S.G.Inge-Vechtomov
Dept of Genetics & Breeding, SPbSU

«Genetics in SPbSU at Post-genomic Era»

“Nothing in biology makes sense except in the light of evolution”

(Th.Dobzhansky)

Ju.A.

Philiptschenko

(1882 – 1930)
Chairman dept. of genetics and experimental zoology
1919 - 1930

“Whether the acquired characters are inherent”
T.H.Morgan
&
Ju.A.Philiptschenko
1925


НАСЛЕДСТВЕННЫ ЛИ
ПРИОБРЕТЕННЫЕ ПРИЗНАКИ.
Статьи
Т. Г. МОРГАНА и Ю. А. ФИЛИПЧЕНКО.
ИЗ КНИГ
Ленина Карловича
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ИНСТИТУТ ОБЩЕЙ ГЕНЕТИКИ
Академии наук СССР
КАБИНЕТ ИСТОРИИ ГЕНЕТИКИ
К-35
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КНИГОИЗДАТЕЛЬСТВО
"СЕЯТЕЛЬ"
Г. В. ВЫСОЦКОГО
ЛЕНИНГРАД
1925

Feodosij Grigorievich
DOBRZHANSKY
(1900-1975)
Dept of Genetics and experimental zoology:
1924-1927

Feodosij Grigorievich DOBRZHANSKY

REC “Genetics” SPbSU

Dept of Genetics and Breeding (Acad. RAS, Prof. Inge-Vechtomov S.G.)

***with laboratories*:**

- **Plant genetics (Dr. Sci. Voilokov A.V.)**
- **Gene and Cell Engineering of Plants (Dr.Sci., Prof. Lutova L.A.)**
- **Enimal Genetics (Dr. Sci., Prof. Smirnov A.F.)**
- **Physiological Genetics (Acad. RAS, Prof. Inge-Vechtomov S.G.)**
- **Biochemical Genetics (Dr. Sci. Padkina M.V.)**

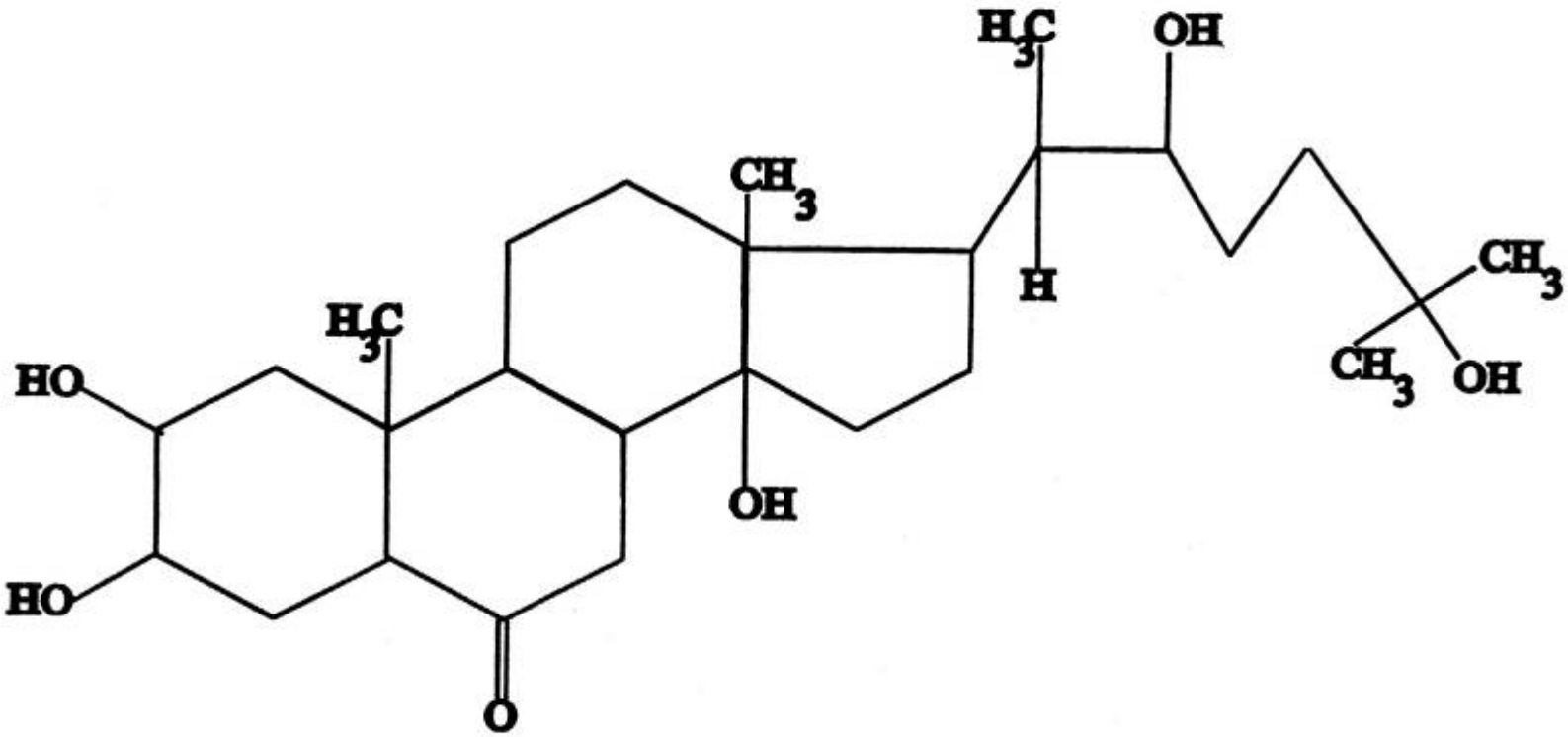
Division of Inst. of Agricultural microbiology, Rus. Acad. Agricultural Sci (Acad.RAAS, Prof. Tikchonovich I.A.)

