urban area of Imbé to evaluate the effects of artificial light on the restinga microbiota and its potential impact on biodiversity loss. Sampling was carried out in duplicate (sites under artificial light exposure and sites without light exposure), followed by plating in triplicate (in the media: Potato Dextrose Agar, Sabouraud, Luria Bertani, and R_2A). Our

preliminary tests revealed a remarkable difference in microbial growth between samples, with substantially reduced growth observed in microorganisms from 24h illuminated sites, indicating a potential interference of artificial light in microbiota. At least eight microorganisms with potential antimicrobial activity, thirteen with potential proteolytic activity, and three extracts from native plants with potential ACE inhibitory activity have already been identified, indicating promising perspectives for health and biotechnological applications. Moreover, preliminary results on the effects of artificial light suggest significant negative impacts on the restinga soil microbiota, underscoring the need for public policies aimed at conservation. Finally, these findings highlight the urgency of further research on this coastal ecosystem and the promotion of preservation strategies.

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