

Среда 13.04 16:00
Конференц-зал ИЦИГ

Татьяна Шнайдер

Уходя, гасите ген:
методы управления экспрессией



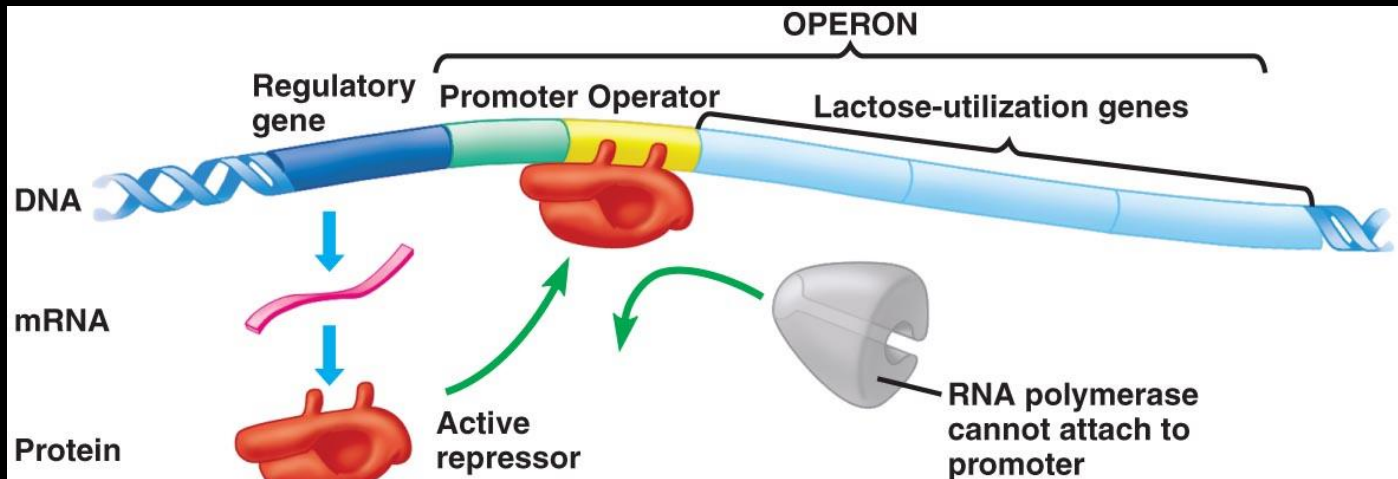
12
АПРЕЛЯ
1961



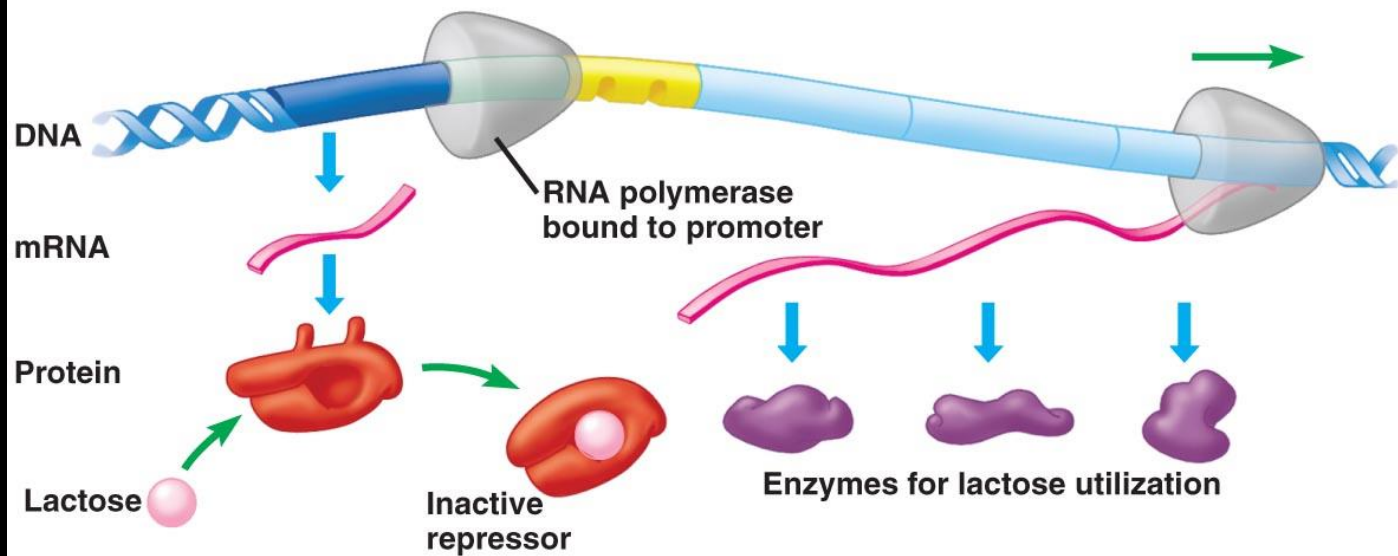
Ф. Жакоб



Ж. Моно



Operon turned off (lactose absent)

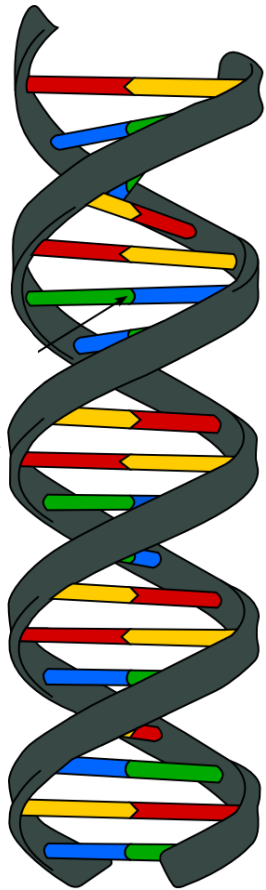


Operon turned on (lactose inactivates repressor)

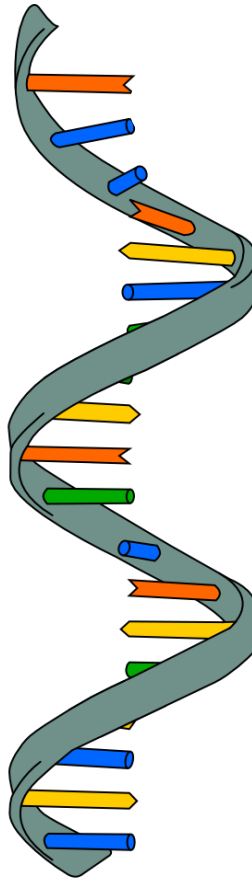
Copyright © 2009 Pearson Education, Inc.

Систематизация?

