TITLE: BIOCHEMICAL AND *IN SILICO* CHARACTERIZATION OF A NEW XANTHOMONADIN PIGMENT FROM THE COLD-TOLERANT *LYSOBACTER* SP. A03 STRAIN

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ABSTRACT:

Lysobacter sp. A03 is a cold-tolerant bacterial strain isolated from the Antarctic environment which has demonstrated a great ability to produce enzymes that are active at low temperatures. In the same way, the strain draws attention due to its yellowish pigmentation, whose functional role has been associated with photodamage protection. Thus, the aim of this work is to perform a biochemical and *in silico* characterization of the pigment produced by *Lysobacter* sp. A03 strain in order to elucidate the mechanisms associated to its production, aiming its utilization for biotechnological purposes. Starting from the genome sequence of the A03 strain, a genetic cluster belonging to a polyketide synthase was identified through Antismash online tool. Based on the cluster information, 12 genes that directly participate in the pigment production pathway were identified and had their annotation confirmed by the NCBI BLAST algorithm. The pigment was extracted from the A03 bacterial biomass using acetone. The analyzes showed that A03 pigment has maximum absorbance at 419 nm (acetone) and 427 nm (chloroform), exhibited antioxidant activity, non-bathochromic shift in alkaline solution, which are characteristics of xanthomonadin pigments. To further assess the pigment reaction in the UV light, colonies of A03 strain cultivated during 7 days in plates containing BHI medium were exposed to artificial UV light (254 nm) during 30 and 60 seconds, and showed that the exposed pigment tends to become brownish approximately 5 days after the exposition, with a high rate of cell survival. The comparison of the genetic cluster with that belonging to *Xanthomonas campestris* ATCC 33913 strain confirmed the identification of the pigment as xanthomonadin, with the essential ORFs of acyl carrier protein (ACP), ketosynthase, dehydratase, acyltransferase, xanthomonadin membrane transporter and glycosyltransferase among those present in the A03 bacterium. As *Lysobacter* sp. A03 was isolated from the Antarctic continent, a region recognized by its high incidence of ultraviolet radiation, due in part to the ozone hole above the continent, A03 yellowish pigment can be a new source of powerful anti-photodamage products with applications ranging from biotechnological to pharmaceutical industries.

Keywords: bacterial pigments, cold-loving microorganisms, bioinformatics, genetic clusters

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