



Supplementary Figure 1 | Phage life cycles. Phages can be generally classified as virulent and temperate. Virulent phages (blue background) have only lytic cycles, whereas temperate phages (yellow background) can follow either the lytic or the lysogenic cycles. Upon infection, phages recognize and bind to their receptors on bacterial cell surface (step 1: adsorption), followed by the delivery of their genetic materials into the host (step 2: genome delivery). In lytic cycle (top), phage genomes replicate inside bacterial cells (step 3: replication) and use host resources to produce more viral components (step 4: transcription & translation). Phage particles are then assembled (step 5: assembly) and released to the surrounding environment (step 6: lysis). During lysogenic cycle, some temperate phages can integrate their genomes into the host chromosome (known as prophages) (step S1: integration), and amplify with their bacterial host (step S2 & S3: bacterial replication and division). Upon induction (such

as host cell stress), prophages can be excised from host chromosome and enter the lytic cycle (step S4: induction).