Lab of Prenatal Diagnostics, Inst. Of Obstetrics and Ginecology, Rus Acad. Medical Sci (Member-corresp. RAMS, Prof. Baranov V.S.)

SPb Branch Vavilov Inst. of General Genetics, RAS (Acad. RAS, Prof. Inge-Vechtomov S.G.)

***with laboratories*:**

- **Plant Genetics and Biotechnology (Dr. Sci. Voilokov A.V.)**
- **Genetic Modeling of Human Diseases (PhD Galkin A.P.)**



Ecdison – Insect hatching hormone

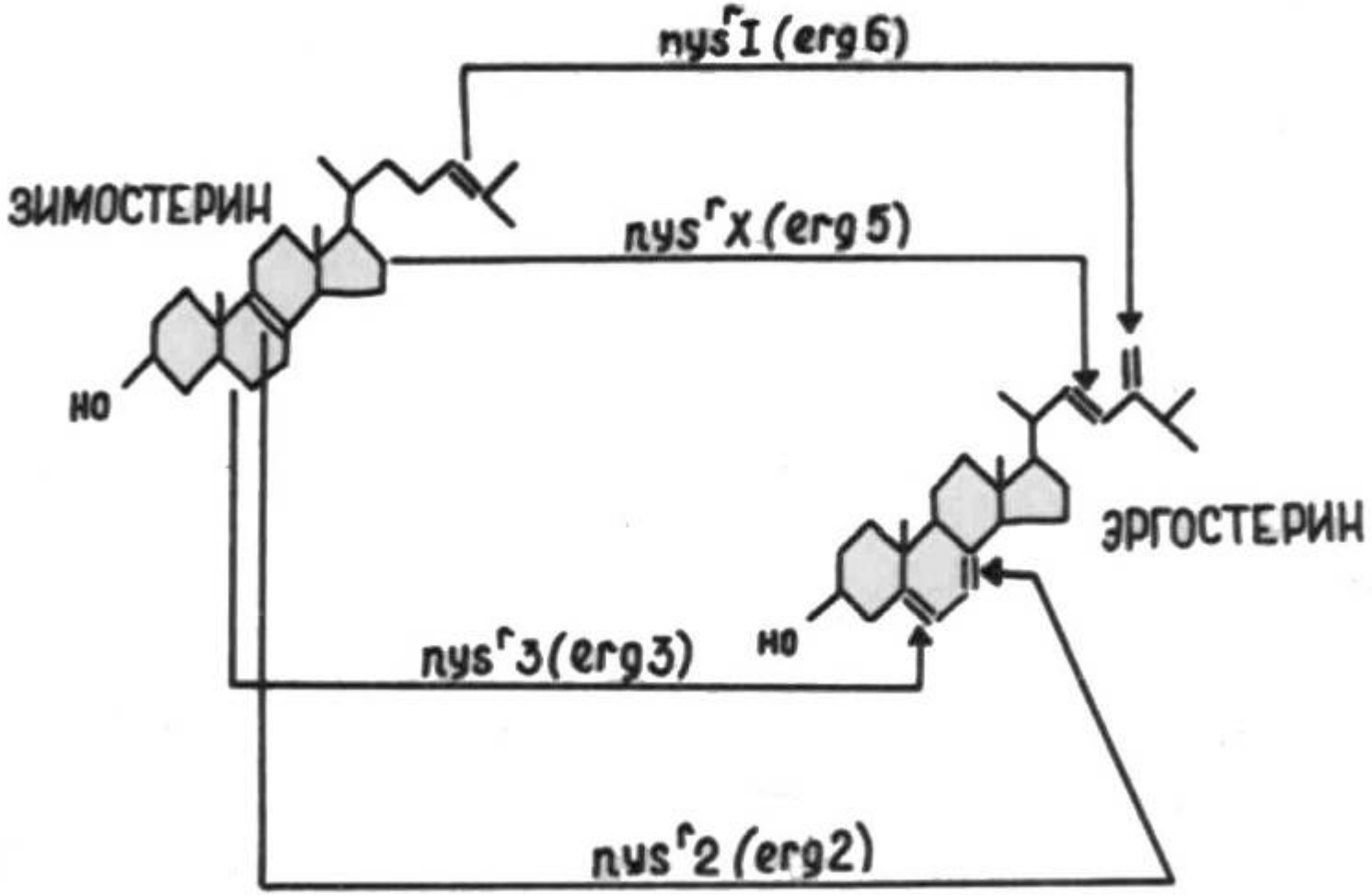
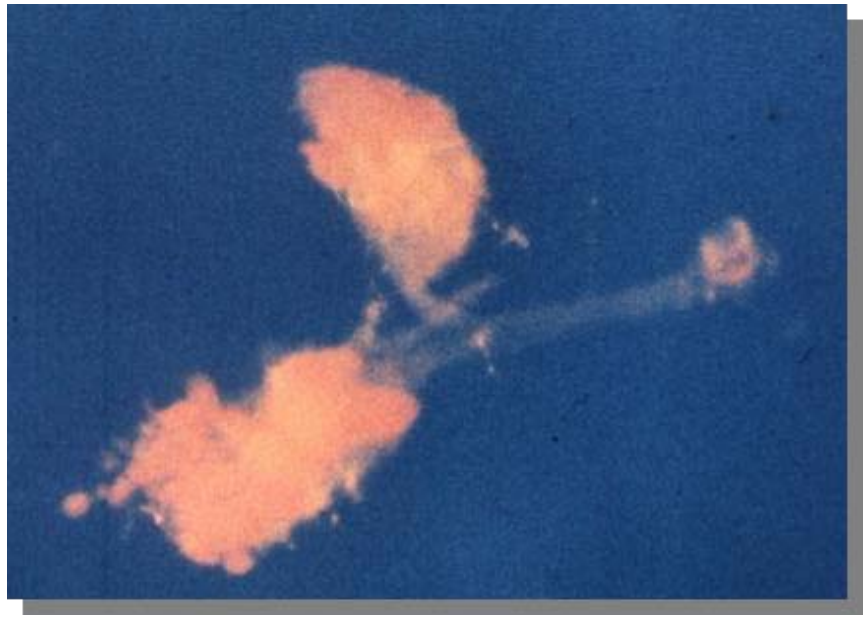