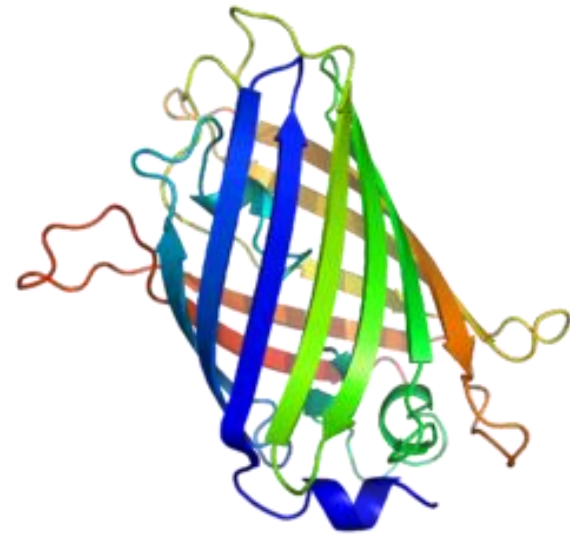




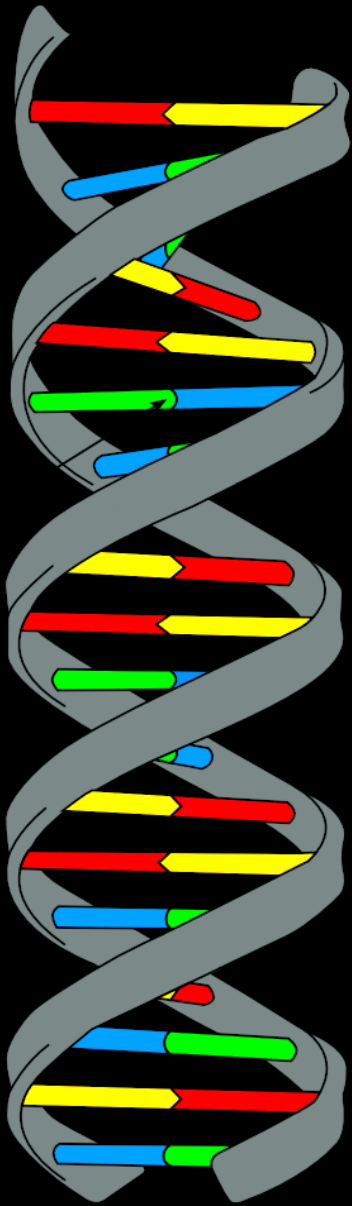
ДНК



PHK



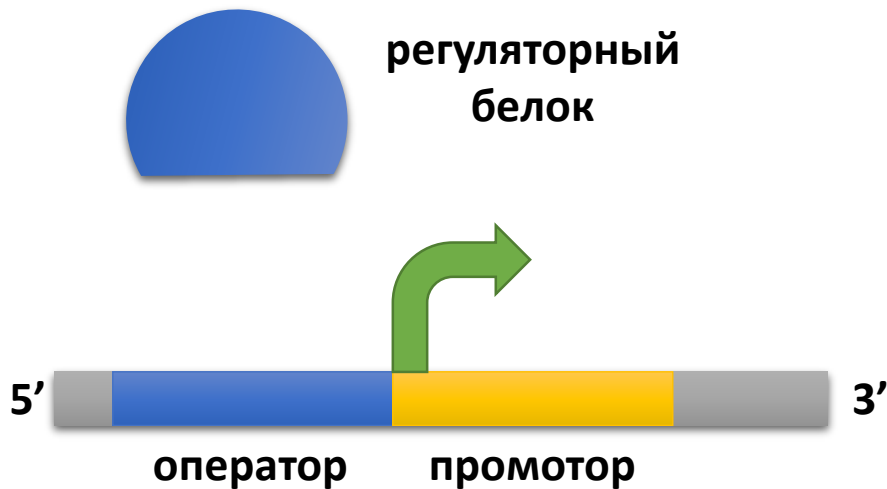
Белок



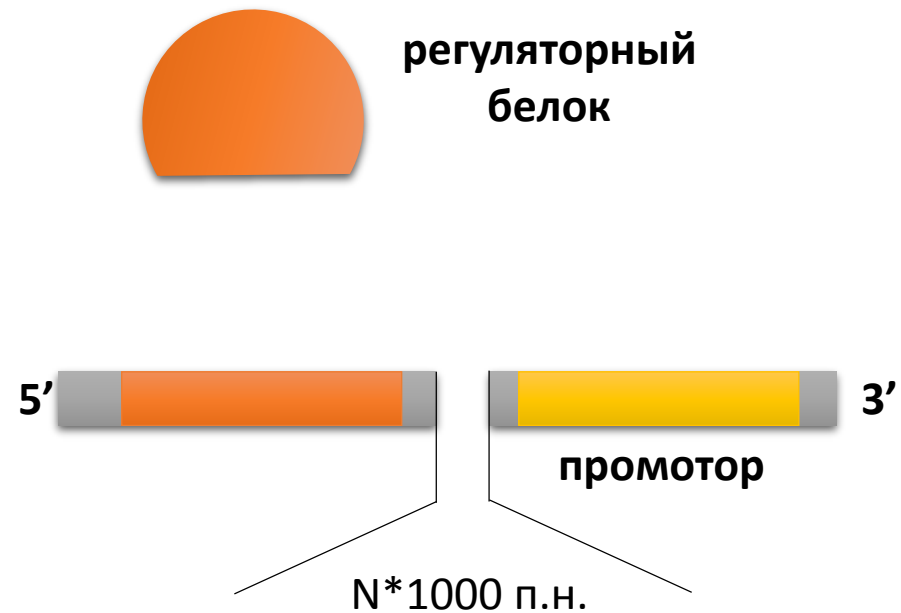
Регуляция на уровне ДНК



Прокариоты

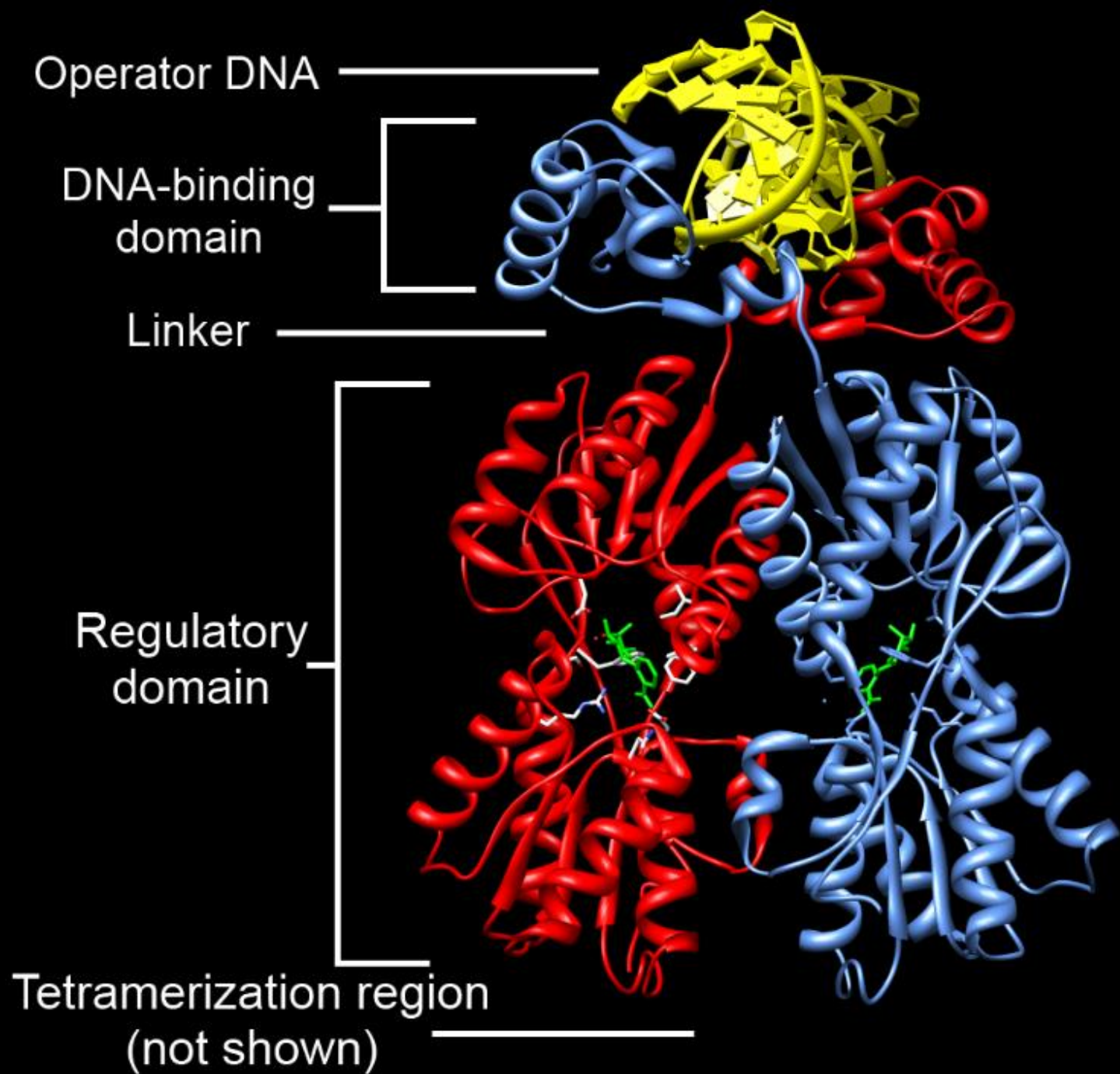


Эукариоты



+

- Несколько регуляторных белков
- Эпигенетическая регуляция



CRISPR Provides Acquired Resistance Against Viruses in Prokaryotes

Rodolphe Barrangou,¹ Christophe Fremaux,² H          ,³ Melissa Richards,¹ Patrick Boyaval,² Sylvain Moineau,³ Dennis A. Romero,¹ Philippe Horvath^{2*}

Clustered regularly interspaced short palindromic repeats (CRISPR) are a distinctive feature of the genomes of most Bacteria and Archaea and are thought to be involved in resistance to bacteriophages. We found that, after viral challenge, bacteria integrated new spacers derived from phage genomic sequences. Removal or addition of particular spacers modified the phage-resistance phenotype of the cell. Thus, CRISPR, together with associated *cas* genes, provided resistance against phages, and resistance specificity is determined by spacer-phage sequence similarity.



CRISPR/Cas9's Ladies



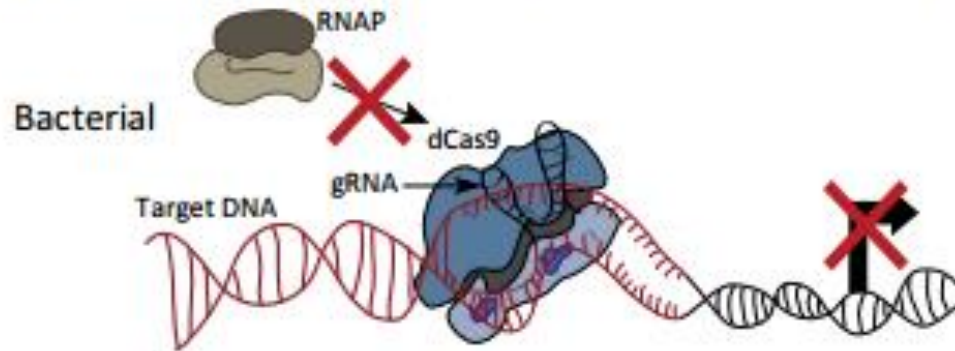
Дженнифер Дудна



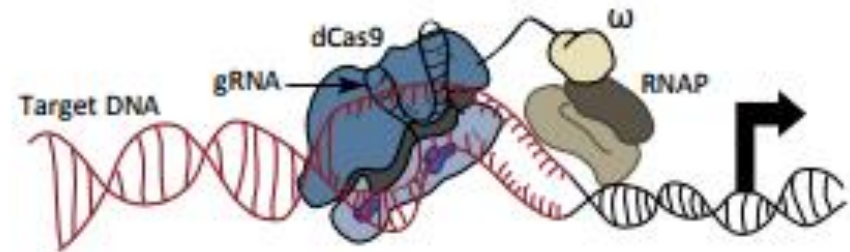
Эммануэль Шарпантье

CRISPR «Вкл/Выкл»

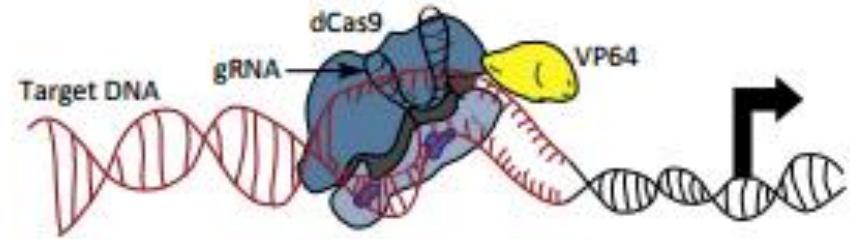
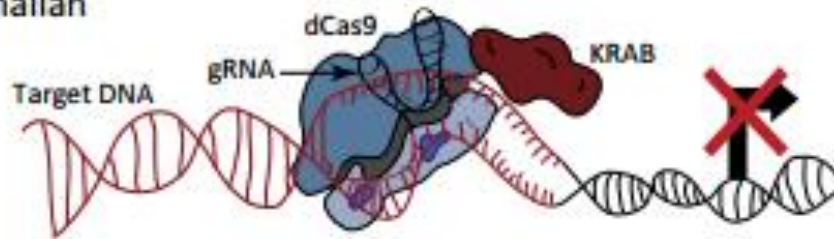
(B) Transcriptional repression



(C) Transcriptional activation



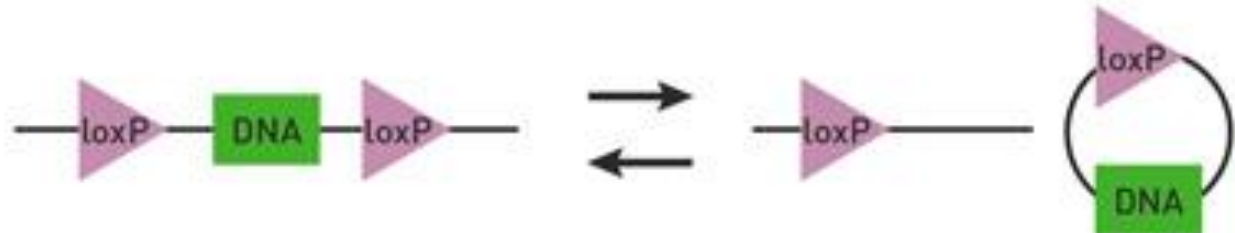
Mammalian



Cre-Lox и FLP/FRT рекомбинация

A. Excision

cis placement of *loxP* sites in same directional orientation.



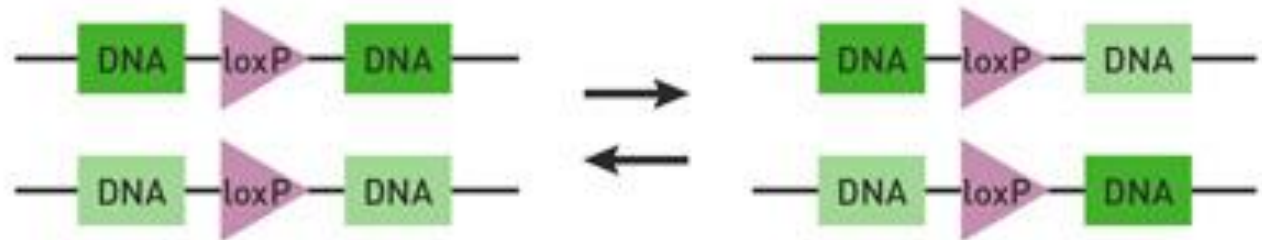
B. Inversion

cis placement of *loxP* sites in opposite directional orientation.

