1018-51-23 **Benjamin Wells*** (`wells@usfca.edu`), Department of Mathematics, University of San Francisco, 2130 Fulton Street, San Francisco, CA 94595. *Mathematical, Physical, and Biological Fractal Sphere-packings.* Preliminary report.

Mineral concretions (spherites) in the Malpighian tubule structure of third larval instars of Mono Lake brine flies optimize a salt-management cost function F through fractal sphere-packing. Electron microscopy [1] shows arrangements reminiscent of Apollonian problems, but instead of the theoretical 3D Apollonian $D \geq 2.47$ of [2], they reflect a dimension step-up from the 2D problem: $D = 1.3 + 1 = 2.3$. This is also lower than the experimental packing results of e.g. [2, 3]. Tasks are to adjust models for lower D, derive D from F and F from science, and account for the data's minor variation from power law.

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