Table S3

New or modified reactions and ODE equations for the alternative models

Interaction between ComW and a late *com* gene product ComZ prevents ComW activity	
New reactions	
Synthesis of ComZ	$ComX_{act} \rightarrow ComX_{ina} + ComZ$
Inhibition of active form of ComW	$ComW_{act} + ComZ \rightarrow ComW_{ina}$

New ODEs

$$\frac{d[ComZ]}{dt} = vmax_{ComZ} * \frac{[ComX_{act}]^z}{[ComX_{act}]^z + {K_{ComZ}}^z} - \omega_2 * [ComZ] * [ComW_{act}] - \gamma_{ComZ} * [ComZ]$$

$$\frac{d[ComW_{act}]}{dt} = vmax_{ComW} \frac{[(ComE{\sim}P)_D]^w}{[(ComE{\sim}P)_D]^w + {K_{ComW}}^w} - \omega_2 * [ComZ] * [ComW_{act}] - \gamma_{ComW} * [ComW_{ina}]$$

$$\frac{d[ComW_{ina}]}{dt} = \omega_2 * [ComZ] * [ComW_{act}] - \gamma_{ComW} * [ComW_{ina}]$$

$$[ComW]_{total} = [ComW_{ina}] + [ComW_{act}]$$

Competition between ComW and a late *com* gene product ComZ for the inactive form of ComX impairs the formation of the active form of ComX	
New reactions	
Synthesis of ComZ	$ComX_{act} \rightarrow ComX_{ina} + ComZ$
Inhibition of ComX activation	$ComX_{ina} + ComW + ComZ \rightarrow ComX_{act} + ComW + ComZ$

New ODEs

$$\frac{d[ComZ]}{dt} = vmax_{comZ} * \frac{[ComX_{act}]^z}{[ComX_{act}]^z + {K_{comZ}}^z} - \gamma_{ComZ} * [ComZ]$$

$$\begin{aligned}\frac{d[ComX_{act}]}{dt} = {} & vmax_{ComX_{act}} * \frac{[ComW_{act}]^j}{[ComW_{act}]^j + {K_{ComX_{act}}}^j} * \left(1 - \frac{[ComZ]^k}{[ComZ]^k + {Ki_{ComX_{act}\_ComZ}}^k}\right) * [ComX_{ina}] \\ & - vmax_{DprA} * \frac{[ComX_{act}]^d}{[ComX_{act}]^d + {K_{DprA}}^d} - vmax_{SsbB} * \frac{[ComX_{act}]^s}{[ComX_{act}]^s + {K_{SsbB}}^s} \\ & - vmax_{ComZ} * \frac{[ComX_{act}]^z}{[ComX_{act}]^z + {K_{ComZ}}^z} - \gamma_{ComX} * [ComX_{act}]\end{aligned}$$

$$\begin{aligned}\frac{d[ComX_{ina}]}{dt} = {} & vmax_{ComX} * \frac{[(ComE{\sim}P)_D]^x}{[(ComE{\sim}P)_D]^x + {K_{ComX}}^x} + vmax_{DprA} * \frac{[ComX_{act}]^d}{[ComX_{act}]^d + {K_{DprA}}^d} \\ & + vmax_{SsbB} * \frac{[ComX_{act}]^s}{[ComX_{act}]^s + {K_{SsbB}}^s} + vmax_{ComZ} * \frac{[ComX_{act}]^z}{[ComX_{act}]^z + {K_{ComZ}}^z} \\ & - vmax_{ComX_{act}} * \frac{[ComW_{act}]^j}{[ComW_{act}]^j + {K_{ComX_{act}}}^j} * \left(1 - \frac{[ComZ]^k}{[ComZ]^k + {Ki_{ComX_{act}\_ComZ}}^k}\right) * [ComX_{ina}] \\ & - \gamma_{ComX} * [ComX_{ina}]\end{aligned}$$

Competition between the active form of ComX and a late *com* gene product ComZ for RNA polymerase binding	
New reactions	
Synthesis of ComZ	$ComX_{act} \rightarrow ComX_{ina} + ComZ$
Synthesis of SsbB	$ComX_{act} + ComZ \rightarrow ComX_{ina} + SsbB + ComZ$
Synthesis of DprA	$ComX_{act} + ComZ \rightarrow ComX_{ina} + DprA + ComZ$