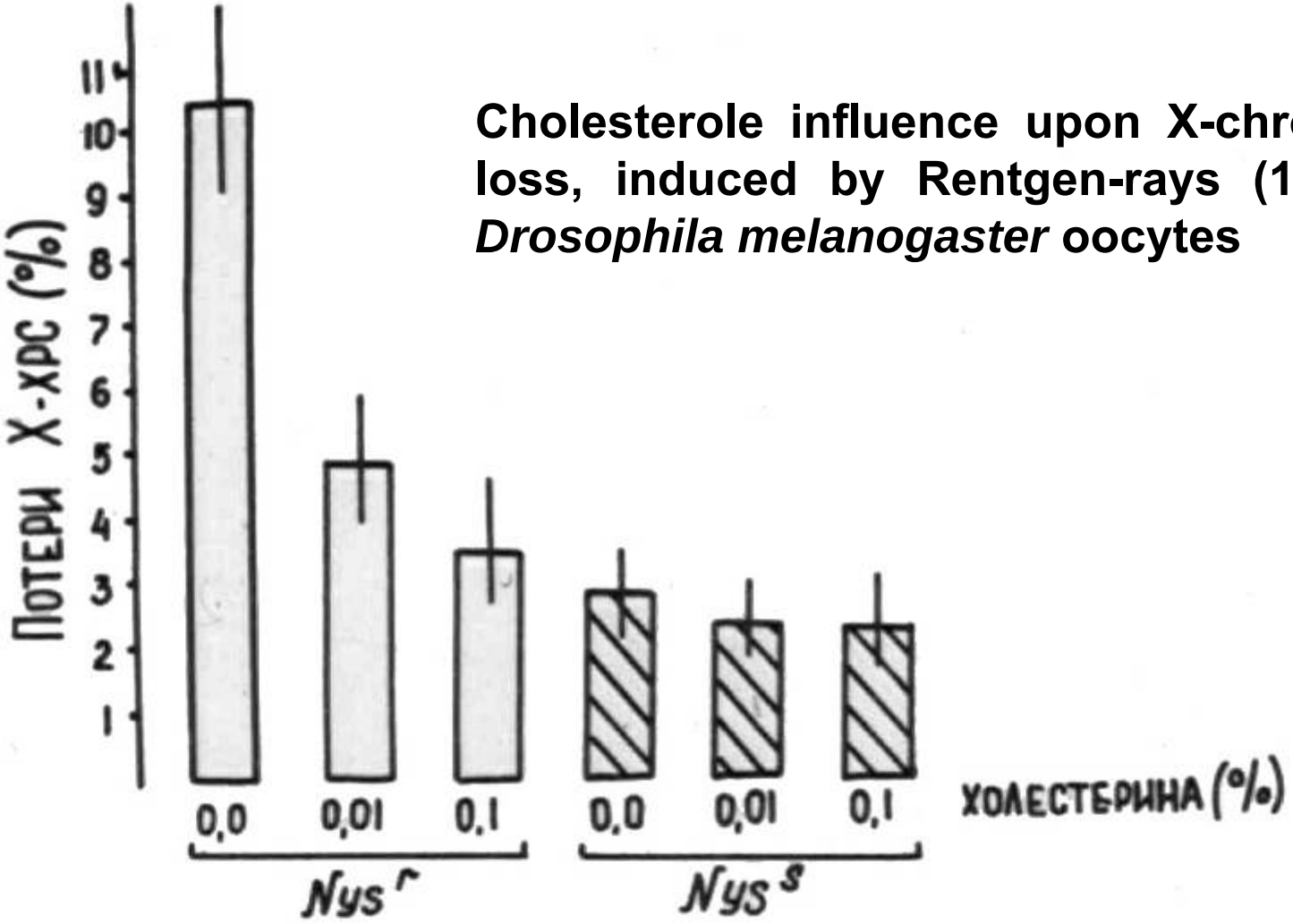
СХЕМА КОНЕЧНЫХ ЭТАПОВ МЕТАБОЛИЗМА СТЕРИНОВ У ДРОЖЖЕЙ.

