



Fig. 13 Structures of antimicrobial peptides albicidin (**25**) and teixobactin (**26**)

ingested in the honeycomb by the bee larvae where they germinate. The outgrown bacterial culture breaks through the midgut lumen and kills the larvae, which ultimately could lead to a collapse of the beehive. From a cocktail of various compounds, a new structure has been identified, paenilamicin, which is a hybrid polyketide/peptide structure with interesting antibacterial and antifungal properties (Müller et al. 2014). Another example comes from plant-associated Gram-negative bacteria of the genus *Xanthomonas*. From these the sugarcane pathogen *Xanthomonas albilineans* causes a chlorosis in sugarcane leaves. The causative agent named albicidin (**25**, Fig. 13) has recently been identified as an unusual structure consisting almost entirely of *para*-amino benzoic acids (Cociancich et al. 2015). Albicidin inhibits bacterial gyrase and constitutes an antibacterial with strong activity against Gram-negative bacteria. The elaboration of a total synthesis (Kretz et al. 2014) and the modular structure of albicidin facilitates the synthesis of derivatives for structure activity relations and a potential development of an antibacterial.

Finally, most recently, researchers have managed to cultivate previously considered non-cultivable bacteria from soil. To achieve this, they developed and applied particular cultivation techniques (Nichols et al. 2010) which enabled the formation of small starter cultures which were able to grow further. From such a culture, the antibacterial teixobactin (**26**) has been isolated (Ling et al. 2015) which shows strong antibacterial activity against various multiresistant Gram-positive bacteria. Teixobactin targets the bacterial cell wall biosynthesis and even a multitude of passages could not generate resistance. While the above examples still await further profiling for use as drugs, these are encouraging to pursue the search of drug leads within less investigated or even untapped natural reservoirs.