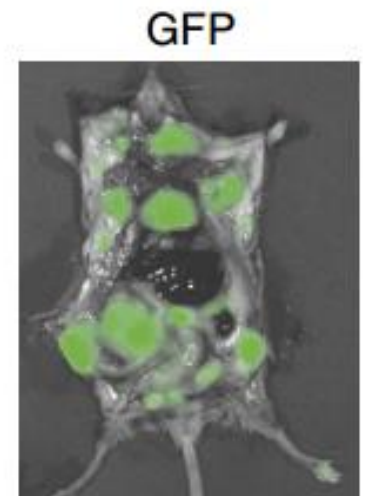
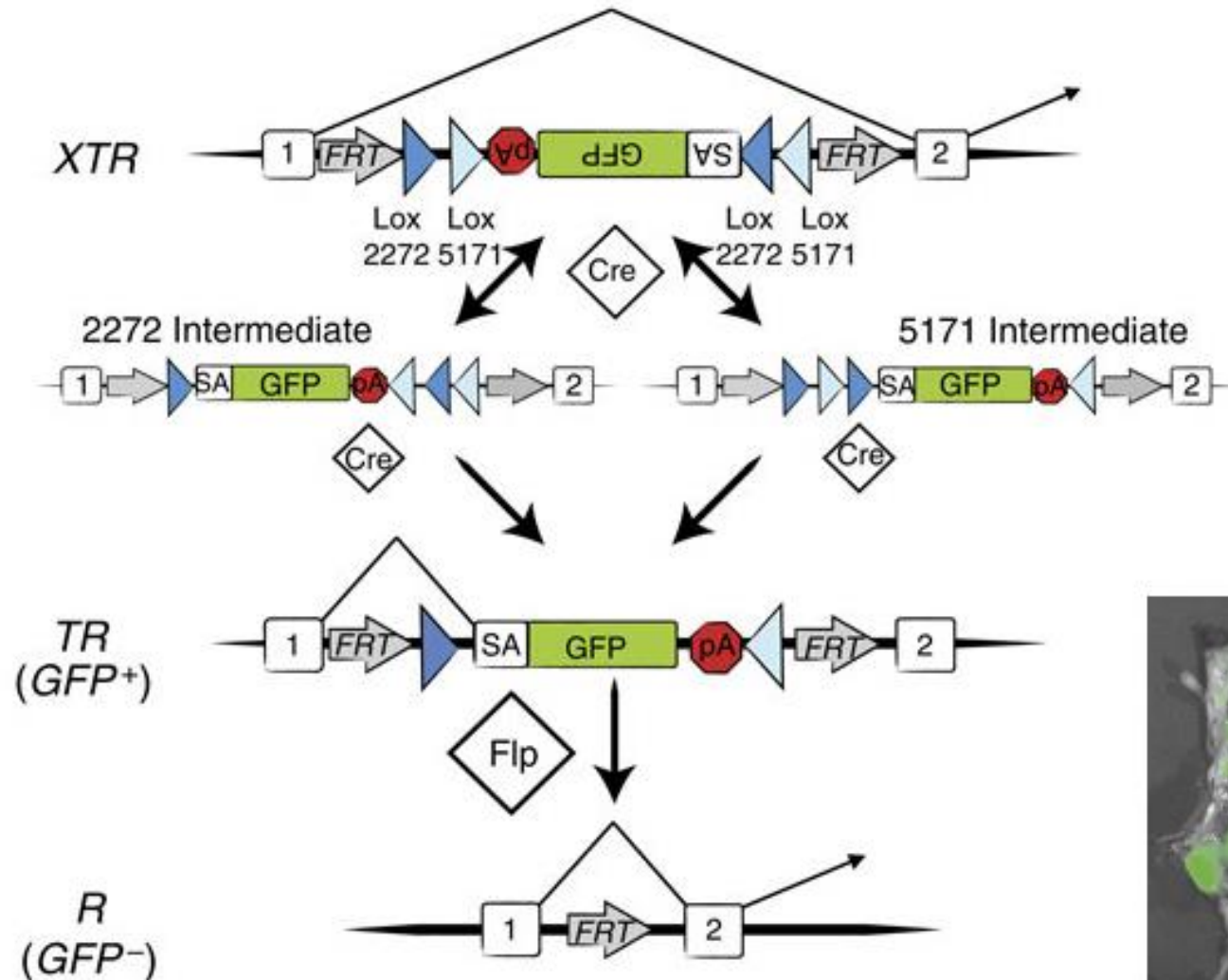


C. Translocation

trans placement of *loxP* sites.



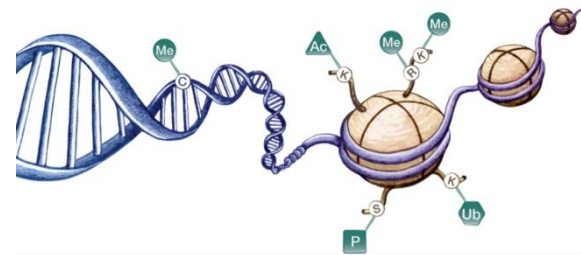
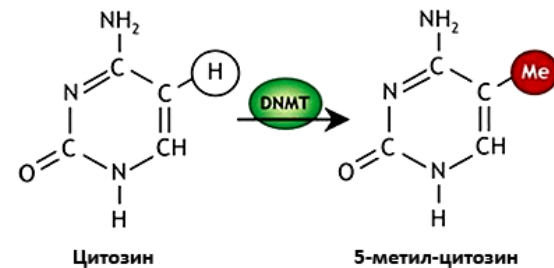
XTR allele



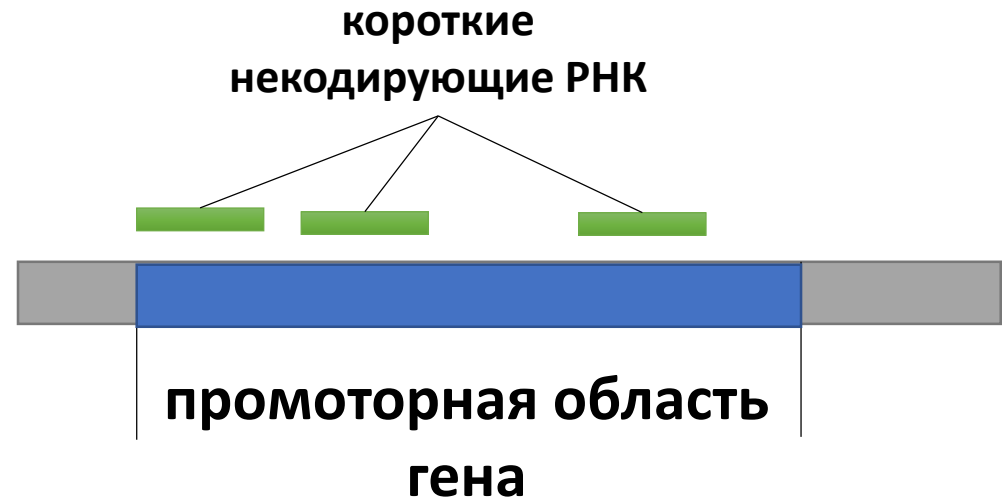
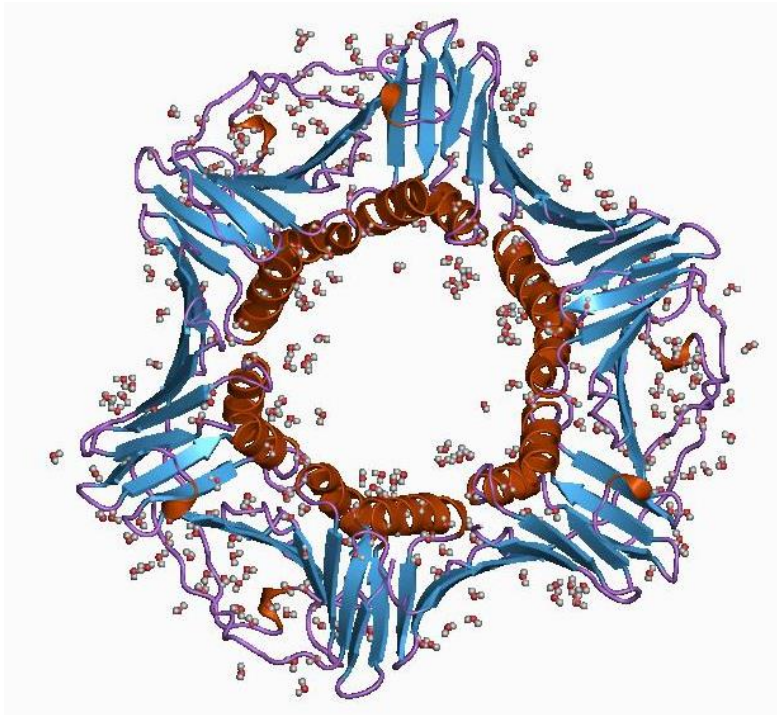