The final steps in sterole metabolism in yeast

Ovary degeneration in *Drosophila melanogaster* at sterole-deficient media (to the right)

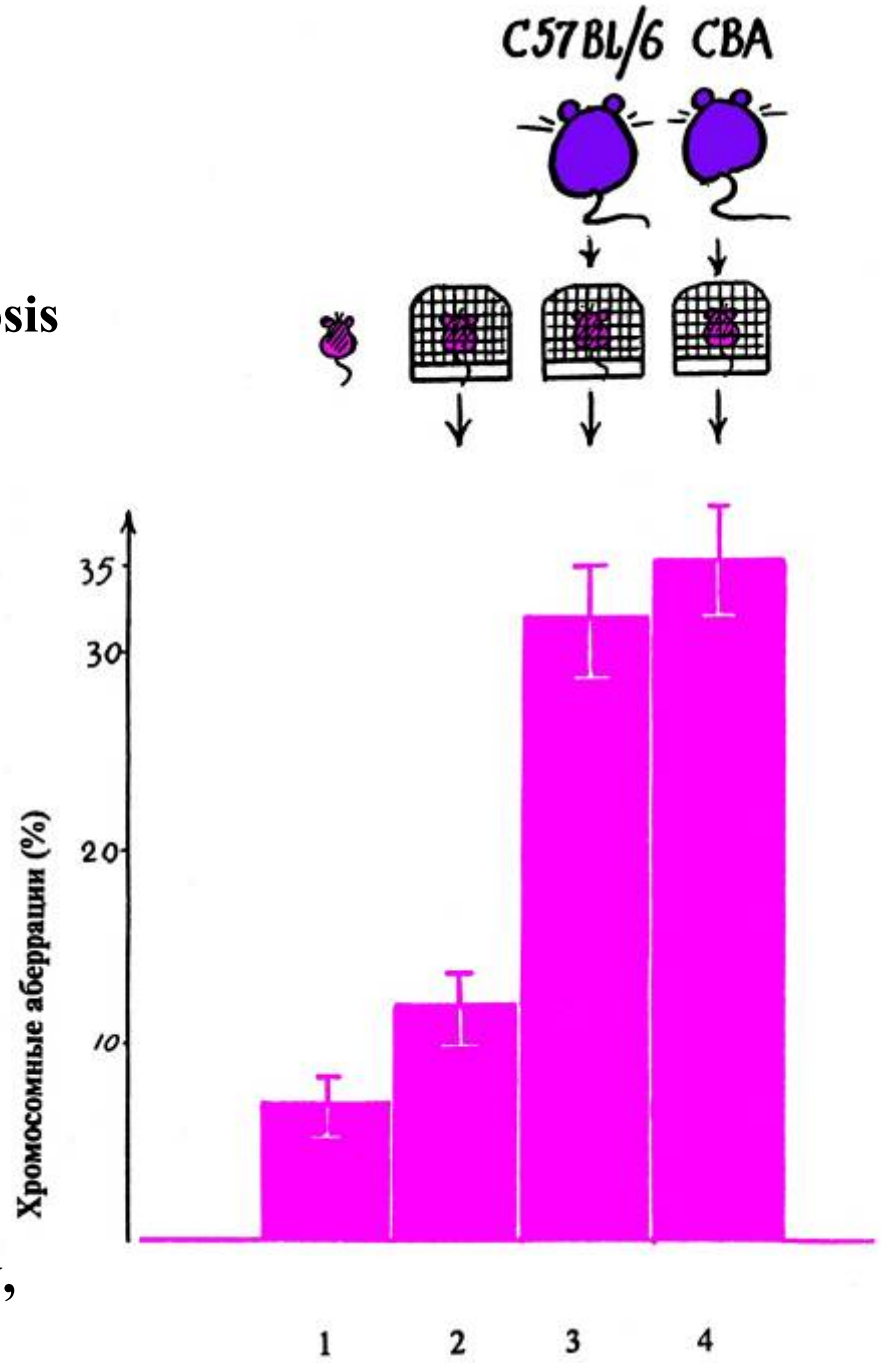


Cholesterole influence upon X-chromosome