The Great Ideas Of Biology

1. The Cell
2. The Gene
3. Evolution by Natural Selection
4. Life as Chemistry

And an Emerging Idea…….

5. Biological Organisation
21. Leeuwenhoek’s illustration of animalcules (bacteria) from the
41. Theodor Schwann (1810–82)
"WE HAVE SEEN THAT ALL ORGANISMS ARE
COMPOSED OF ESSENTIALLY LIKE PARTS,
NAMELY, OF CELLS; THAT THESE CELLS
ARE FORMED AND GROW IN ACCORDANCE
WITH ESSENTIALLY THE SAME LAWS;
HENCE, THAT THESE PROCESSES MUST
EVERYWHERE RESULT FROM THE OPERATION
OF THE SAME FORCES."

SCHWANN  1839

"IN BOTH THE REJUVENATED INFUSORIAN
AND THE FERTILIZED EGG-CELL WE SEE
THE ONSET OF AN ENERGETIC
MULTIPLICATION BY CELL-DIVISION WHICH
LEADS IN THE ONE CASE TO THE
FORMATION OF MULTICELLULAR ORGANISM
AND IN THE OTHER TO A SERIES OF CELL
GENERATIONS."

BUTSCHLI  1876
51. Rudolf Virchow (1821–1902)
"EVERY ANIMAL APPEARS AS A SUM OF VITAL UNITS, EACH OF WHICH BEARS IN ITSELF THE COMPLETE CHARACTERISTICS OF LIFE."

VIRCHOW 1858

"WHERE A CELL EXISTS THERE MUST HAVE BEEN A PRE-EXISTING CELL ....... THE PRINCIPLE IS THUS ESTABLISHED ....... THAT THROUGHOUT THE WHOLE SERIES OF LIVING FORMS ....... THERE RULES AN ETERNAL LAW OF CONTINUOUS DEVELOPMENT."

VIRCHOW 1858
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Fig. 2.—Group of cells from the meristem or embryonic tissue of the growing root-tip of the onion, as seen in longitudinal section. Like the preceding figure this is combined from a number of separate camera drawings; several stages of mitosis having been brought together. At a, a are seen anaphase-figures, at s, s spiremes, at m a métaphase, and at t an early telophase.
63. Van Beneden’s illustration of the four chromosomes (‘anes chromatiques’) of *Ascaris maglocephala*, two paternal and two maternal
The two strands of the parental double helix unwind, and each specifies a new daughter strand by base pairing rules.
The Central Dogma of Molecular Biology

1. **DNA**
   - DNA duplicates

2. **Transcription**
   - RNA synthesis
   - mRNA

3. **Translation**
   - Protein synthesis
   - Ribosome
   - Protein in cytoplasm

4. **DNA to RNA to Protein**
   - Replication
   - Transcription
   - Translation

5. **Steps**
   - DNA to RNA
   - RNA to Protein
   - Protein synthesis

6. **Locations**
   - Nucleus
   - Cytoplasm
   - Nuclear envelope
   - Ribosome

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The diagram illustrates the flow of information from DNA to RNA to Protein, which is the central dogma of molecular biology.
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Chromosomes Replicate

Chromosomes determine Cell properties

CELL REPRODUCTION
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A fanciful model of the circuitry involved in cell signaling, with the extracellular factors on top and the transcription factors at the bottom.
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