Sociedad Argentina de Microbiología General

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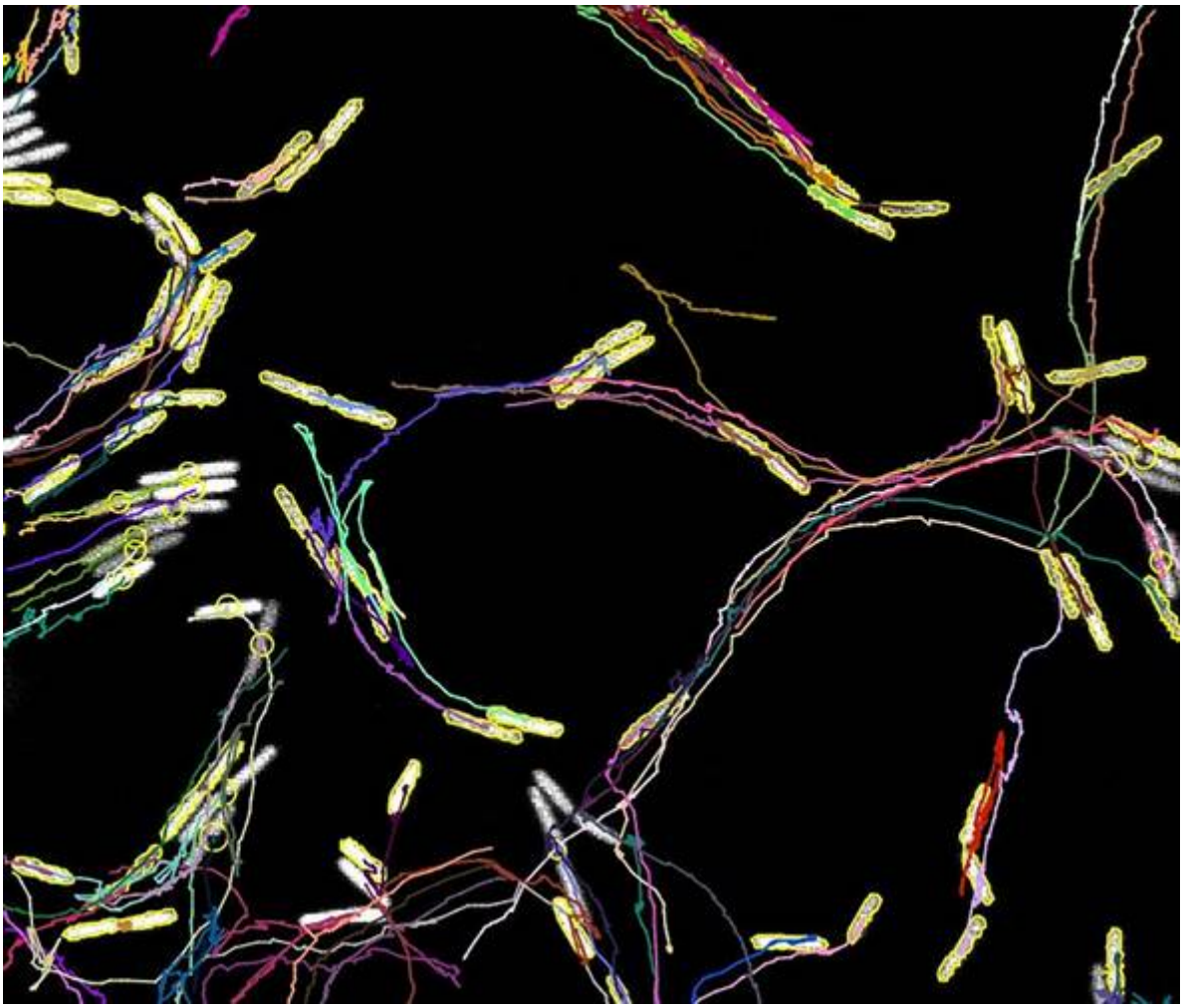

Foto: Se hace camino al andar. Celeste Dea. 1er puesto. Concurso fotográfico SAMIGE 20 años.

BACTERIAL VOLATILE COMPOUNDS CAN BE SENSED BY DIFFERENT MICROALGAE FAMILIES AND TRIGGER PHYSIOLOGICAL RESPONSES.

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Bacterial volatile organic compounds (VOCs) are diverse components that can act as functional agents by affecting other organisms such as terrestrial plants. During the last years, our group isolated the actinobacterium *Microbacterium sp*, strain 15 (MB15) which has proved to affect the growth and physiology of model plants from moderate growth promotion to strong inhibition in a dose-dependent way. This study aimed to evaluate the effect of volatile compounds emitted by MB15 on microalgae (MA) growth. Here we tested the hypothesis that MB15 VOCs can also affect the growth and metabolism of different MA families. We started by analyzing four different MA species: *Chlorella sp*. (Chlorellaceae) (L20); *Ankistrodesmus sp*. (Selenastraceae) (LP1); *Scenedesmus obliquus* (Scenedesmaceae) (C1S); *Haematococcus sp*. (Haematococcaceae) (HL1). First, we performed solid medium assays using two-compartment Petri Dishes by exposing the different MA to two volatile bacterial volatile concentrations. Droplets of different concentrations of MA (OD750=1; OD750=0.1; OD750=0.01) were placed equidistantly in the compartment of the septate plate containing BG11-AGAR medium. We observed that all MA responded to the stimulus triggered by the bacterial VOCs, with some species being much more sensitive to the stimulus than others. Under moderate bacterial inoculation, growth-promoting effects were observed for L20 and LP1. By contrast, on higher VOCs assays, growth inhibition was observed for all species. Microscopic observation showed that cells exposed to a growth inhibitory condition presented changes in cell morphology and size, with an increase in lipid accumulation for L20, LP1, and HL1, by Nile Red staining. Subsequently, we sought to determine whether it was possible to promote the growth of MA from bacterial VOCs and/or trigger an increase in the accumulation of biotechnologically relevant metabolites. To do so, we developed an in vitro liquid culture-system, in which the microorganisms were cultured without physical contact allowing only the exchange of VOCs. We carried out this assay using both MA that had the strongest response in previous experiments, L20 and LP1, with a continued 7 days VOCs exposure. MA growth was measured by optical dispersion at 750 nm and chlorophyll-a content,

biomass productivity, and biochemical composition (carbohydrates, lipids, proteins). We observed drastic changes in LP1 biochemical composition, with a 32.8% rise in lipid accumulation concerning the control and a subsequent decrease of carbohydrates (37.85% to 17.94%) respectively, with no significant changes in protein content. So far, we have not detected that the presence of VOCs significantly changed either the growth or the biochemical composition of L20 in liquid culture. In conclusion, this approach could be a tool for biotechnological applications of MA, allowing the possibility to improve growth performance and modulate production of biocompounds.

Palabras clave: Bacterial Organic Compounds – Microalgae – Lipid production – Physiological responses