loss, induced by Rentgen-rays (1000 r) in *Drosophila melanogaster* oocytes



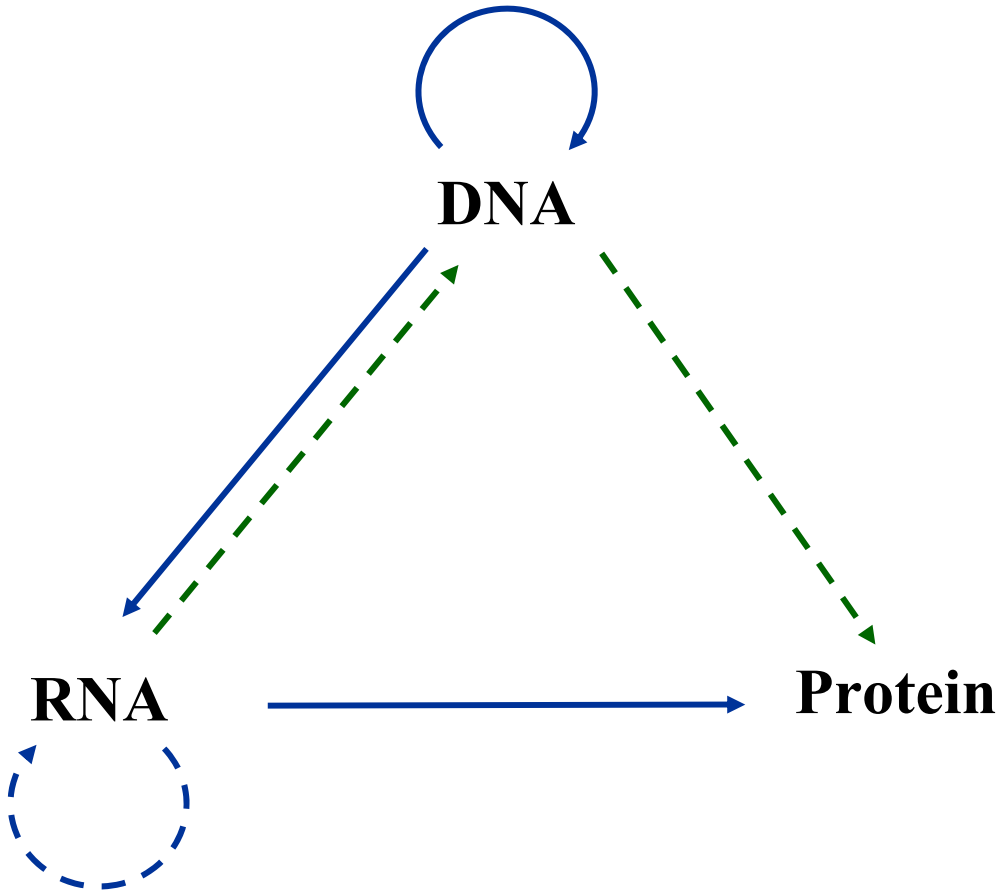
Влияние холестерина на частоту рентгениндуцированной (1000р) анеуплоидии в зрелых ооцитах.

