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On the Cover: In each plant lineage, some pathways have evolved that diverge from primary metabolism and lead to the synthesis of specialized compounds (secondary metabolites) with diverse ecological roles, many of them involving defense. Some of these compounds can be toxic to a predatory organism through external or internal contact and are occasionally synthesized in dedicated cells such as glandular trichomes, perhaps because they divert primary metabolic pathways and also because they might be toxic to the plant itself. The background image shows the surface of a leaf of a wild tomato (*Solanum habrochaites* f. sp. *glabratum*) with its dense distribution of glandular trichomes and (out of focus) long, nonglandular trichomes. Superimposed is a scanning electron micrograph image of a single glandular trichome, which serves as the site of synthesis and accumulation of methylketones (mostly 2-tridecanone and 2-undecanone), compounds that are toxic to many insects. In this issue, Ben-Israel et al. (pp. 1952–1964) investigated the polygenic basis for the monophyletic divergence of this metabolic pathway (found in only in one wild species of tomato) from fatty acid biosynthesis. Comprehensive analysis of progeny derived from an interspecific cross between the cultivated and wild species revealed tight correlation between the shape of the glandular trichomes and their methylketone content. In addition, the presence of a wild species-specific transcript for a novel thioesterase, named *Methylketone Synthase2* (*MKS2*), showed significant correlation with methylketone accumulation as well as epistatic interactions with the previously identified gene *MKS1* in this pathway. Cover design and leaf picture made by Eran Pichersky and Eyal Fridman. Photograph of the scanning electron micrograph taken by Jihong Wang.

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