Эпигенетические механизмы регуляции

- Метилирование ДНК
- Модификация гистонов
- Ремоделирование хроматина

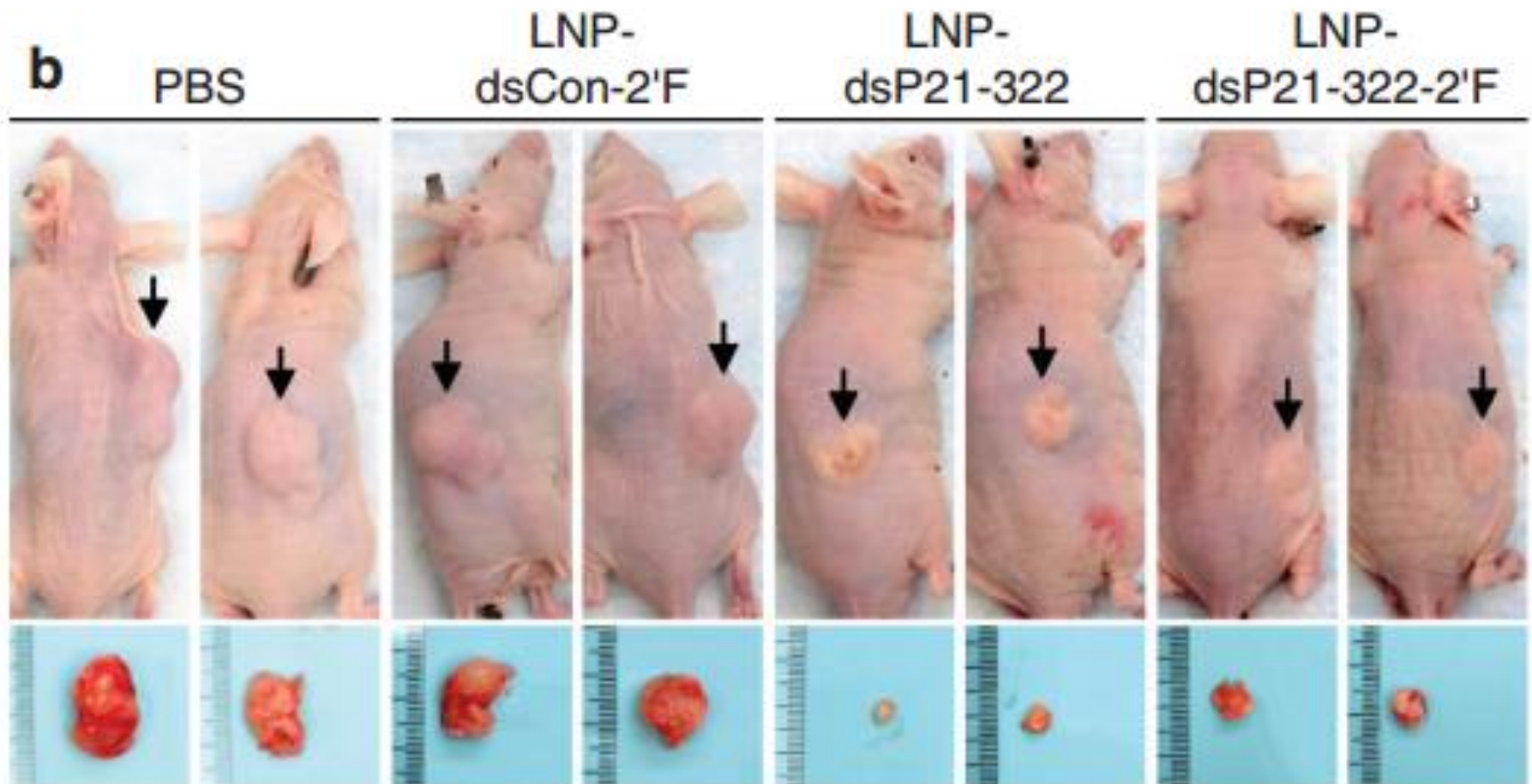


Эпигенетический выключатель



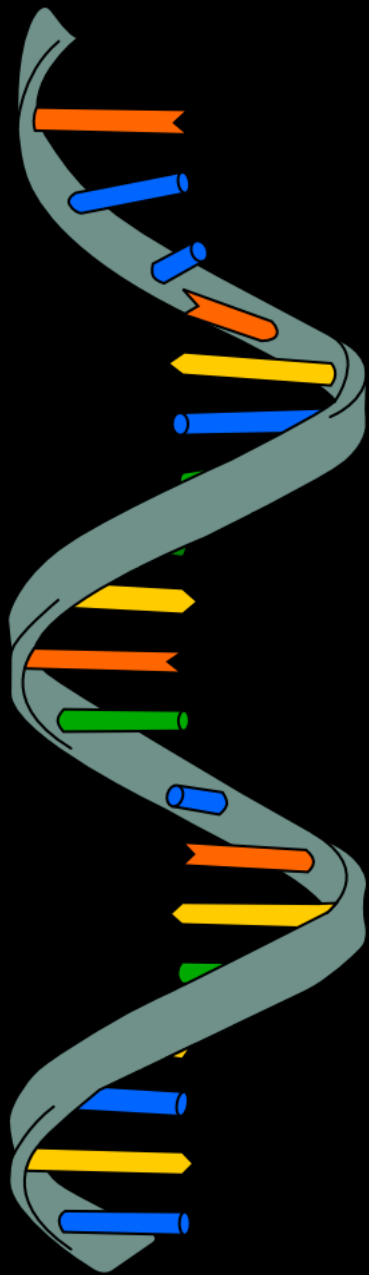
p21

Эпигенетический выключатель



Статья: <http://www.nature.com/mtna/journal/v1/n3/pdf/mtna20125a.pdf>

Регуляция на уровне РНК



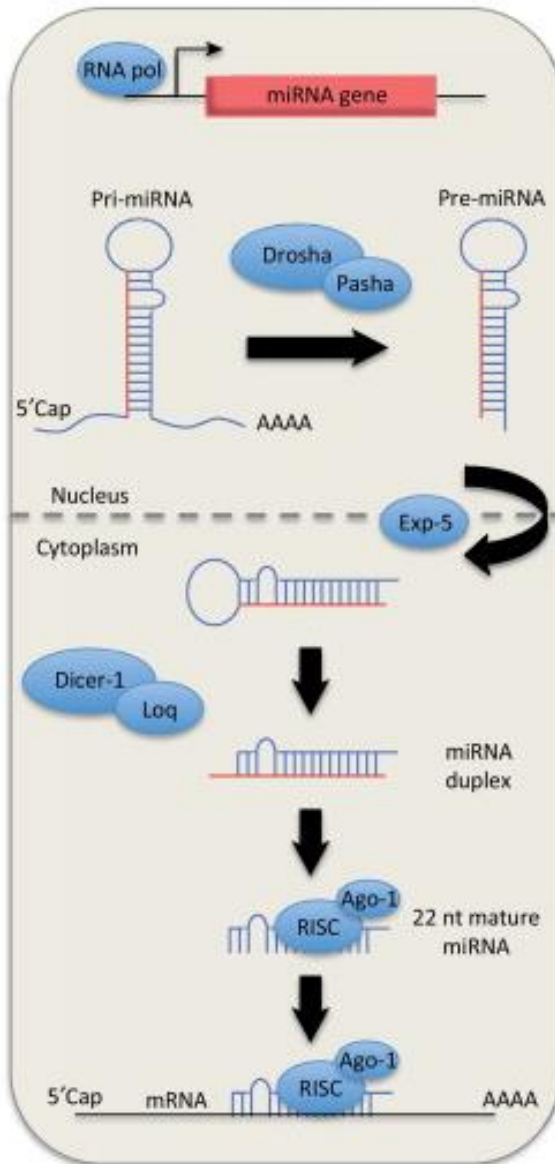


miR218

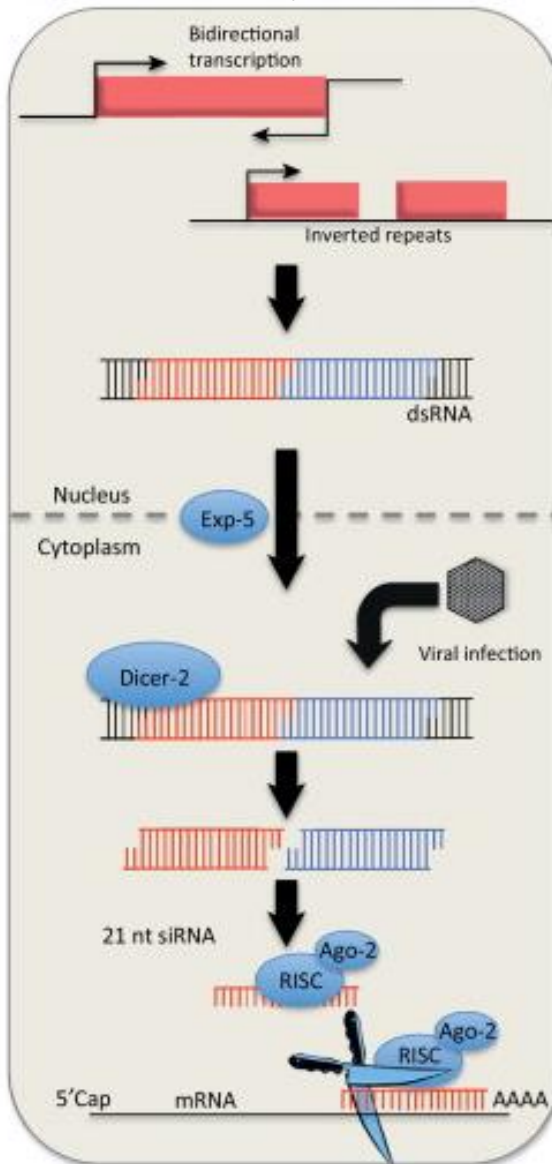


Статья и видео: <http://science.sciencemag.org/content/350/6267/1525.full>

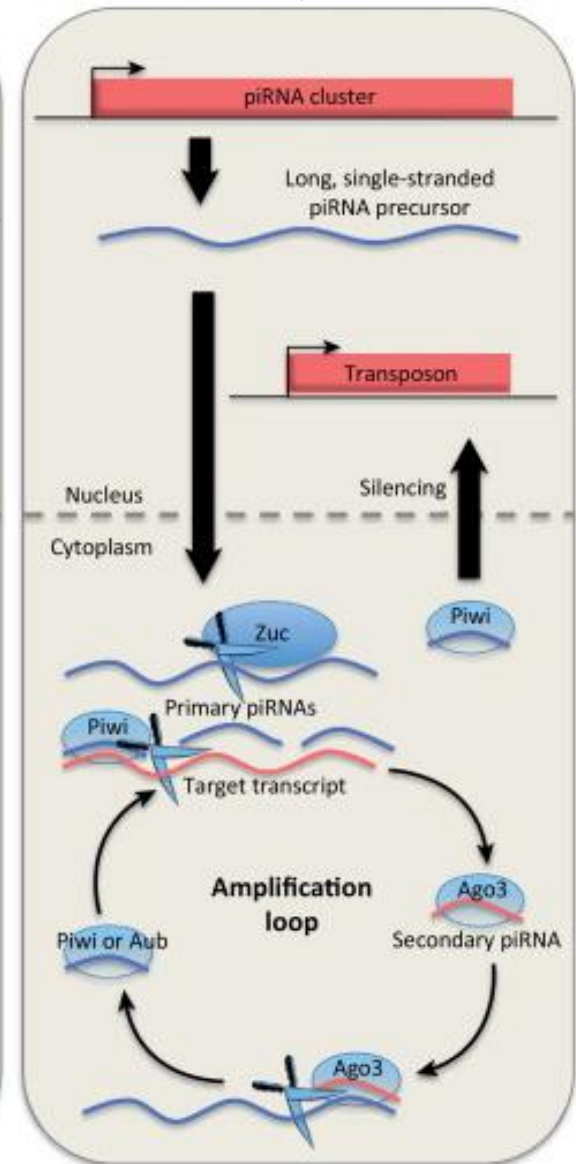
miRNA



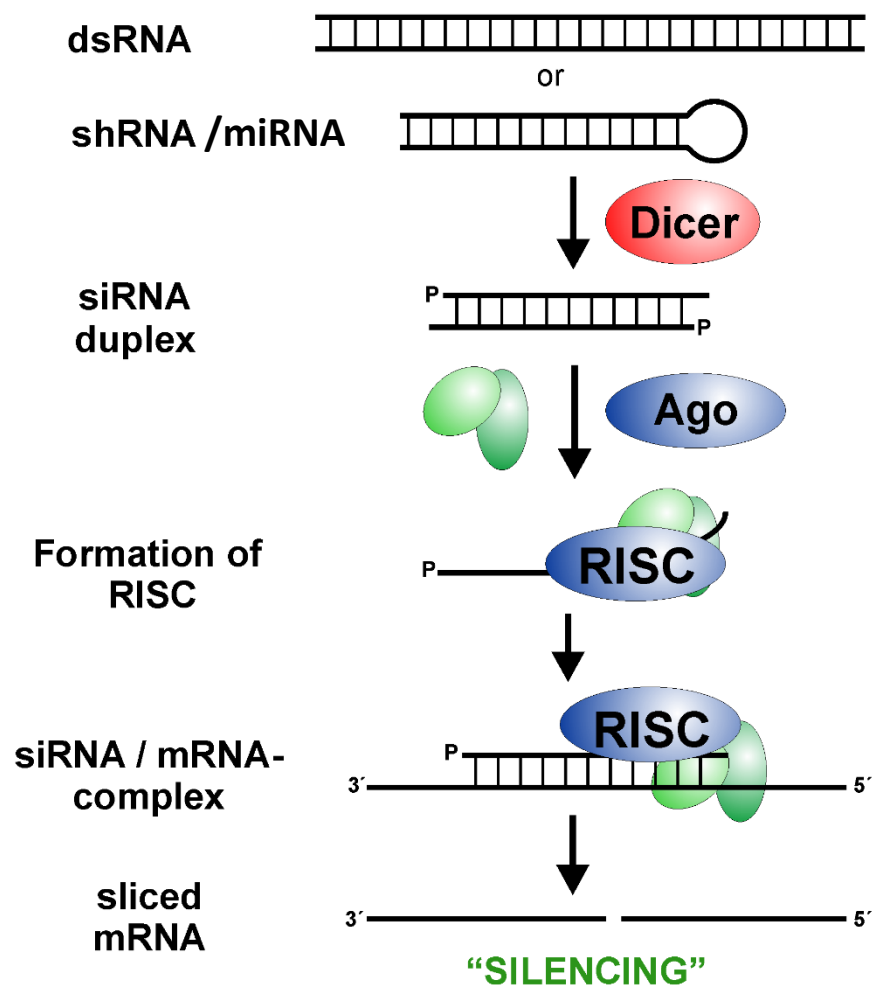
siRNA/shRNA



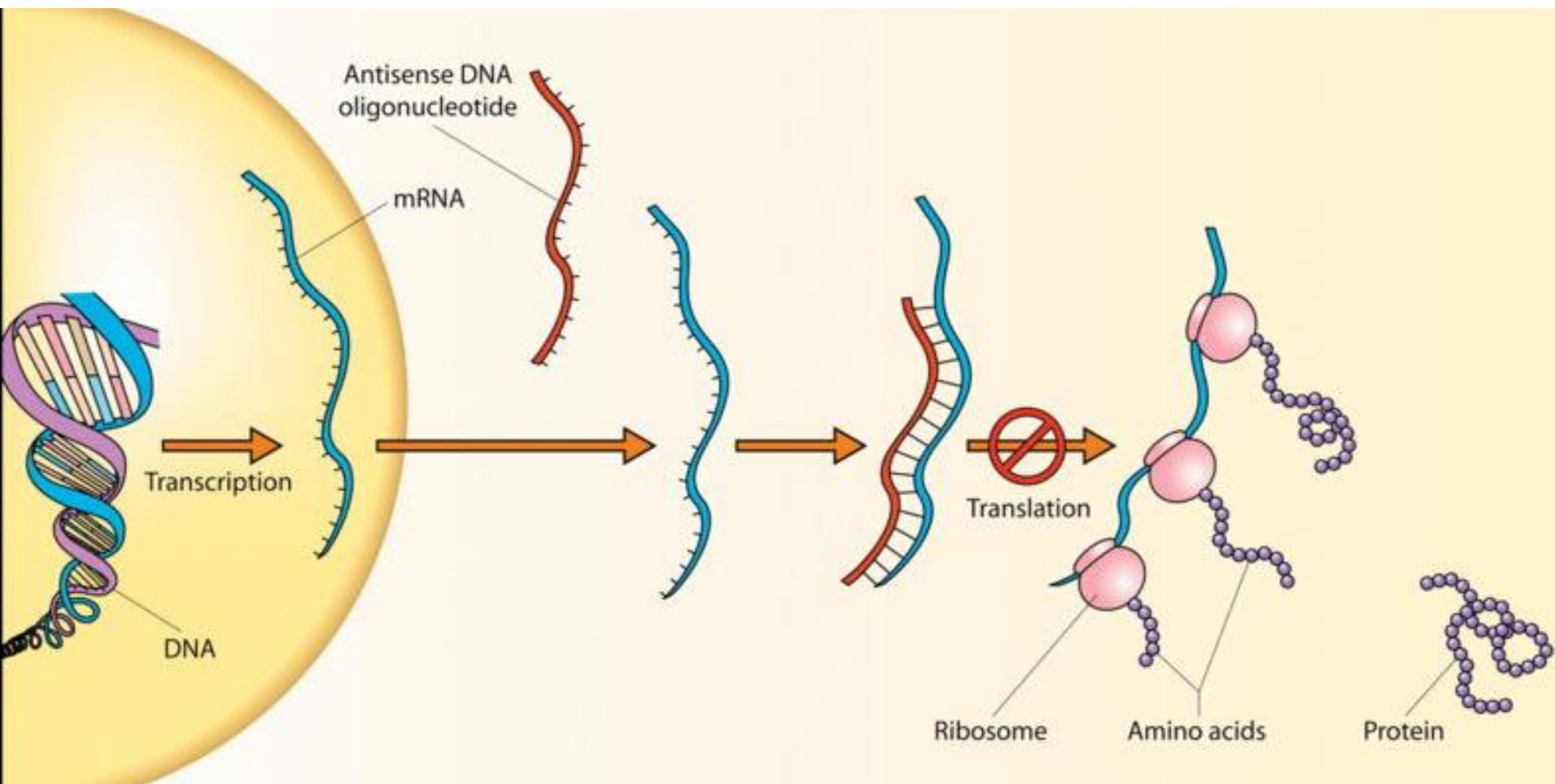
piRNA



РНК-интерференция



Антисмысловые РНК



Flavr Savr,

или медленно портящийся помидор



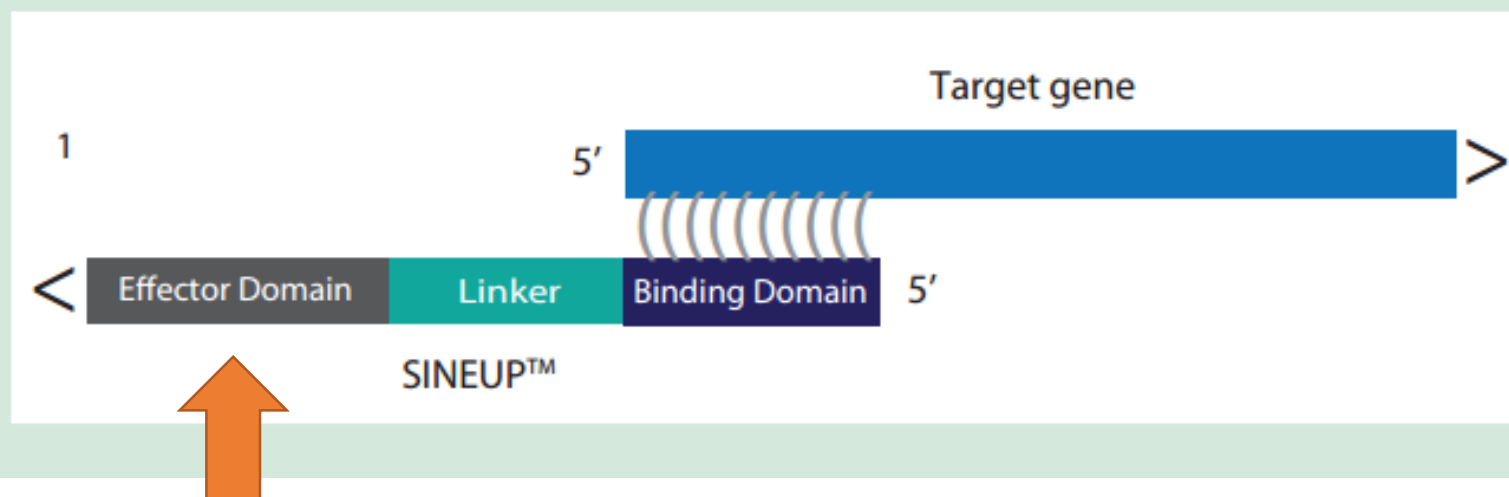
Image shows three sets of tomatoes. The ordinary control tomatoes (extreme left) soften and shrivel up, while texture of gene-silenced tomatoes remains intact for up to 45 days.

