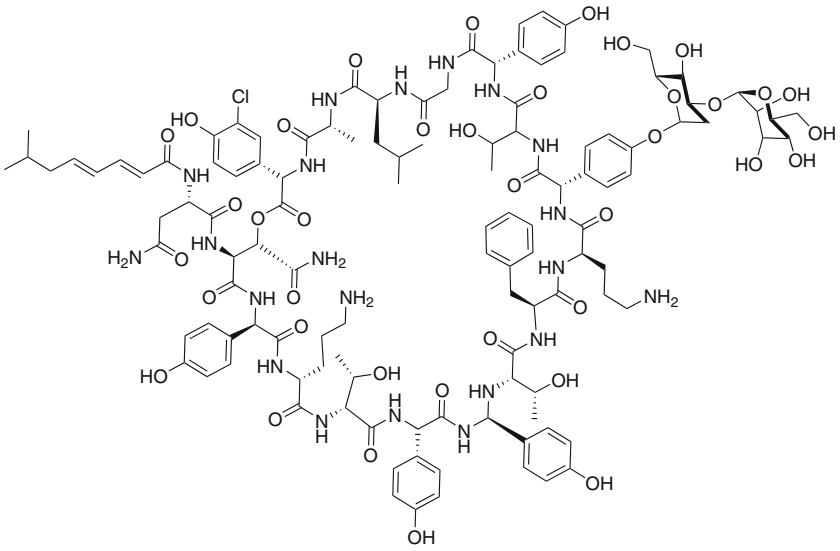
The structure of fidaxomicin with obvious structural resemblance to other polyketides is unique in that the compound is bactericidal while the other macrolides are bacteriostatic. It also shares similarity with rifamycin in that it also inhibits bacterial RNA polymerase, be it in a different position: where rifamycin inhibits this process by binding to the nascent RNA chain, fidaxomicin binds to the DNA template which in turn prevents RNA polymerases from binding to the DNA (Venogupal and Johnson 2012). This unique mechanism could provide treatment for patients infected with methicillin-resistant and vancomycin-resistant bacterial strains.

Another thing of interest to note is, while fidaxomicin was already discovered in 1975, it was largely overlooked by the big pharmaceutical companies and was not approved until 2011 after being developed by a small company called Optimer Pharmaceuticals (Erb and Zhu 2013).

Ramoplanin

The peptide antibacterial ramoplanin (**19**, Fig. 9) (2,510.1 Da) has been approved in 2011 for the treatment of *Clostridium difficile* bacterial infections in the gastrointestinal tract. It is a fermentation product of the soil actinomycete *Actinoplanes* spp. ATCC 33076 (Pallanza et al. 1984). Ramoplanin shows high bactericidal activity against a wide range of Gram-positive bacteria, but it has the same limitations and advantages as fidaxomicin. The mechanism of action involves bacterial cell wall inhibition by binding to lipid II, but whereas vancomycin binds to the pentapeptide



19

Fig. 9 Structure of the antibacterial natural product ramoplanin (**19**)