Chromosome aberrations in meiosis in mice after feromonal stress induction



After Tsapigina, Daev, Novikov, 1981

Central Dogma of Molecular Biology as reflection of the template principle (Crick, 1958, 1970)



Common features of template processes

(I order)

Stages:

Initiation

Elongation (copying)

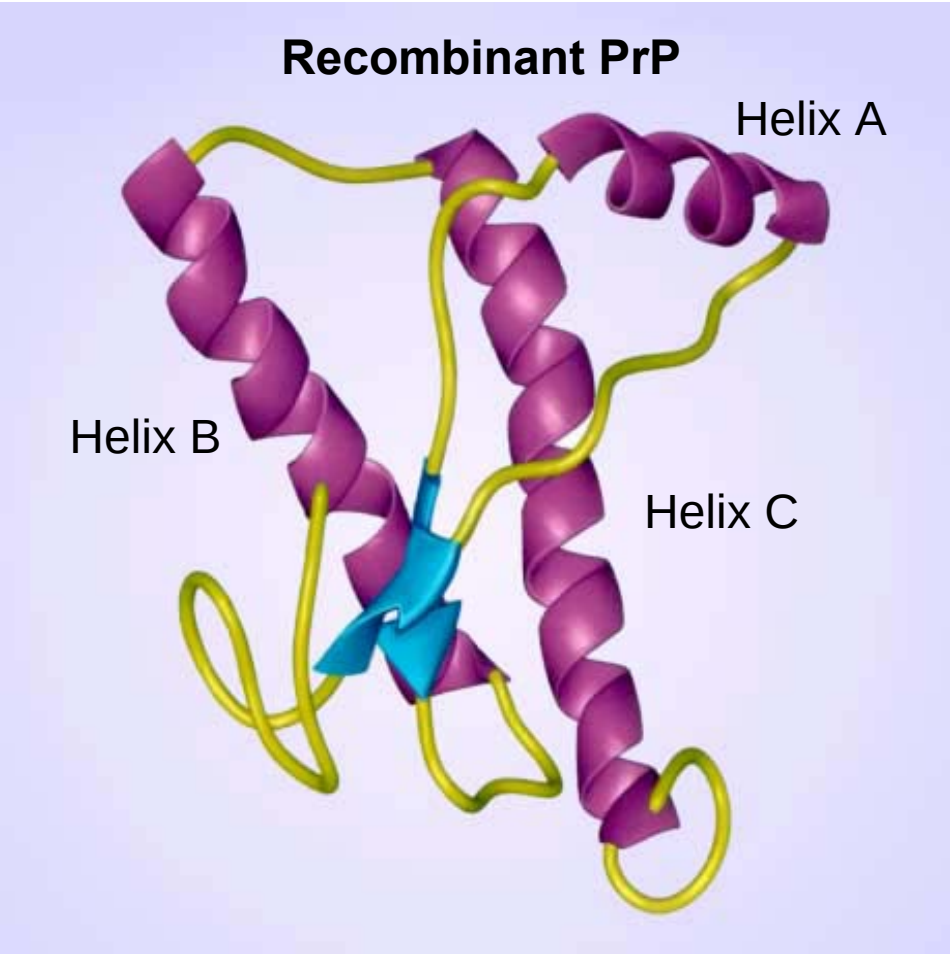
Termination

***Characters*:**

Polyvariancy (ambiguity)

Correction ability (repair)

