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Patulin is a toxic secondary metabolite of more than one fungal genera. It is biosynthesized by *Byssosclamyces* spp., *Penicillium* spp., *Aspergillus* spp. and *Paecilomyces* spp. It also causes neurological, immunological, and gastrointestinal disorders in animals and humans. Patulin has been in the focus of the scientific community due to its occurrence in fruits, especially apples, as a result of infection by the necrotrophic plant pathogen *Penicillium expansum*. *P. expansum* is one of the most destructive postharvest pathogens that causes serious decay in a wide range of fruits during transport, storage and retail sale, resulting huge economic losses to the fruit industry every year. In addition to apples, patulin can also be found in other fruits such as pineapples, grapes, peaches and apricots. The European Commission has therefore set stricter limits for baby foods made from fruit (10 µg/kg) and for mild apple products (25 µg/kg).

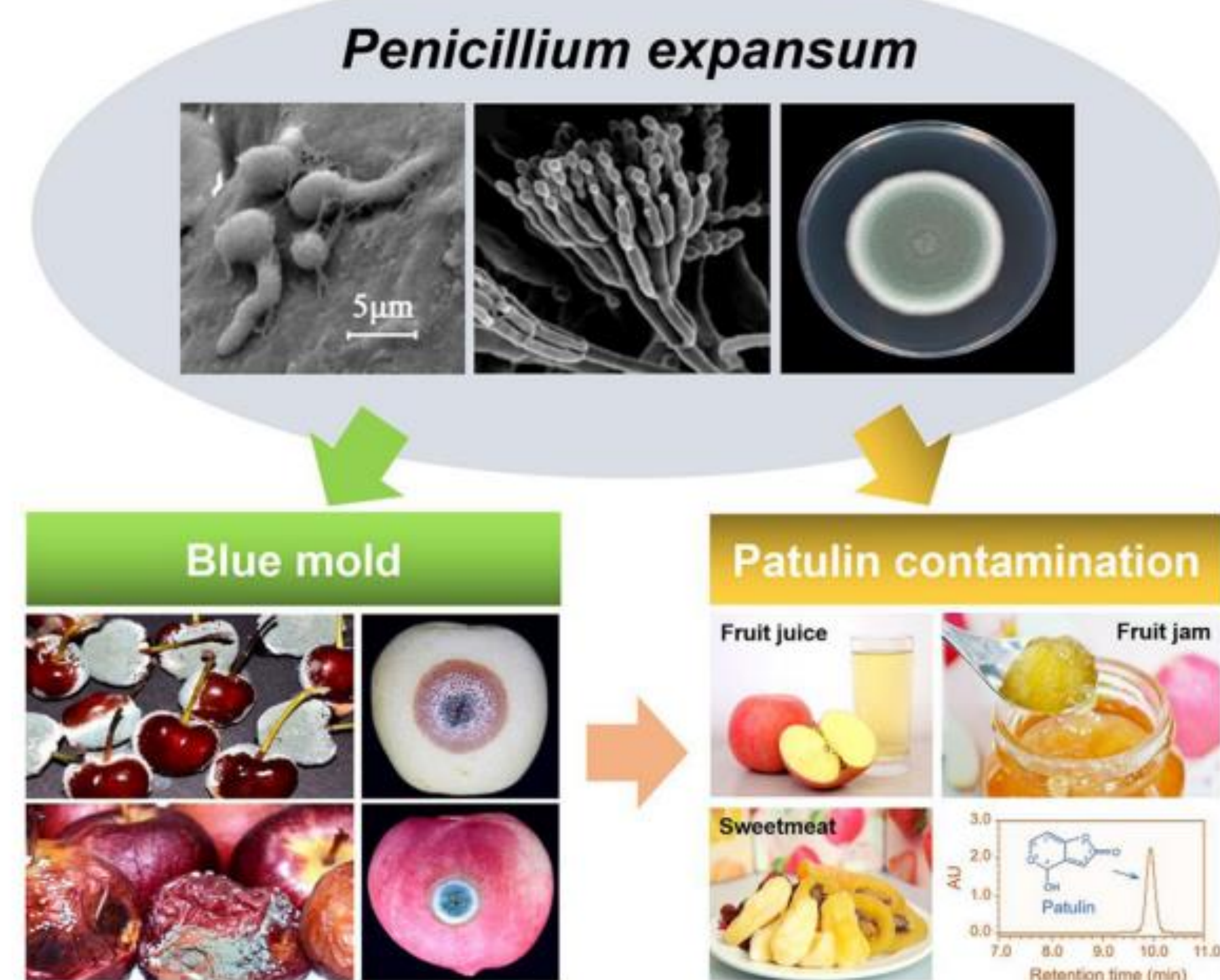


Figure 1. *P. expansum* infects various fruits, causing blue mold and patulin contamination in fruits and fruit-derived foods (Li et al., 2020)

