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**Steve Baer, Bingtuan Li and Hal L. Smith\*** (halsmith@asu.edu), Dept. of Math. & Stat., Arizona State University, Tempe, AZ 85287. *Multiple limit cycles in the standard model of three species competition for three essential resources.*

We consider the dynamics of the standard model of three species competing for three essential resources in a chemostat using Liebig's law of the minimum functional response. A subset of these systems which possess cyclic symmetry such that its three single-population equilibria are part of a heteroclinic cycle bounding the two-dimensional carrying simplex is examined. We show that a subcritical Hopf bifurcation from the coexistence equilibrium together with a repelling heteroclinic cycle leads to the existence of at least two limit cycles enclosing the coexistence equilibrium on the carrying simplex. Numerical simulations suggest that there are exactly two limit cycles and that almost every positive solution approaches either the stable limit cycle or the stable coexistence equilibrium, depending on initial conditions. In an alternative scenario, we show that the subcritical Hopf together with an attracting heteroclinic cycle leads to an unstable periodic orbit separatrix. (Received September 04, 2008)