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Daniel Orr* (dorr@vt.edu), **Mark Shimozono** and **Joshua Jeishing Wen**. *Difference operators for wreath Macdonald polynomials*. Preliminary report.

The subject of Macdonald theory began with the Macdonald polynomials themselves, and with the very concrete auxiliary algebraic structures used to define them. Later, when Haiman's proof of the Macdonald positivity conjecture revolutionized the subject, the scope of Macdonald theory enlarged to include the geometry of Hilbert schemes of points in the plane. For this reason, one should associate ordinary Macdonald polynomials with the Jordan quiver.

A cyclic quiver generalization of Macdonald polynomials were born in reverse, starting with geometry (of cyclic quiver Nakajima varieties). These are known as wreath Macdonald polynomials. Their existence relies on an elusive object known as the Procesi bundle, which is available only by deep and indirect means.

Only recently has direct understanding of wreath Macdonald polynomials begun to emerge, through methods based on the quantum toroidal algebra. In this talk, I will review the origins of (wreath) Macdonald theory and discuss new explicit results on wreath Macdonald polynomials, and anticipated applications, from joint work in progress with Mark Shimozono and Joshua Wen. (Received September 20, 2021)