Total Synthesis of Legionaminic Acid as Basis for Serological Studies

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Details

Abstract

Legionaminic acid is a nine-carbon diamino monosaccharide that is found coating the surface of various bacterial human pathogens. Its unique structure makes it a valuable biological probe, but access via isolation is difficult and no practical synthesis has been reported. We describe a stereoselective synthesis that yields a legionaminic acid building block as well as linker-equipped conjugation-ready legionaminic acid starting from cheap Dthreonine. To set the desired amino and hydroxyl group pattern of the target, we designed a concise sequence of stereoselective reactions. The key transformations rely on chelation-controlled organometallic additions and a Petasis multicomponent reaction. The legionaminic acid was synthesized in a form that enables attachment to surfaces. Glycan microarray containing legionaminic acid revealed that human antibodies bind the synthetic glycoside. The

synthetic bacterial monosaccharide is a valuable probe to detect an immune response to bacterial pathogens such as Legionella pneumophila, the causative agent of Legionnaire's disease.

Involved units

Paleobiotechnology Pierre Stallforth Read more

Leibniz-HKI-Authors

Pierre Stallforth

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