Photo credit: Asis Datta, Subhra Chakraborty, National Institute of Plant Genome Research, New Delhi

Polygalacturonase

Активация РНК (long ncRNA)

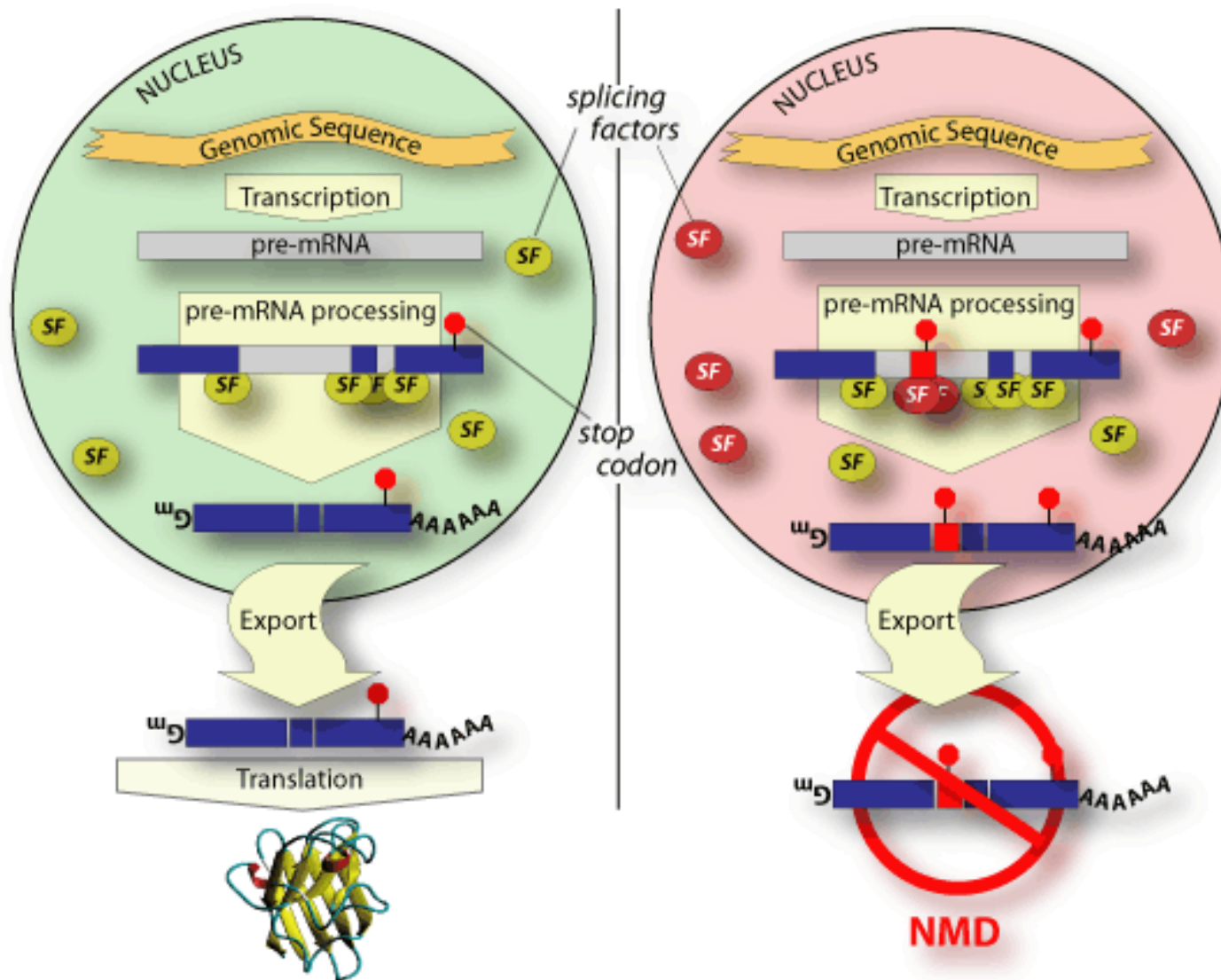
SINEUP™ Technology



SINEB2

Short Interspersed Nuclear Element B2

Нонсенс-опосредованный распад мРНК





OPEN

SUBJECT AREAS:

FLUORESCENT PROTEINS

RNA DECAY

FLUORESCENCE IMAGING

Received

22 September 2014

Accepted

9 December 2014

Method for quantitative analysis of nonsense-mediated mRNA decay at the single cell level

Anton P. Pereverzev¹, Nadya G. Gurskaya¹, Galina V. Ermakova¹, Elena I. Kudryavtseva¹, Nadezhda M. Markina¹, Alexey A. Kotlobay¹, Sergey A. Lukyanov^{1,2}, Andrey G. Zaisky¹ & Konstantin A. Lukyanov^{1,2}

¹Institute of Bioorganic Chemistry, Miklukho-Maklaya 16/10, 117997 Moscow, Russia, ²Nizhny Novgorod State Medical Academy, Minin Sq. 10/1, 603005 Nizhny Novgorod, Russia.

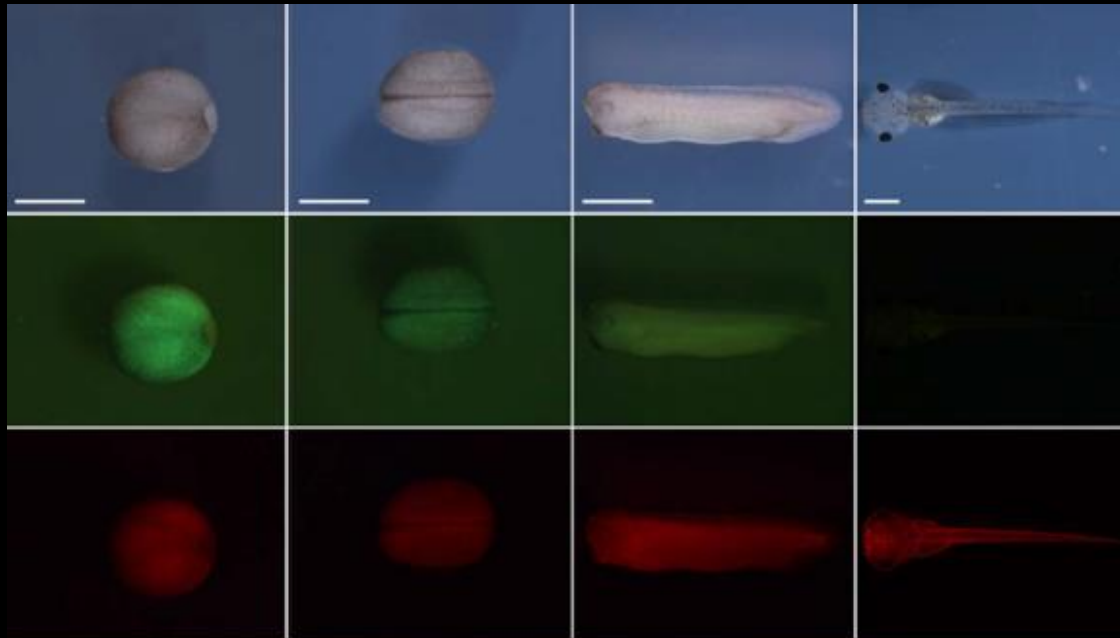
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22h