New ODEs

$$\frac{d[ComZ]}{dt} = \beta_{ComZ} + vmax_{ComZ} * \frac{[ComX_{act}]^z}{[ComX_{act}]^z + {K_{ComZ}}^z}\left(1 - \frac{[ComZ]^i}{[ComZ]^i + {Ki_{ComZ\_ComZ}}^i}\right) - \gamma_{ComZ} * [ComZ]$$

$$\frac{d[SsbB]}{dt} = vmax_{SsbB} * \frac{[ComX_{act}]^s}{[ComX_{act}]^s + {K_{SsbB}}^s} * \left(1 - \frac{[ComZ]^i}{[ComZ]^i + {Ki_{ComZ\_SsbB}}^i}\right) - \gamma_{SsbB} * [SsbB]$$

$$\frac{d[DprA]}{dt} = vmax_{DprA} * \frac{[ComX_{act}]^d}{[ComX_{act}]^d + {K_{DprA}}^d} * \left(1 - \frac{[ComZ]^u}{[ComZ]^u + {Ki_{ComZ\_DprA}}^u}\right) - 2 * k_{on\_DprA\_EP} * [DprA]^2 * [(ComE{\sim}P)_D] - \gamma_{DprA} * [DprA]$$

$$\frac{d[ComX_{act}]}{dt} = \omega_1 * [ComW] * [ComX_{ina}] - vmax_{DprA} * \frac{[ComX_{act}]^d}{[ComX_{act}]^d + {K_{DprA}}^d}\left(1 - \frac{[ComZ]^u}{[ComZ]^u + {Ki_{ComZ\_DprA}}^u}\right) - vmax_{SsbB} * \frac{[ComX_{act}]^s}{[ComX_{act}]^s + {K_{SsbB}}^s}\left(1 - \frac{[ComZ]^i}{[ComZ]^i + {Ki_{ComZ\_SsbB}}^i}\right) - vmax_{ComZ} * \frac{[ComX_{act}]^z}{[ComX_{act}]^z + {K_{ComZ}}^z}\left(1 - \frac{[ComZ]^i}{[ComZ]^i + {Ki_{ComZ\_ComZ}}^i}\right) - \gamma_{ComX} * [ComX_{act}]$$

$$\frac{d[ComX_{ina}]}{dt} = vmax_{ComX} * \frac{[(ComE{\sim}P)_D]^x}{[(ComE{\sim}P)_D]^x + {K_{ComX}}^x} - \omega_1 * [ComW] * [ComX_{ina}] + vmax_{DprA} * \frac{[ComX_{act}]^d}{[ComX_{act}]^d + {K_{DprA}}^d}\left(1 - \frac{[ComZ]^u}{[ComZ]^u + {Ki_{ComZ\_DprA}}^u}\right) + vmax_{SsbB} * \frac{[ComX_{act}]^s}{[ComX_{act}]^s + {K_{SsbB}}^s}\left(1 - \frac{[ComZ]^i}{[ComZ]^i + {Ki_{ComZ\_SsbB}}^i}\right) + vmax_{ComZ} * \frac{[ComX_{act}]^z}{[ComX_{act}]^z + {K_{ComZ}}^z}\left(1 - \frac{[ComZ]^i}{[ComZ]^i + {Ki_{ComZ\_ComZ}}^i}\right) - \gamma_{ComX} * [ComX_{ina}]$$

Inhibition of the active form of ComX by a late *com* gene product ComZ

New reactions

Synthesis of ComZ	$ComX_{act} \rightarrow ComX_{ina} + ComZ$
Inhibition of ComX	$ComX_{act} + ComZ \rightarrow ComX_{ina}$

New ODEs

$$\frac{d[ComZ]}{dt} = vmax_{ComZ} * \frac{[ComX_{act}]^z}{[ComX_{act}]^z + {K_{ComZ}}^z} - \omega_2 * [ComZ] * [ComX_{act}] - \gamma_{ComZ} * [ComZ]$$

$$\frac{d[ComX_{act}]}{dt} = \omega_1 * [ComW] * [ComX_{ina}] - \omega_2 * [ComX_{act}] * [ComZ] - vmax_{DprA} * \frac{[ComX_{act}]^d}{[ComX_{act}]^d + {K_{DprA}}^d} - vmax_{SsbB} * \frac{[ComX_{act}]^s}{[ComX_{act}]^s + {K_{SsbB}}^s} - vmax_{ComZ} * \frac{[ComX_{act}]^z}{[ComX_{act}]^z + {K_{ComZ}}^z} - \gamma_{ComX} * [ComX_{act}]$$

$$\frac{d[ComX_{ina}]}{dt} = vmax_{ComX} * \frac{[(ComE{\sim}P)_D]^x}{[(ComE{\sim}P)_D]^x + {K_{ComX}}^x} + vmax_{DprA} * \frac{[ComX_{act}]^d}{[ComX_{act}]^d + {K_{DprA}}^d} + vmax_{SsbB} * \frac{[ComX_{act}]^s}{[ComX_{act}]^s + {K_{SsbB}}^s} + vmax_{ComZ} * \frac{[ComX_{act}]^z}{[ComX_{act}]^z + {K_{ComZ}}^z} + \omega_2 * [ComX_{act}] * [ComZ] - \omega_1 * [ComW] * [ComX_{ina}] - \gamma_{ComX} * [ComX_{ina}]$$

