A An engram can be labeled with a light-sensitive switch

1

Ca^{2+} → CaMK

CREB
CRE — c-Fos → c-Fos → c-Fos — tTA → tTA

Doxycycline prevents expression → tTA

Remove doxycycline

2

TRE — ChR2-EYFP

3

tTA — TRE — ChR2-EYFP

4

ChR2-EYFP allows identification and reactivation of a memory
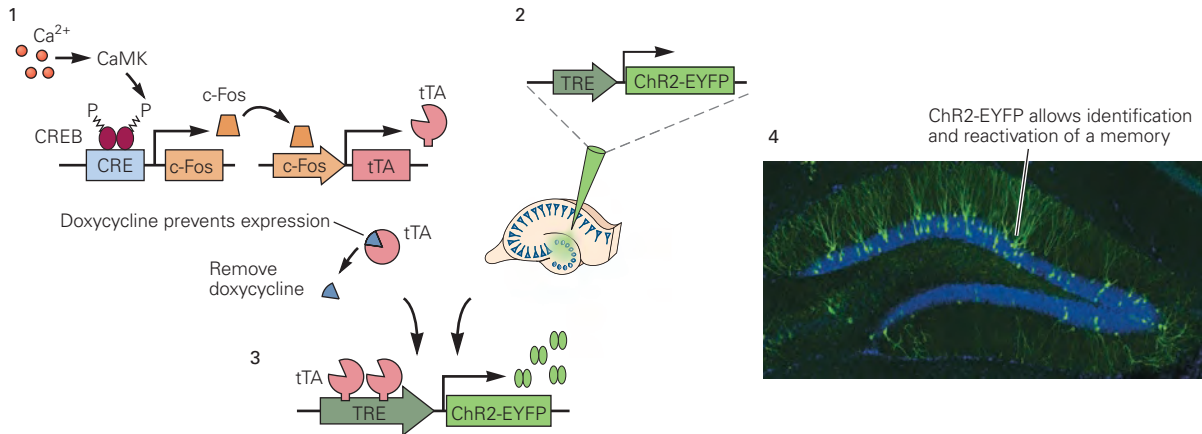
B A memory can be recalled when the engram is activated by light

1 Fear memory encoding

Doxycycline	No doxycycline
Environment 1	Environment 2
Habituation	Conditioning

Shock
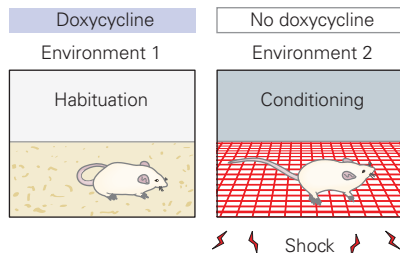
2 Fear memory reactivation

Doxycycline

Environment 1

| Light off | Light on | Light off | Light on |

Freezing (%)

After fear conditioning

Before fear conditioning