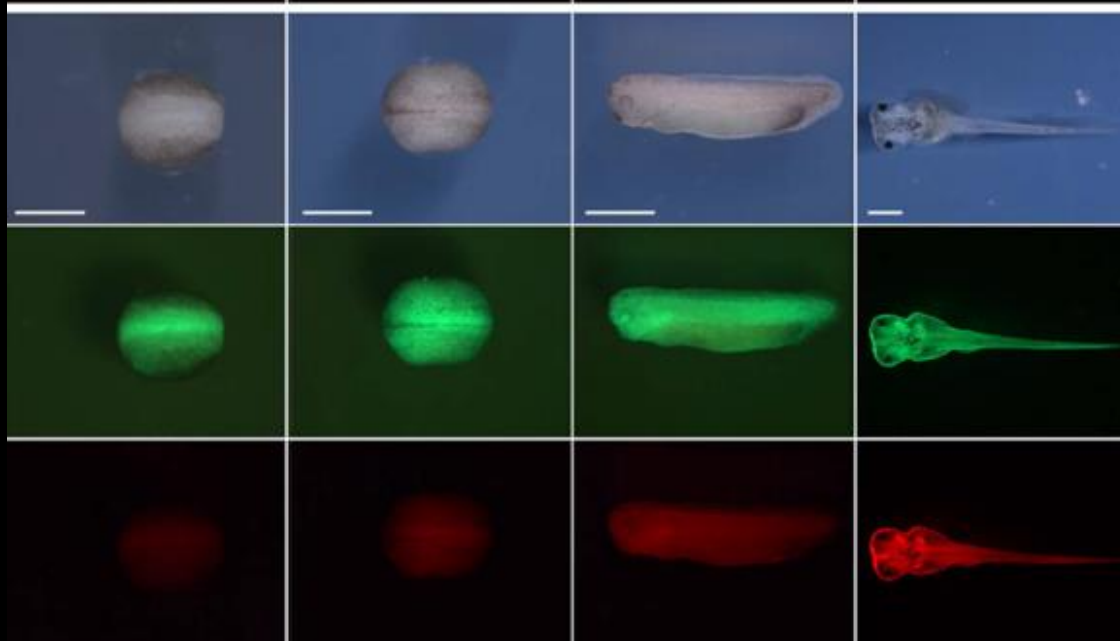
44h

115h

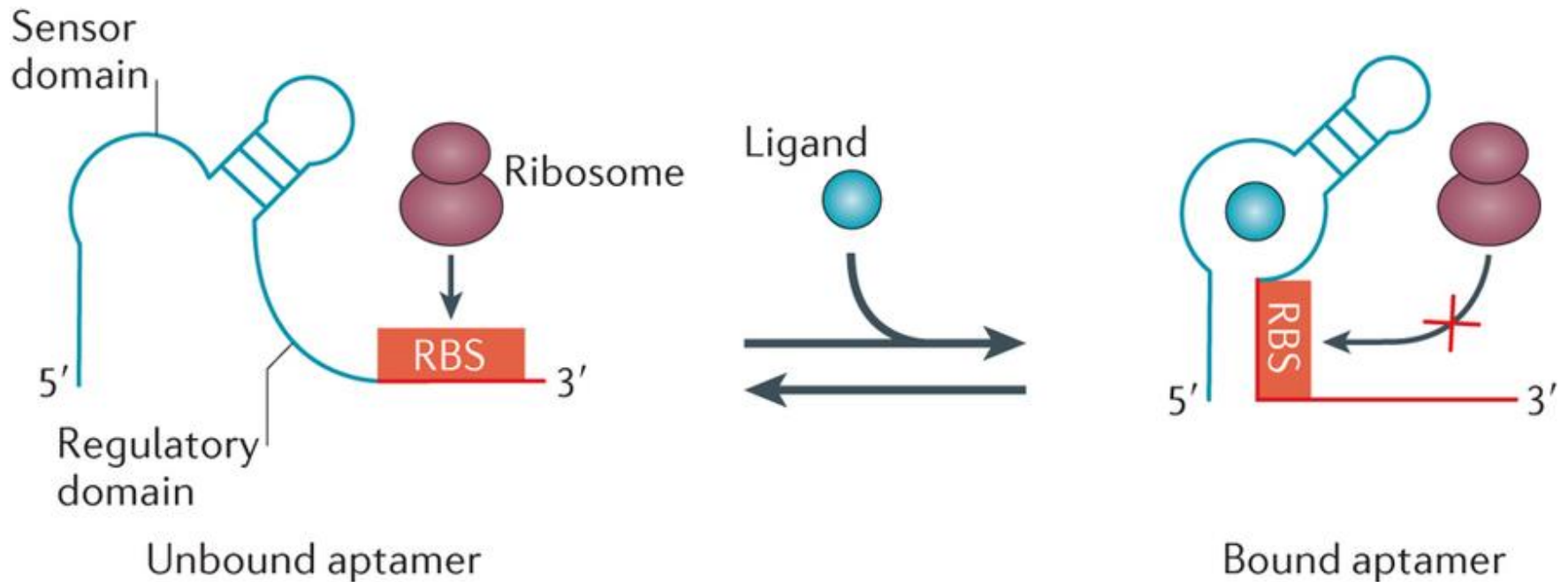
NMD+

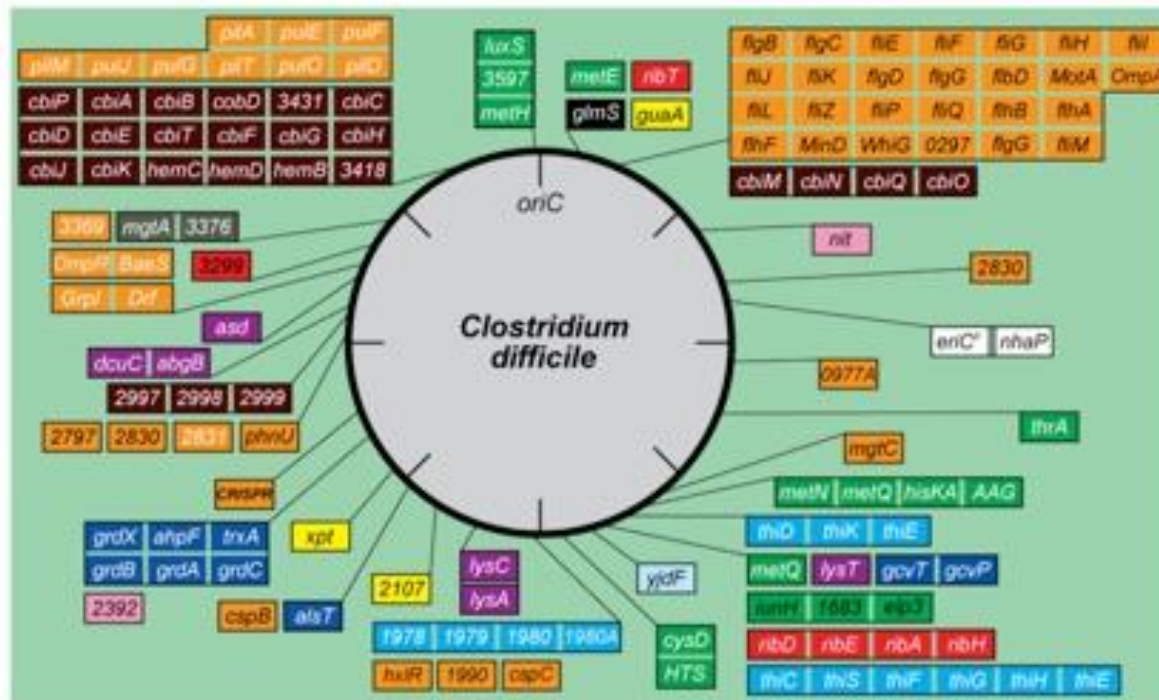
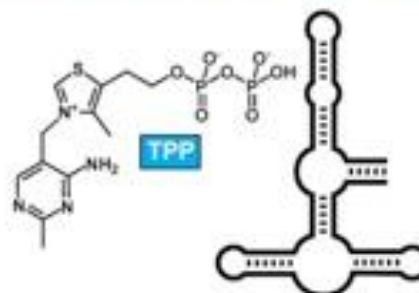
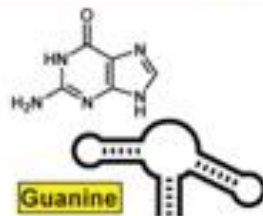
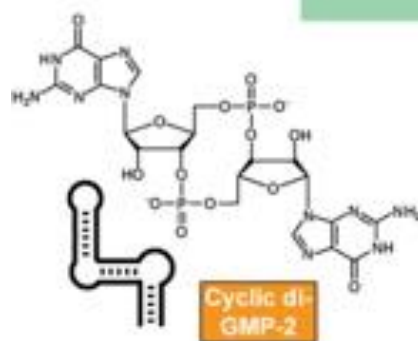
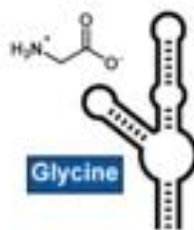
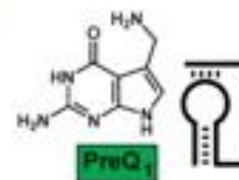
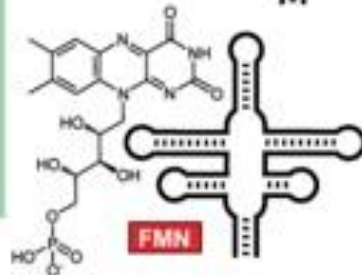
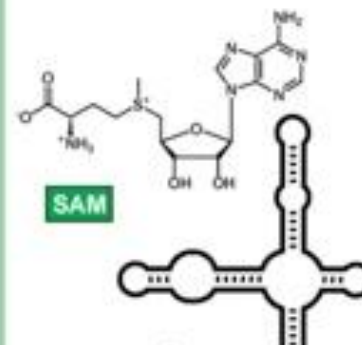
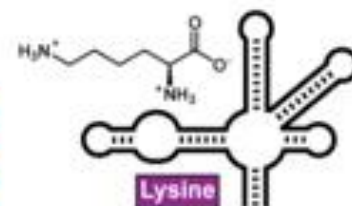
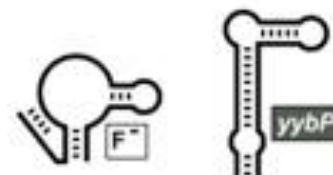
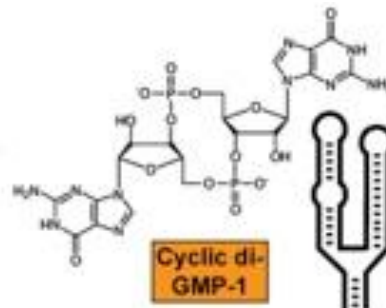
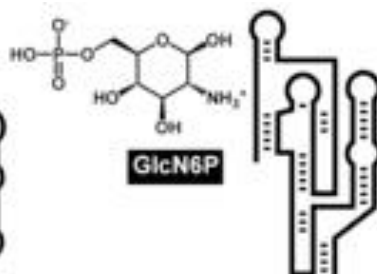
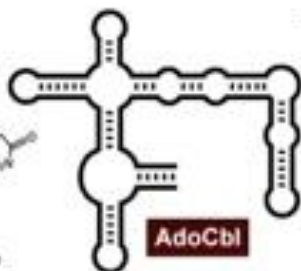
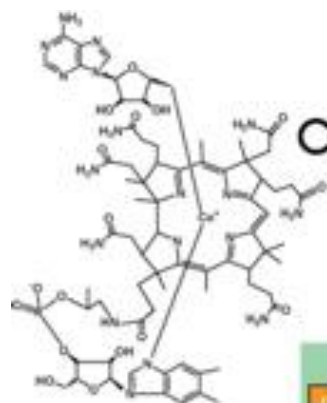


