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Synthesis via Decarboxylative Coupling: Nature routinely utilizes decarboxylation as an energetic driving force for the manipulation of chemical structure and function. We have shown that this simple paradigm can be applied toward the synthesis of a variety of important structures that are not produced by Nature. For instance, we have shown that decarboxylation can be used as a driving force for the formation of reactive organometallic intermediates directly from carboxylic acid derivatives (decarboxylative metallation). Compared to other methods for generation of reactive synthetic intermediates, decarboxylation is advantageous because carboxylic acid substrates are ubiquitous and decarboxylative metallation avoids expensive, toxic, and highly basic reagents commonly employed in synthesis. The development of decarboxylative metallations has led to new and better methods for racemic and asymmetric syntheses of a variety of important chemical “building blocks.”