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**Asymmetric Corrections to the West, Brown, and Enquist Model of Biological Resource Distribution Networks** ALEX BRUMMER, University of Arizona, Depts. of Physics and Ecology and Evolutionary Biology, USA, VAN SAVAGE, University of California, Los Angeles, Depts. of Biomathematics and Ecology and Evolutionary Biology, Santa Fe Institute, USA, BRIAN ENQUIST, University of Arizona, Department of Ecology and Evolutionary Biology, Santa Fe Institute, USA — Biological allometries, such as metabolic scaling, have been shown to result from a balancing between the geometrical network structure comprising an organism and a minimization of energy loss during resource transport. The West, Brown, and Enquist (WBE) model uses this approach in describing biological networks that exhibit allometric scaling, but in so doing it is assumed that the networks are perfectly symmetric with respect to their geometric properties. Our work relaxes this assumption by defining and exploring two candidates for asymmetrically bifurcating networks. We incorporate asymmetric branching into the WBE model by treating the symmetric case as a zeroth-order approximation with the necessary geometrical effects of asymmetry treated as small deviations from the symmetric model. We then impose hydrodynamic and fractal space-filling principles by the method of undetermined Lagrange multipliers, resulting in several theoretical predictions regarding how asymmetric branching is manifest as well as in a selection of one type of asymmetric network over the other. Additionally, network asymmetry can be incorporated into the many allometric relationships, and it can be shown that the 3/4ths metabolic scaling exponent from Kleiber's Law is still attainable in such networks.

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