NMD-



Riboswitches

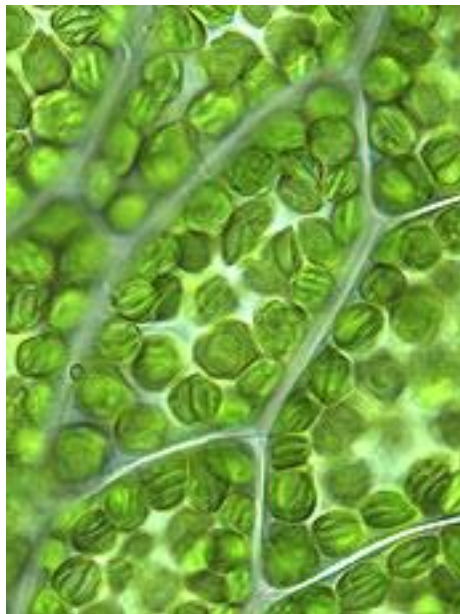




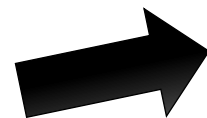
Inducible gene expression from the plastid genome by a synthetic riboswitch

Andreas Verhounig, Daniel Karcher, and Ralph Bock¹

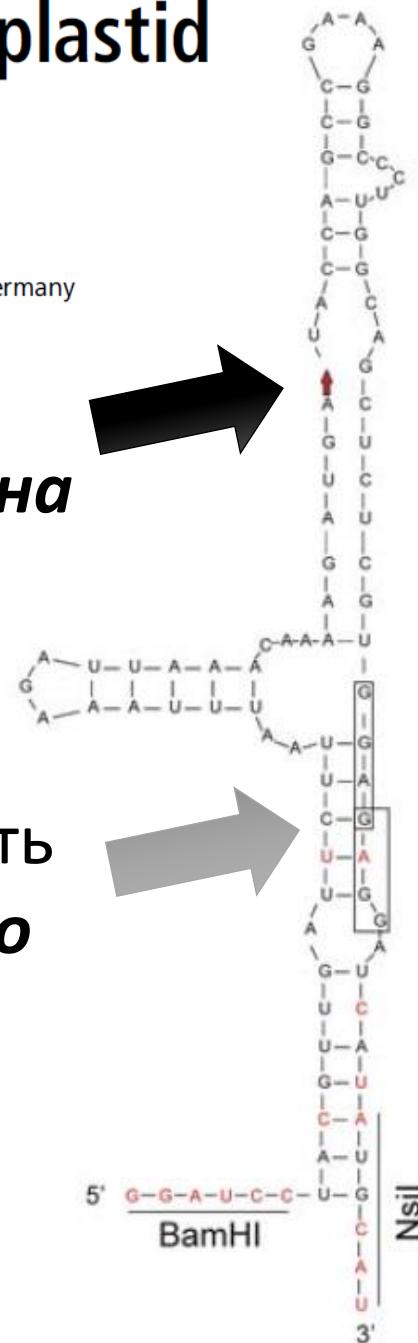
Max-Planck-Institut für Molekulare Pflanzenphysiologie, Am Mühlenberg 1, D-14476 Potsdam-Golm, Germany



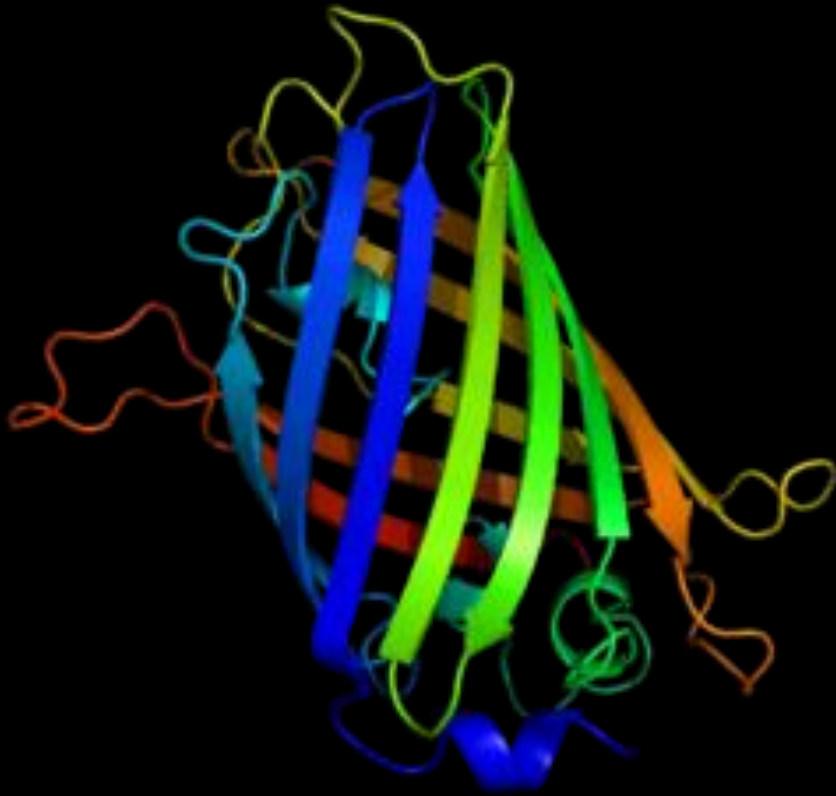
сайт для
теофиллина



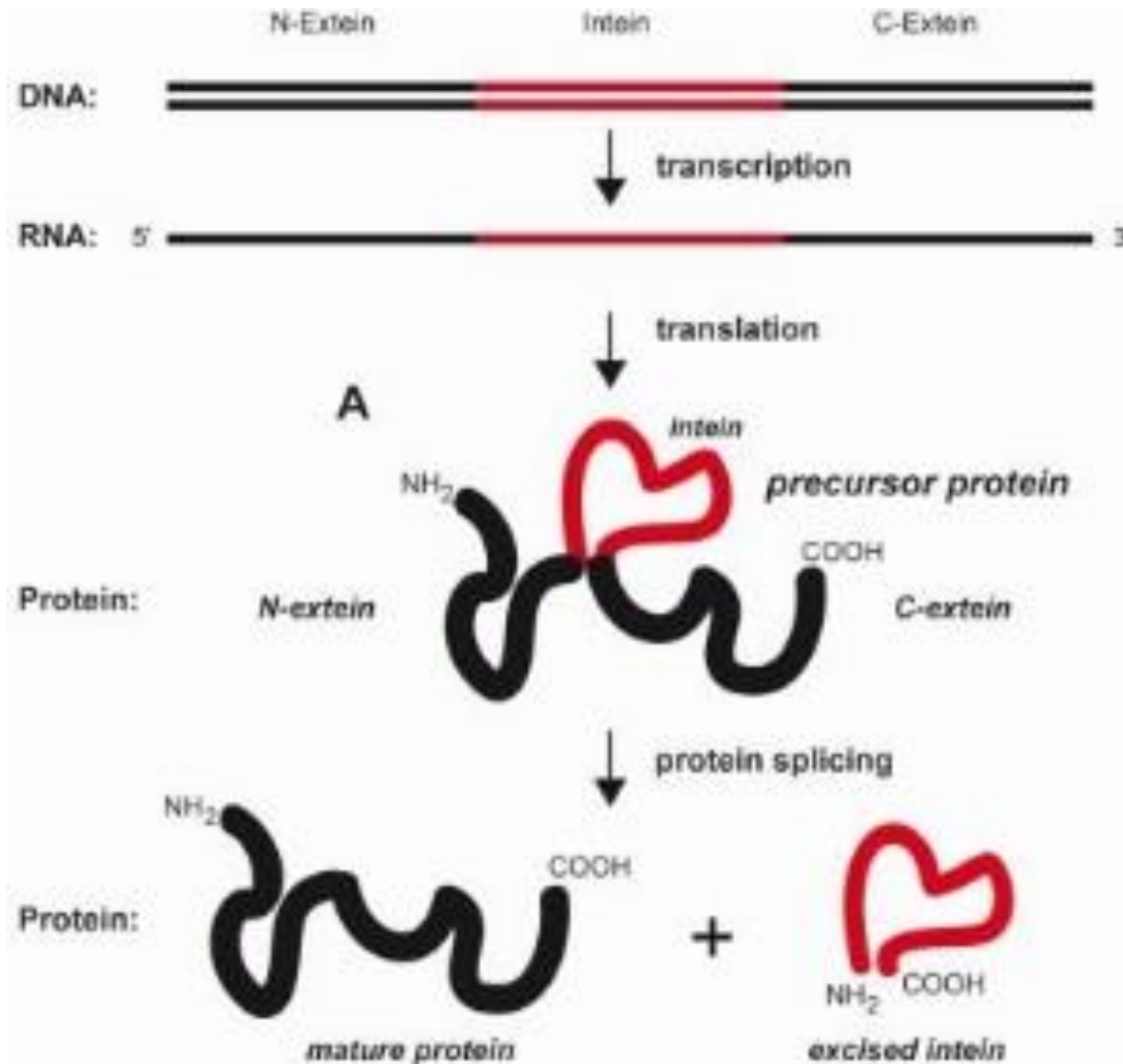
последовательность
Шайна-Дальгарно



Регуляция на уровне белка

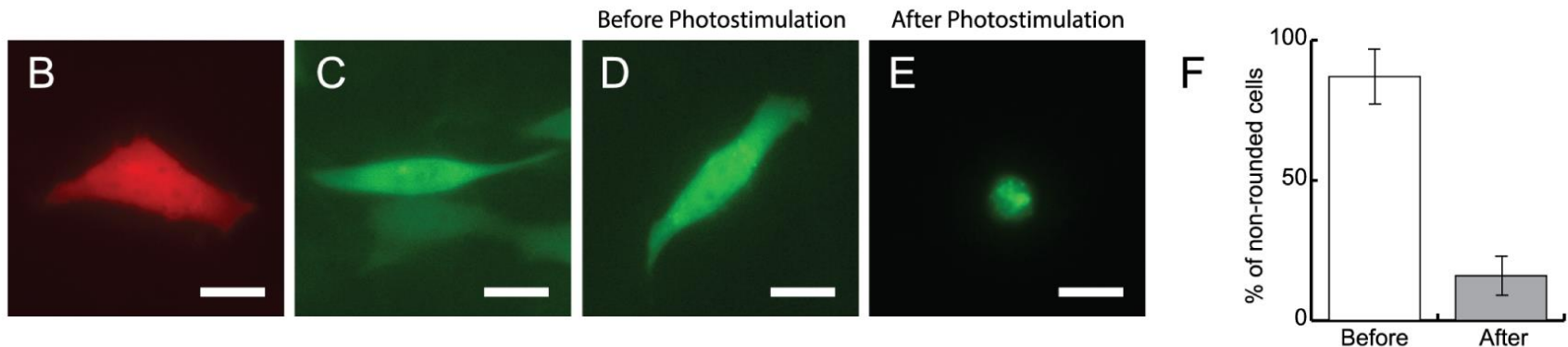
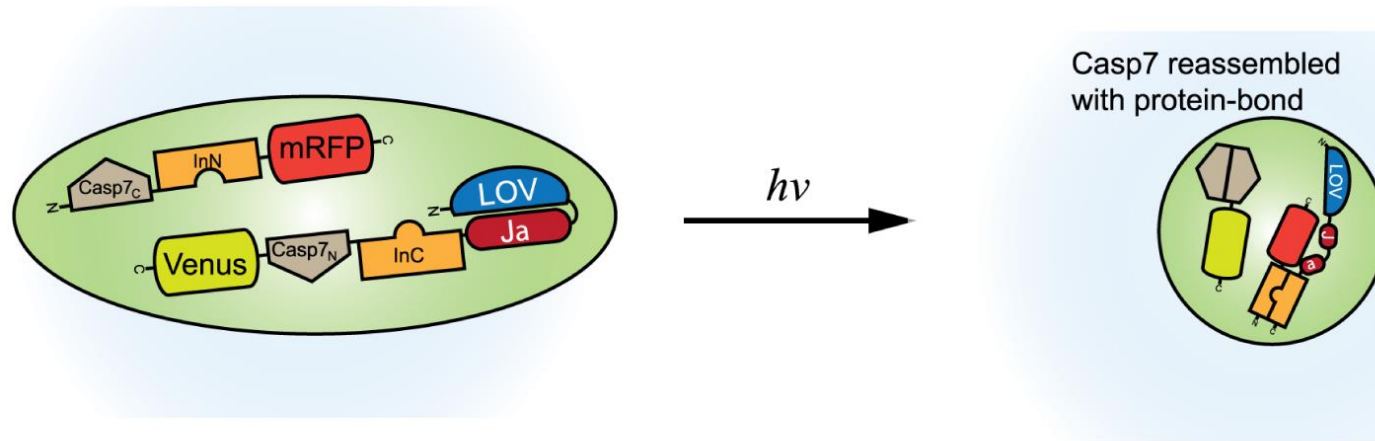


