

THE ECOSYSTEM RESPONSE TO URBAN TRANSFORMATION: THE IMPACT OF RAPID URBANIZATION ON THE SOCIAL DEMOGRAPHICS OF ECOLOGICALLY SIGNIFICANT INSECT SPECIES

The International Cooperative Biodiversity Group (ICBG) Program addresses the interdependent issues of drug discovery, biodiversity conservation, and sustainable economic growth (<http://www.icbg.org/>). Our ICBG brings together an interdisciplinary leadership team of physicians, pharmacologists, evolutionary biologists, and chemists that will discover and develop therapeutic agents produced by Brazilian bacteria. The team will target three therapeutic areas: 1) infectious fungal diseases, 2) cancers of the blood, and 3) Chagas disease, all of which urgently require new therapeutic agents to meet unmet needs. Invasive fungal diseases are a challenge to human health and now kill more people than malaria or TB. In spite of major improvements in cancer chemotherapy, cancer will kill 8-million people around the world this year (13% of all deaths, WHO) and an estimated 13-million in 2030. Chagas disease imposes a special burden on Brazil, which has roughly half the world's patient population (4-million Brazilians), and the disease kills as many Brazilians as does TB. The ICBG has focused and separate screening platforms for all three diseases that can perform all required steps from primary screens through in vivo mouse model studies. The ICBG will focus on the bacterial symbionts of social insects like the fungus-growing ants as these insect communities have specialized bacterial symbionts that provide chemical defenses against pathogenic fungi that threaten their communities. The ecological role of the bacterially produced chemical defenses killing pathogenic fungi but sparing the fungal gardens and the insect host matches the therapeutic requirements for antifungal, anticancer, and antiprotozoal

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agents. The population level diversity of the bacterial producers will also provide multiple variations of a structural family, which will be very useful in supporting a discovery and development pipeline. The discovery efforts will make extensive use of cutting edge technology and genomic approaches. Bacteria will be micro-cultured for high-throughput primary phenotypic screens, and priority actives will be re-cultured for secondary screens and then dereplication. All bacterial strains will be genotyped (16S), and strains advancing along pipelines will have their genomes sequenced and subjected to bioinformatic analysis. In addition, the ICBG will undertake major efforts to catalog Brazil's microbial diversity, train Brazilian scientists, and support the development of drug discovery in the country.