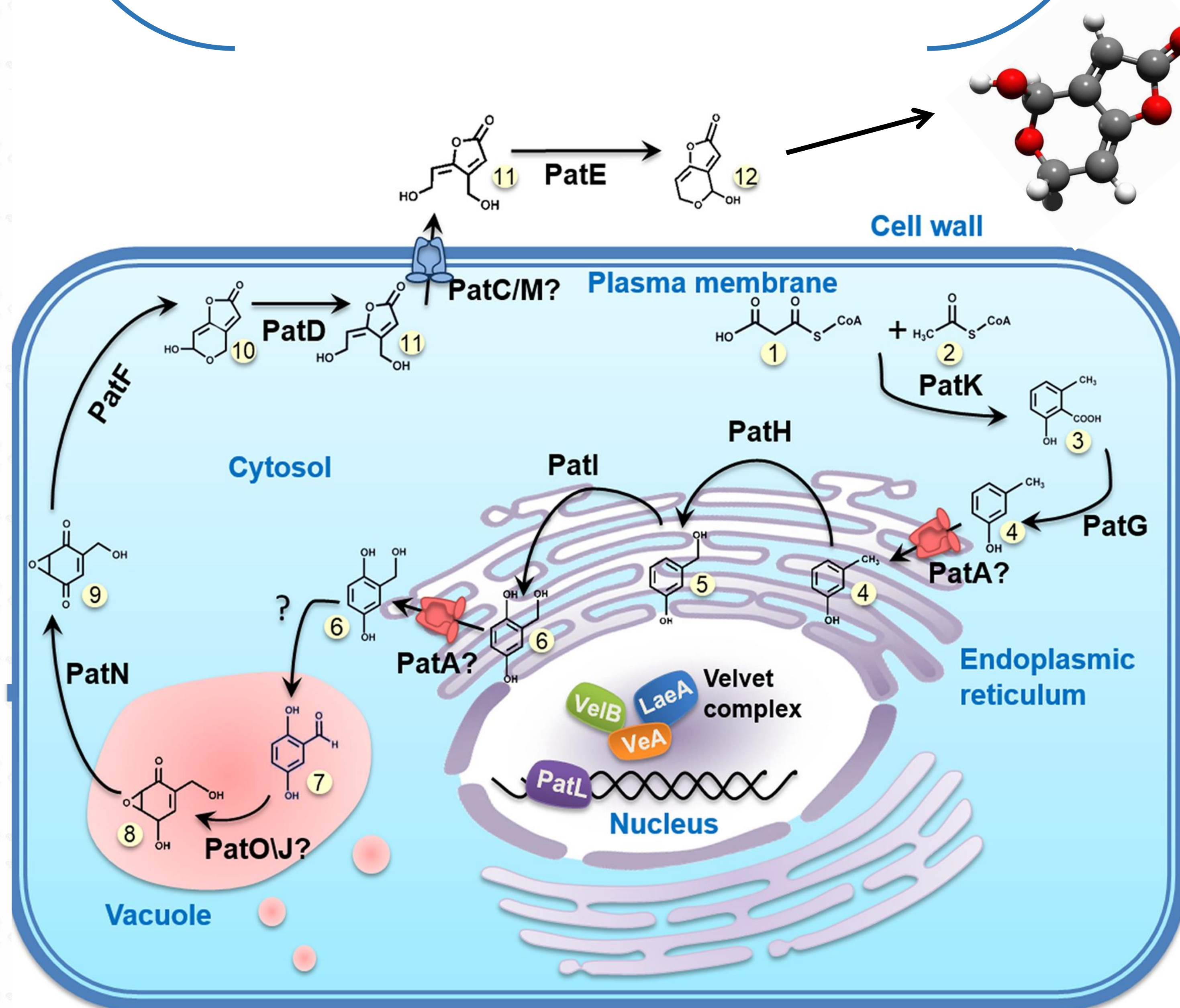


Figure 2. Dissection of patulin biosynthesis and regulation mechanism in *Penicillium expansum* (Li et al., 2019)

The patulin biosynthetic pathway involves approximately ten steps and the enzymes involved are regulated by 15 genes (from *PePatA* to *PePatO*), of which *PePatL* and *PePatK* are the most important. The main reactions that enable the formation of patulin are oxidation-reduction reaction. The synthesis of patulin is initiated with a condensation reaction of one unit of acetyl coenzyme A (CoA) and three units of malonyl CoA. However, patulin production is not related to the virulence of *P. expansum*. Although the currently accepted scheme of patulin biosynthesis is described in the literature, this issue is still unresolved and important due to the complexity and interconnectedness of regulatory networks and other regulatory mechanisms. Therefore, the aim of this study is to provide a comprehensive and up-to-date overview of the patulin biosynthetic pathway to enable a better understanding of fungal pathogenicity and its implications for the development of food loss control strategies.