Белковый сплайсинг



Фотоактивируемый белковый сплайсинг

A

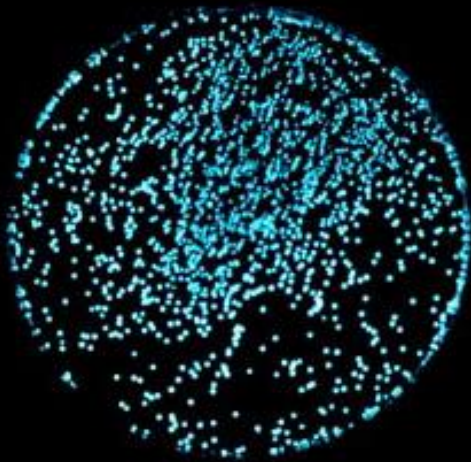




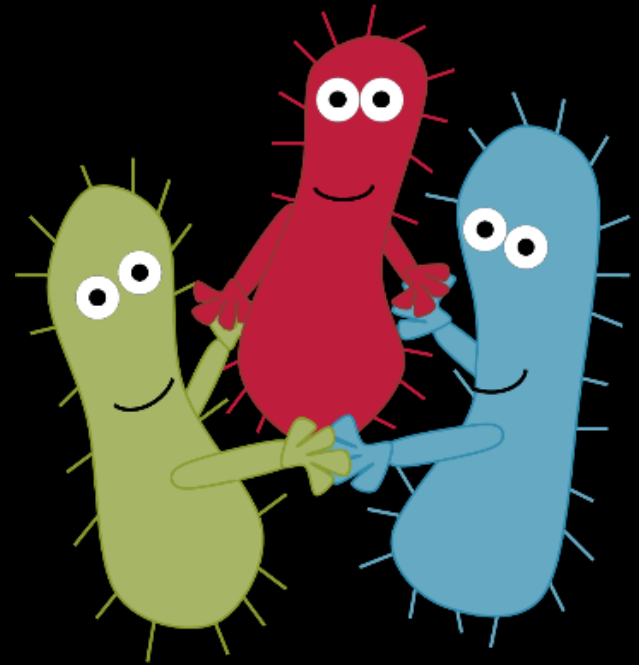
«Genetic clocks»



Euprymba scolopes



Vibrio fischeri



Чувство кворума



Статья и видео:

<http://www.nature.com/nature/journal/v463/n7279/full/nature08753.html>

Cosmetics-triggered percutaneous remote control of transgene expression in mice

Hui Wang¹, Haifeng Ye^{1,2}, Mingqi Xie¹, Marie Daoud El-Baba³ and Martin Fussenegger^{1,4,*}

¹Department of Biosystems Science and Engineering, ETH Zurich, Mattenstrasse 26, CH-4058 Basel, Switzerland,

²Shanghai Key Laboratory of Regulatory Biology, Institute of Biomedical Sciences and School of Life Sciences, East China Normal University, Dongchuan Road 500, 200241 Shanghai, China, ³Département Génie Biologique, Institut Universitaire de Technologie, F-69622 Villeurbanne Cedex, France and ⁴Faculty of Science, University of Basel, CH-4058 Basel, Switzerland

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Центр Психического и духовного развития «Мозговой Штурм»
представляет:

психокинетическое СГИБАНИЕ ЛОЖЕК

На этом семинаре Вы
САМИ согнете ложку
силой СВОЕЙ мысли, если
не получится, мы вернем
Вам деньги.

98-19-60

think it.
love it.
live it.



ARTICLE

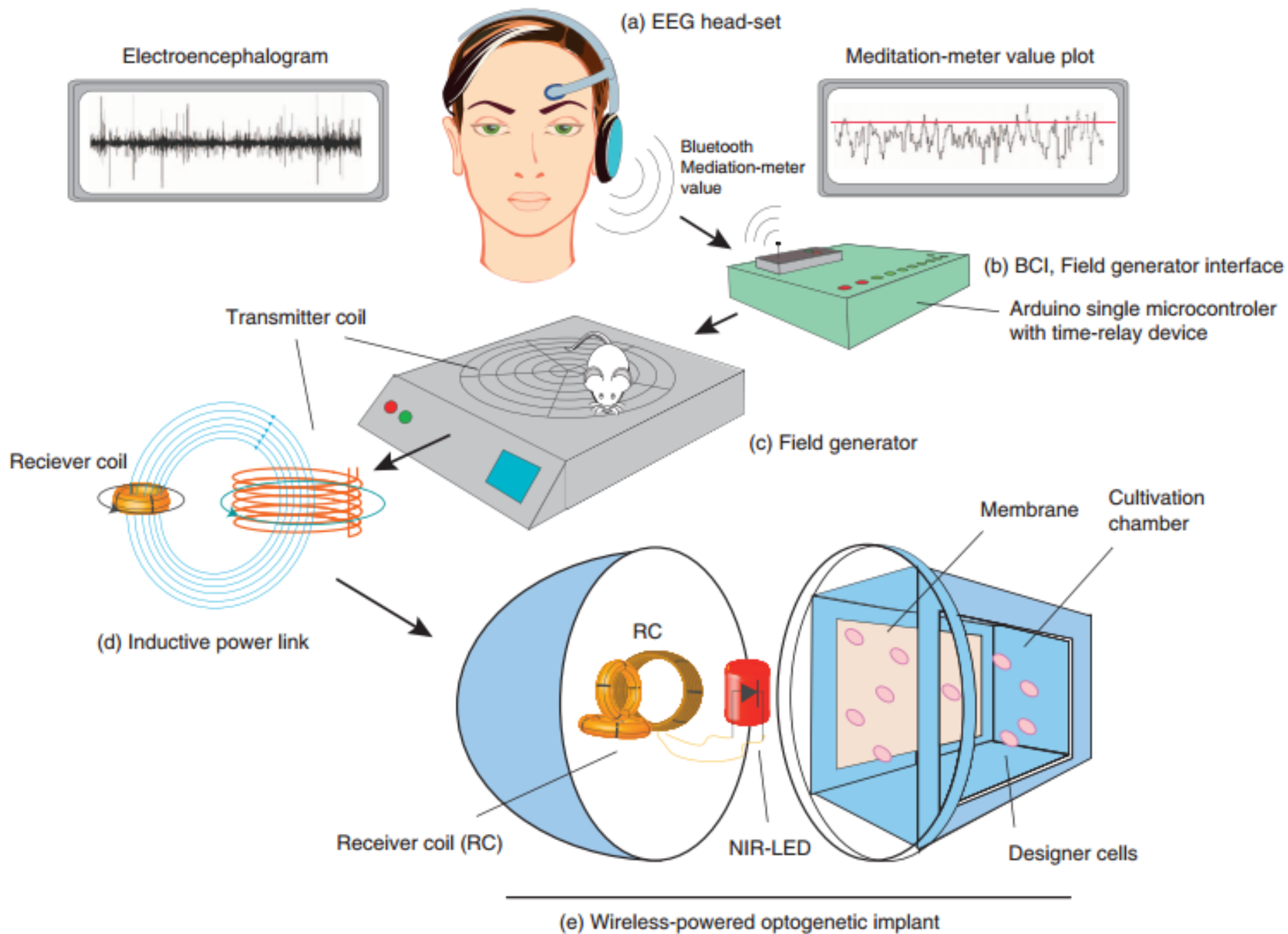
Received 23 Jun 2014 | Accepted 26 Sep 2014 | Published 11 Nov 2014

DOI: 10.1038/ncomms6392

OPEN

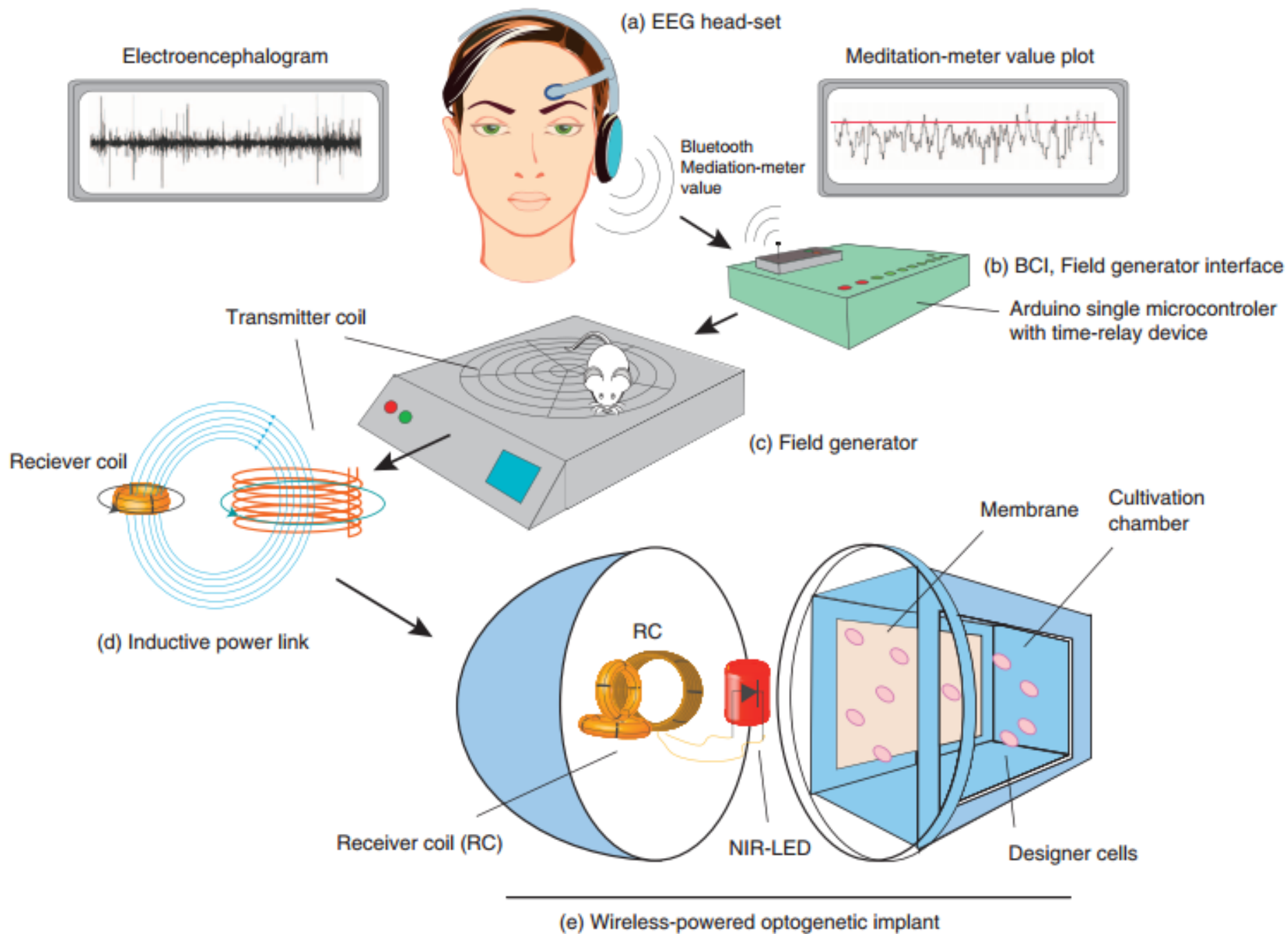
Mind-controlled transgene expression by a wireless-powered optogenetic designer cell implant

Marc Folcher¹, Sabine Oesterle¹, Katharina Zwicky¹, Thushara Thekkottil¹, Julie Heymoz¹, Muriel Hohmann¹, Matthias Christen¹, Marie Daoud El-Baba², Peter Buchmann¹ & Martin Fussenegger^{1,3}



a







*На душе легко и тревожно —
Мы достигли чудесной поры!
Невозможное стало возможным —
Нам открылись иные миры!*