962-52-1220 **Bob Erdahl** (erdahlr@mast.queensu.ca), Dept. of Math & Stats, Queen's University, Kingston, Ontario K7L 3N6, Canada, and **Konstantin Rybnikov*** (kr57@cornell.edu), Deptartment of Mathematics, Malott Hall, Cornell University, Ithaca, NY 14853. *Big holes in lattices.* Preliminary report.

Lattices L_1 and L_2 have the same L-type if their Delaunay tilings are affinely equivalent. Lattice Delaunay polytopes are called L-polytopes. L-polytopes of large relative volume and/or many vertices are of special interest to the study of lattice L-types and perfect forms. L-polytopes with various extremal properties are often related to highly symmetric lattices, such as E_n $(n = 6, 7)$,, BW, (Λ_{24}), etc. and their perturbations. Let $MD(n)$ denotes the maximal volume of an L-simplex in dimension n. It is known that $MD(4) = 1$, $MD(5) = 2$, $MD(6) = 3$, $MD(7) \geq 4$, $MD(24) \geq 85$. We prove that $MD(n) \geq n - 3$. (It is known that for $n \geq 4$ there are empty latice simplexes of arbitrary volume). Some of the perturbations of E_6 have a simplex of volume 3, maximal for this dimension. This observation helped us to understand the symmetries of the perfect domain of E_6^* and to disprove the 90 year old Voronoi's hypothesis asserting that the tiling of the cone of PQF with L-type domains refines the partition of this cone into perfect domains. We conjecture that the failure of this conjecture in the dimension 6 relates to the existence of a perfect non-extreme form φ_5 *in this dimension.* (Received October 02, 2000)