S.Prusiner. “N Engl J Med” , **2001**. Vol. 344, No. 20: 1516 - 1527



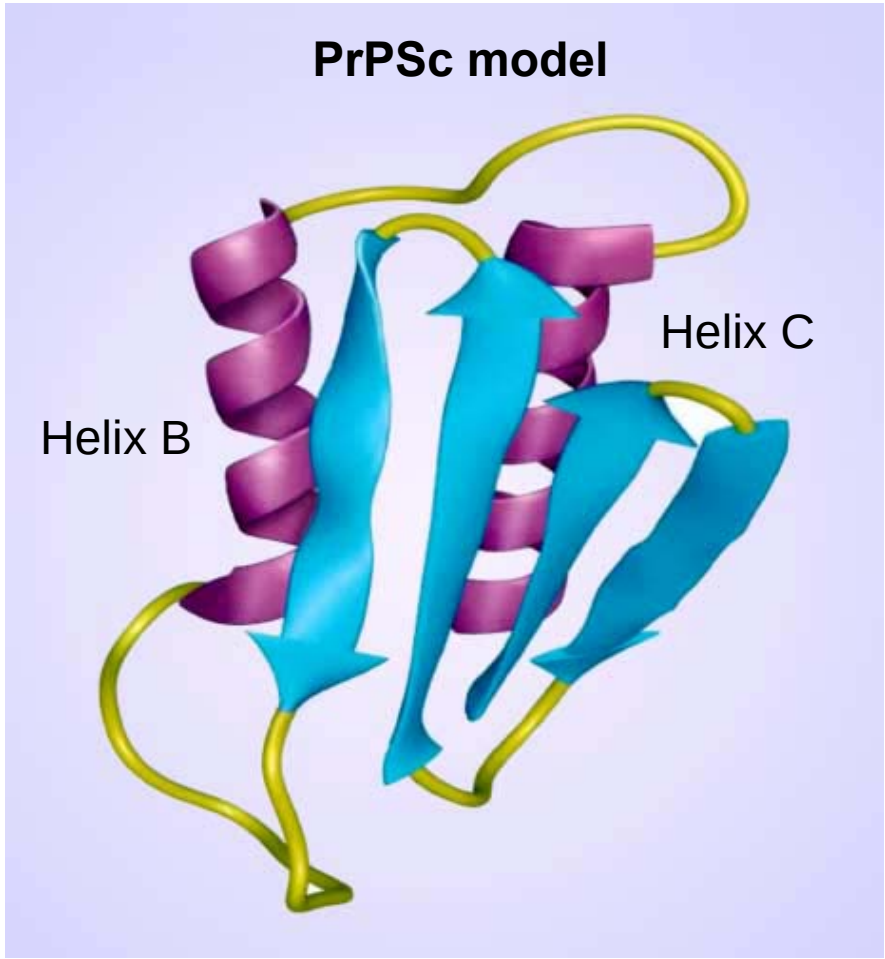


Figure 1. Structures of Prion Protein (PrP) Isoforms
Panel A shows the*a*-helical structure of Syrian hamster recombinant PrP 90-231, which presumably resembles that of the cellular isoform (PrPC). It is viewed from the point at which the scrapie isoform (PrPSc) is thought to bind to PrPC. *a*-Helixes A (residues 144 through 157), B (172 through 193), and C (200 through 227) are purple, with loops in yellow; residues 129 through 134, in strand S1, and residues 159 through 165, in strand S2, are blue.
Panel B shows a plausible model of the tertiary structure of human PrPSc. S1 *b*-strands (residues 108 through113 and 116 through 122) and S2 *b*-strands (residues 128 through135 and 138 through 144) are blue. *a*-Helixes B (residues 178 through 191) and C (residues 202 through 218) are purple, with yellow loops.

Fungal prions

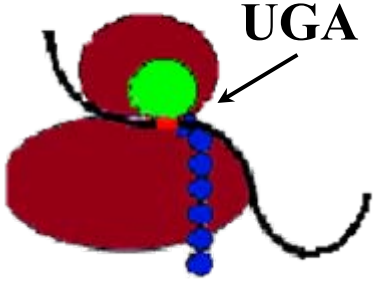
[Prion] (phenotype, product)	Structural gene	Spcies	Source
[*PSI*+] (nonsens-suppression)	*SUP35*	*Saccharomyces cerevisiae*	Cox , 1965; Чернов и др.. 1988; Wickner, 1994
[*URE3*] (utilisation of ureidosuccinate)	*URE2*	*S. cerevisiae*	Wickner, 1994
[*PIN*+] ([*PSI*] initiation)	*RNQ1*	*S. cerevisiae*	Derkatch et al., 2001
[*Het-s*] (incompatibility factor)	*HET-s*	*Podospora anserina*	Coustou et al., 1997
[*ISP*+] (antisuppr. to *sup35*-transcript. f-r)	*SFP1*	*S. cerevisiae*	Рогоза и др., 2009
[*SWI*+] (chromatin regulation)	*SWI1/SNF5*	*S. cerevisiae*	Du et al., 2008
[*OCT*+] (transcription f-r)	*CYC8/SSN6*	*S. cerevisiae*	Patel et al., 2009
[*MCA*] (metacaspase)	*MCA1*	*S. cerevisiae*	Nemecek et al., 2009
[*MOT3*] (transcription f-r)	*MOT3*	*S. cerevisiae*	Alberty et al., 2009
[*GAR*+] (glucose repression resistance)	*PMA1, STD1*	*S. cerevisiae*	Brown, Lindquist, 2009

Nonsesnse suppression in [*PSI*$^+$] cells of *S.cerevisiae*

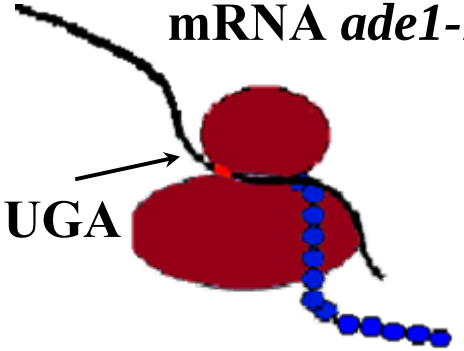
[*psi*$^-$] cells

[*PSI*$^+$] cells

mRNA *ade1-14*



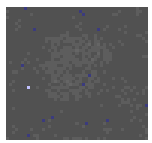
mRNA *ade1-14*

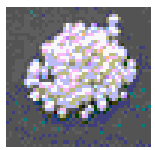


Native Sup35 protein recognizes stop-codone UGA, appeared at the place of the meaning one.

Sup35 prion aggregates do not recognize the stop-codone UGA, and it is being red as the meaning one.

