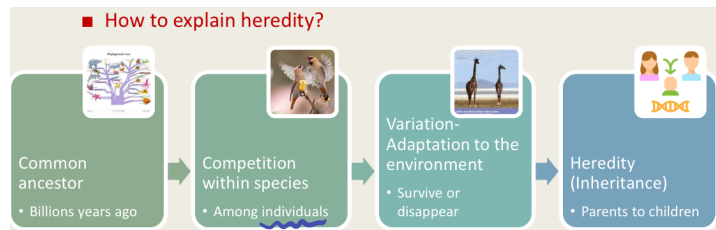


What is the code of life?

How to explain heredity?



Mechanism of heredity → Quantum theory.

Modern genetics (Mendel's paper) (Max Plank)

Small, cont. variations 不能遗传.

Small but "Jump like" change 能遗传. (Mutation)

Before DNA:

Pangenesis 泛生说 / Preformationism 先成说.

why wrong?

↓
August Weismann's
mice experiment

egg or sperm contained
a complete performed individual.

↓
更高级的 microscope.

遗传物质在DNA or 蛋白质?

DNA first isolated. 分离



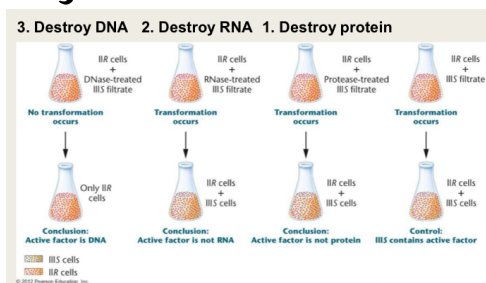
Heat-Killed S + Living R = Living S

(Living innocuous R bacteria

acquires sth. from dead S variant).



Avery-MacLeod-McCarty's Experiments

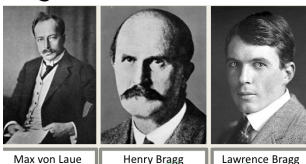


体外转化实验.

DNA confirmed as the transforming factor.



X-Ray Diffraction X光衍射 (XRD).



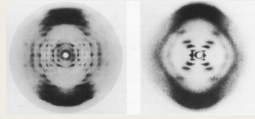
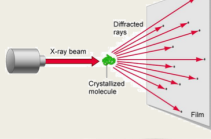
Max + 2x Bragg.

DNA model building

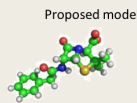
Model Building

骨架在外

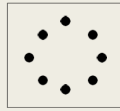
Diffraction pattern from experiment



If not matches, adjust the model
Until the calculated pattern matches with the observed one.
Compare the calculated pattern with experiment



Calculate diffraction pattern with the model



GFN1000 by Honghui

30

↓
DNA有几条链?

All that remained to be settled is the **number of chains!**

Maurice Wilkins: No water in DNA! **Three-chain!** Backbone **at the center!**

Rosalind Franklin: No!!! DNA is **full of water!!!** Backbone has to be **outside!!!**

James Watson: DNA density-measurement slightly favored a **2-chain model**. As a biologist, I preferred the idea of a genetic molecule made of 2; after all, chromosomes are duplicating!

GFN1000 by Honghui

32

↓
Erwin Chargaff's Rule..

$$A=T \quad G=C$$

$$29.3\% = 30\% \quad 20.7\% = 21\%$$

↓
Linus Pauling's Mistake.

(DNA involves 3 intertwined helical polynucleotide chains)

↓
Meselson-Stahl Experiment

(^{15}N isotope tracing technique).

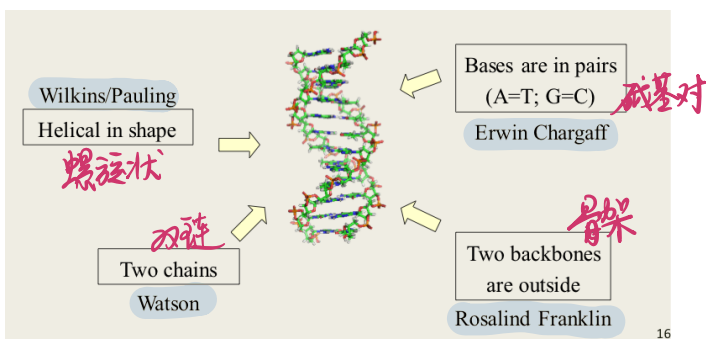
→ DNA半保留复制

* Hypothesis - Deductive Method

1. Identify the **hypothesis** to be tested. 假设
2. Generate **predications** from the hypothesis. 预测
3. Use **experiments to check** whether predictions are correct. 实验验证
4. If the predictions are correct, then the hypothesis is confirmed. If not, then the hypothesis is disconfirmed.

假设 → 预测 → 验证 → 成功 ✓
失败

DNA结构:



Waston ("What is life")

Para 64: "Life was just a matter of physics and chemistry"