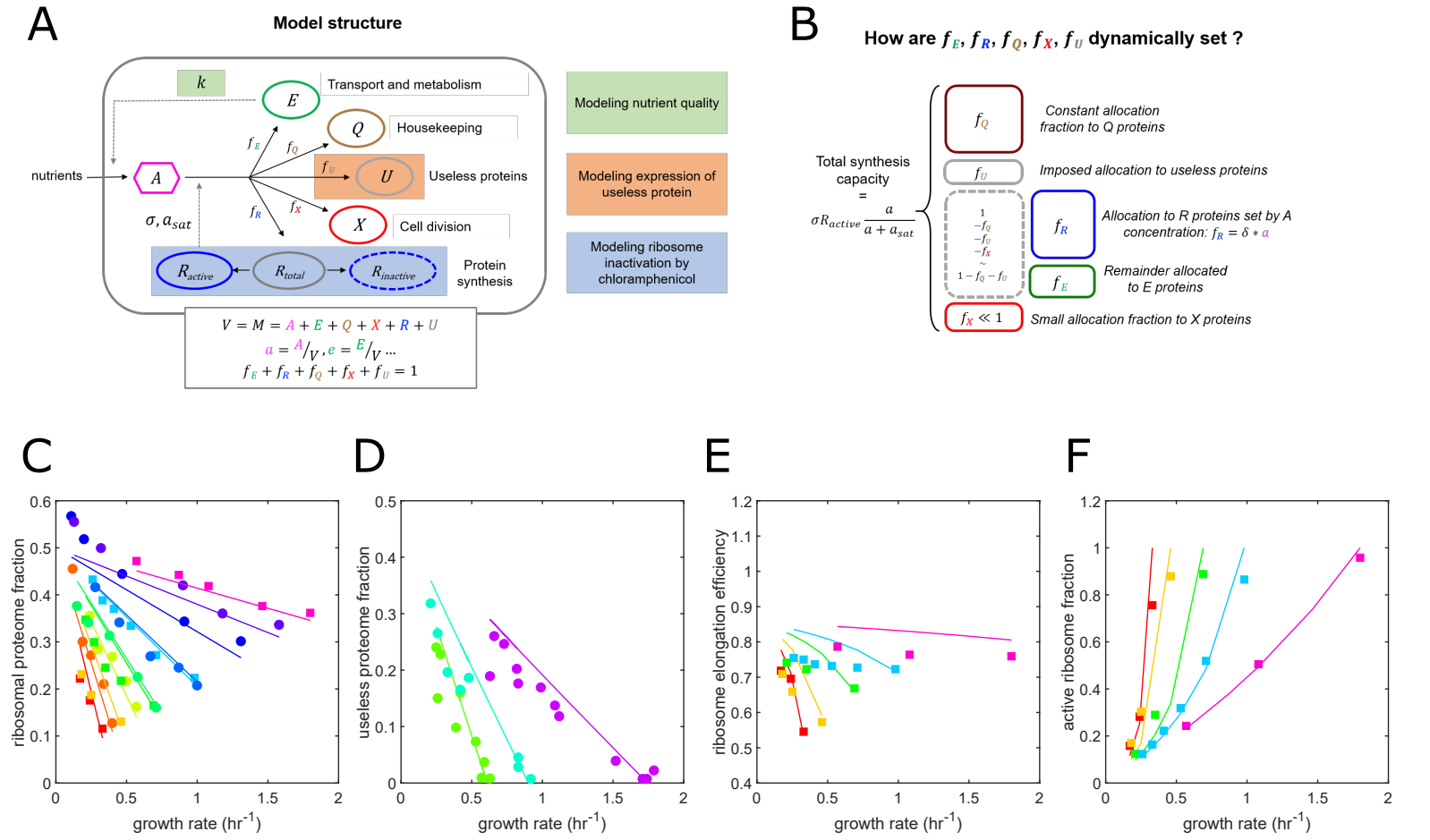
A
Model structure
k
E
Transport and metabolism
Q
Housekeeping
nutrients
A
f_E
f_Q
f_U
U
Useless proteins
f_R
f_X
X
Cell division
σ, a_{sat}
R_{active}
R_{total}
$R_{inactive}$
Protein synthesis
Modeling nutrient quality
Modeling expression of useless protein
Modeling ribosome inactivation by chloramphenicol
$V = M = A + E + Q + X + R + U$
$a = A/V, e = E/V \ldots$
$f_E + f_R + f_Q + f_X + f_U = 1$
B
How are f_E, f_R, f_Q, f_X, f_U dynamically set ?
Total synthesis capacity
=
$\sigma R_{active} \frac{a}{a + a_{sat}}$
f_Q
Constant allocation fraction to Q proteins
f_U
Imposed allocation to useless proteins
$1 - f_Q - f_U - f_X \sim 1 - f_Q - f_U$
f_R
Allocation to R proteins set by A concentration: $f_R = \delta * a$
f_E
Remainder allocated to E proteins
$f_X \ll 1$
Small allocation fraction to X proteins
C
ribosomal proteome fraction
growth rate (hr^{-1})
D
useless proteome fraction
growth rate (hr^{-1})
E
ribosome elongation efficiency
growth rate (hr^{-1})
F
active ribosome fraction
growth rate (hr^{-1})