As a result: the truncated, nonfunctional Ade1 protein is synthesized. Yeast does not grow at adenineless media.

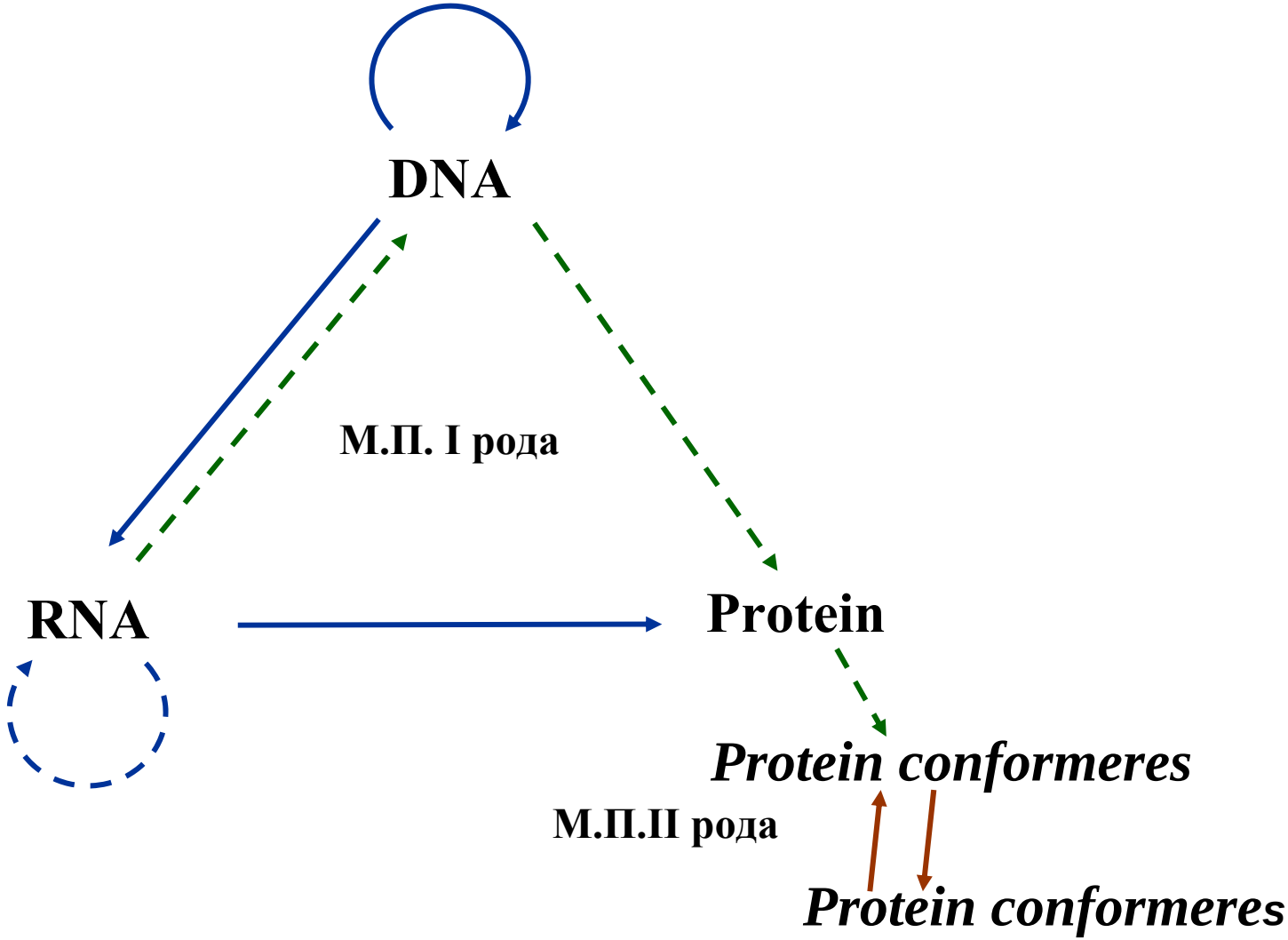




As a result the full length, functional protein Ade1 appears. Yeast does grow at adenineless media.

Central Dogma of Molecular Biology as reflection of the Template Principle (Crick, 1958, 1970)

With addition



The other topics …

- Genetics of translation (yeast)
- Transcription regulation in foreign proteins production in yeast
- Repair and mutagenesis *vs* recombination (yeast)
- Nuclear-cytoplasm mRNA transport in *Drosophila*
- Genetic toxicology test systems in *Drosophila* & aquatic *Arthropoda*
- Snp in rye breeding
- Green vaccines
- Genetics of meiosis in rye
- Tumorogenesis in plants
- Genetic control of plants–microbes interaction
- Interspecies (rye X wheat) hybrid incompatibility
- Genetic polymorphism in Humans and medicine