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Scale Ranges, the Variety of Matter's Forms, and Levels of Organization as Local Maxima

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Originally applied to preserve a materialist worldview that extended beyond physics and chemistry, the notion of *levels of organization* is one of the most recognizable ideas in biology. Although sometimes (erroneously) used interchangeably, the relationship between "levels" and "scale" presents an exciting area in theoretical biology and the history and philosophy of science. Here, I will address this lacuna by clarifying how the two notions can inform and enhance one another. To this effect, I link up the idea of levels of organization with the insight that putative levels (e.g., cells, tissue, and ecosystems) exhibit distributed clustering that extends across scale ranges rather than particular part-whole demarcations. This "local maxima" approach suggests that levels should be seen as a spectrum, where attributing discrete identity (as a particular type of, cell, tissue, ecosystem) is distributed across distinct and moderately localized or regional resolutions in time and space.

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