Interaction between ComW and an early *com* gene product ComZ impairs ComW activity

New reactions

Synthesis of ComZ	$(ComE{\sim}P)_D \rightarrow (ComE{\sim}P)_D + ComZ$
Inhibition of active ComW	$ComW_{act} + ComZ \rightarrow ComW_{ina}$

New ODEs

$$\frac{d[ComZ]}{dt} = vmax_{ComZ} * \frac{[ComE{\sim}P]^Z}{[ComE{\sim}P]^Z + {K_{ComZ}}^Z} - \omega_2 * [ComZ] * [ComW_{act}] - \gamma_{ComZ} * [ComZ]$$

$$\frac{d[ComW_{act}]}{dt} = vmax_{ComW} * \frac{[(ComE{\sim}P)_D]^w}{[(ComE{\sim}P)_D]^w + {K_{ComW}}^w} - \omega_2 * [ComZ] * [ComW_{act}] - \gamma_{ComW} * [ComW_{act}]$$

$$\frac{d[ComW_{ina}]}{dt} = \omega_2 * [ComZ] * [ComW_{act}] - \gamma_{ComW} * [ComW_{ina}]$$

$$[ComW_{total}] = [ComW_{ina}] + [ComW_{act}]$$

Competition between ComW and an early *com* gene product ComZ for the inactive form of ComX impairs the formation of the active form of ComX

New reactions

Synthesis of ComZ	$(\text{ComE}\sim\text{P})_\text{D} \rightarrow (\text{ComE}\sim\text{P})_\text{D} + \text{ComZ}$
Inhibition of ComX activation	$\text{ComX}_\text{ina} + \text{ComW} + \text{ComZ} \rightarrow \text{ComX}_\text{act} + \text{ComW} + \text{ComZ}$

New ODEs

$$\frac{d[ComZ]}{dt} = vmax_{ComZ} * \frac{[ComE\sim P]^Z}{[ComE\sim P]^Z + {K_{ComZ}}^Z} - \gamma_{ComZ} * [ComZ]$$

$$\begin{aligned}\frac{d[ComX_{act}]}{dt} = {} & vmax_{ComX_{act}} * \frac{[ComW_{act}]^j}{[ComW_{act}]^j + {K_{ComX_{act}}}^j} * \left(1 - \frac{[ComZ]^k}{[ComZ]^k + {Ki_{ComX_{act}\_ComZ}}^k}\right) * [ComX_{ina}] \\ & - vmax_{DprA} * \frac{[ComX_{act}]^d}{[ComX_{act}]^d + {K_{DprA}}^d} - vmax_{SsbB} * \frac{[ComX_{act}]^s}{[ComX_{act}]^s + {K_{SsbB}}^s} - \gamma_{ComX} * [ComX_{act}]\end{aligned}$$

$$\begin{aligned}\frac{d[ComX_{ina}]}{dt} = {} & vmax_{ComX} * \frac{[(ComE\sim P)_D]^x}{[(ComE\sim P)_D]^x + {K_{ComX}}^x} + vmax_{DprA} * \frac{[ComX_{act}]^d}{[ComX_{act}]^d + {K_{DprA}}^d} \\ & + vmax_{SsbB} * \frac{[ComX_{act}]^s}{[ComX_{act}]^s + {K_{SsbB}}^s} - \gamma_{ComX} * [ComX_{ina}] \\ & - vmax_{ComX_{act}} * \frac{[ComW_{act}]^j}{[ComW_{act}]^j + {K_{ComX_{act}}}^j} * \left(1 - \frac{[ComZ]^k}{[ComZ]^k + {Ki_{ComX_{act}\_ComZ}}^k}\right) * [ComX_{ina}]\end{aligned}$$

Competition between the active form of ComX and an early *com* gene product ComZ for RNA polymerase binding

New Reactions

Synthesis of ComZ	$(\text{ComE}\sim\text{P})_\text{D} \rightarrow (\text{ComE}\sim\text{P})_\text{D} + \text{ComZ}$
Synthesis of SsbB	$\text{ComX}_\text{act} + \text{ComZ} \rightarrow \text{ComX}_\text{ina} + \text{SsbB} + \text{ComZ}$
Synthesis of DprA	$\text{ComX}_\text{act} + \text{ComZ} \rightarrow \text{ComX}_\text{ina} + \text{DprA} + \text{ComZ}$

New ODEs

$$\frac{d[ComZ]}{dt} = \beta_{ComZ} + vmax_{ComZ} * \frac{[ComE\sim P]^Z}{[ComE\sim P]^Z + {K_{ComZ}}^Z} - \gamma_{ComZ} * [ComZ]$$

$$\frac{d[SsbB]}{dt} = vmax_{SsbB} * \frac{[ComX_{act}]^s}{[ComX_{act}]^s + {K_{SsbB}}^s} * \left(1 - \frac{[ComZ]^i}{[ComZ]^i + {Ki_{ComZ\_SsbB}}^i}\right) - \gamma_{SsbB} * [SsbB]$$

$$\begin{aligned}\frac{d[DprA]}{dt} = {} & vmax_{DprA} * \frac{[ComX_{act}]^d}{[ComX_{act}]^d + {K_{DprA}}^d} * \left(1 - \frac{[ComZ]^u}{[ComZ]^u + {Ki_{ComZ\_DprA}}^u}\right) \\ & - 2 * k_{on\_DprA\_EP} * [DprA]^2 * [(ComE\sim P)_D] - \gamma_{DprA} * [DprA]\end{aligned}$$

$$\begin{aligned}\frac{d[ComX_{act}]}{dt} = {} & \omega_1 * [ComW] * [ComX_{ina}] - vmax_{DprA} * \frac{[ComX_{act}]^d}{[ComX_{act}]^d + {K_{DprA}}^d}\left(1 - \frac{[ComZ]^u}{[ComZ]^u + {Ki_{ComZ\_DprA}}^u}\right) \\ & - vmax_{SsbB} * \frac{[ComX_{act}]^s}{[ComX_{act}]^s + {K_{SsbB}}^s}\left(1 - \frac{[ComZ]^i}{[ComZ]^i + {Ki_{ComZ\_SsbB}}^i}\right) - \gamma_{ComX} * [ComX_{act}]\end{aligned}$$

$$\begin{aligned}\frac{d[ComX_{ina}]}{dt} = {} & vmax_{ComX} * \frac{[(ComE\sim P)_D]^x}{[(ComE\sim P)_D]^x + {K_{ComX}}^x} - \omega_1 * [ComW] * [ComX_{ina}] \\ & + vmax_{DprA} * \frac{[ComX_{act}]^d}{[ComX_{act}]^d + {K_{DprA}}^d}\left(1 - \frac{[ComZ]^u}{[ComZ]^u + {Ki_{ComZ\_DprA}}^u}\right) \\ & + vmax_{SsbB} * \frac{[ComX_{act}]^s}{[ComX_{act}]^s + {K_{SsbB}}^s}\left(1 - \frac{[ComZ]^i}{[ComZ]^i + {Ki_{ComZ\_SsbB}}^i}\right) - \gamma_{ComX} * [ComX_{ina}]\end{aligned}$$

Inhibition of the active form of ComX by an early *com* gene product ComZ

New reactions

Synthesis of ComZ	$(\mathrm{ComE{\sim}P})_D \rightarrow (\mathrm{ComE{\sim}P})_D + \mathrm{ComZ}$
Inhibition of ComX	$\mathrm{ComX_{act}} + \mathrm{ComZ} \rightarrow \mathrm{ComX_{ina}}$

New ODEs

$$\frac{d[ComZ]}{dt} = vmax_{comZ} * \frac{[ComE{\sim}P]^Z}{[ComE{\sim}P]^Z + {K_{ComZ}}^Z} - \omega_2 * [ComX_{act}] * [ComZ] - \gamma_{ComZ} * [ComZ]$$

$$\frac{d[ComX_{act}]}{dt} = \omega_1 * [ComW] * [ComX_{ina}] - \omega_2 * [ComX_{act}] * [ComZ] - vmax_{DprA} * \frac{[ComX_{act}]^d}{[ComX_{act}]^d + {K_{DprA}}^d} - vmax_{SsbB} * \frac{[ComX_{act}]^s}{[ComX_{act}]^s + {K_{SsbB}}^s} - \gamma_{ComX} * [ComX_{act}]$$

$$\frac{d[ComX_{ina}]}{dt} = vmax_{ComX} * \frac{[(ComE{\sim}P)_D]^x}{[(ComE{\sim}P)_D]^x + {K_{ComX}}^x} + vmax_{DprA} * \frac{[ComX_{act}]^d}{[ComX_{act}]^d + {K_{DprA}}^d} + vmax_{SsbB} * \frac{[ComX_{act}]^s}{[ComX_{act}]^s + {K_{SsbB}}^s} + \omega_2 * [ComX_{act}] * [ComZ] - \omega_1 * [ComW] * [ComX_{ina}] - \gamma_{ComX} * [ComX_{ina}]$$