Nature of the ideas: Every ever deepening everyday life is an open model. Meanwhile ideas can understand. Nevertheless ideas (as a whole) important in development. Reason for this: Basic theory of chemistry and physics.

Physics not been is (mainly) irrelevant. Chemistry calculations difficult in practice.


Aspects of chemistry and physics used:
- obviously: techniques e.g. X-ray diffraction, radioactivity, (electrochemistry, electron beam, etc.)
- but especially: bond distances and angles, hydrogen bond, Vander Waals interaction.

Stones chemistry: the one handedness - nucleic acid, protein, sugar etc.

Shows shape is important. e.g. many enzyme reactions.

The entire stereochemistry is important.

few basic principles: the habit: equivalence, inner, outer groups. Almost equivalence = coiled coil (virus)
The same ideas. DNA → RNA → protein, their success, except r-RNA.

And idea: nucleic acid replication due to base-pairing.

Also probably involved in protein synthesis (though not necessarily more complicated)

The two nucleic languages: the 4-letter one

The 20-letter one

related by the code

e.g. DNA → RNA, RNA → protein; unit held together by chemical (i.e. strong) bonds.

Great variety

1) how does this give the complexity required?

process: the one-dimensional nature of the chemical structure (remember corn-lukes)

the three-dimensional nature of the physical structure.

Analogy: the structure of a piece of art. English (as in Chinese)

2) why two languages?

the importance of natural selection — in all biology.

(idea: random mutation)
The requirement for natural selection:

1. Geometrical replication - diff. under

2. Meaningful random mutation necessary (i.e., "mutation" - not random)
   (gives an opportunity for natural selection) (emphasized)

3. Versatility

[4. Requirement for an association (e.g., a cell)]

Gene product must stay associated.

Thus, nucleic acid: idea for replication, but very

inversible. (probably no exact basepair

possible)

Protein:

Protein: basic structure is helix

single-stranded, marginally soluble in

water (hydrophobic groups rich inside)

20 different variables, with a variety of

possible chemical functions.

But probably bad for replication.

Hard to know how an elaborate system

could not do it. May be due to "origin" as historical

accident.
Are two distinct layers necessary for theoretical 

grounds, and to avoid confusion between the genetic code and the mRNA? (many agree regarding the choice)

Notice process is inadvertent explain

the central dogma (explained)

irreversibility due to energy put into it.

(also help to increase accuracy)

partly explain why altered acquired characteristics

not inherited.

math in biology and for special purposes

eg. very difficult

in any theory, difficult to unwind and relate to reality (gene theorem)

especially the economy of the cell.

lack of application of information theory in

molecular genetics yet.

probably due to very few noise of the channel

in that unique set too big.

(replacement for lost or damaged DNA)

repair mechanisms?)
Molecular Genetics

Show the gene is made of a linear one, it must be a polymer.

Then it is made of acids, and it acts as a code.

Problem: Are there carriers? Listed: Arkansas. DNA.
Remark on methods

Some experiments done on liver cells; some on
punished part of broken cells; some are both techniques.

usually (so can be repeated many times)
method must be rapid, and sample in work
on small quantities

Technique for separation: ultra centrifuge
electrophoresis
Chromatography - columns
- paper

(see also chemist)

Study of physical chemistry

Technique for detection and recognition
- U.V. absorption
- Radioactivity

Subject has advanced work because

methods so far
(in addition to a good academic theory)
The Structure of DNA by X-rays (often self-heating)

work of Wilkins and Franklin

Nature of Structure

preparation of DNA: break open cells, selecte precipitate.

can be fairly pure, but damaged following man.

technique of pellets does 60% per alignment, an art.

control of humidity (also the salt, and pH)

taking x-ray photograph. large exposure, need thin amount of material (carbon etc.)

What do X-ray see? electron density: not base sequence.

repeating structure gives discrete spots. Examples:

note a fibre diagram; crystalline, etc.

To solve structure: Fourier transform: amplitudes, but not phase.


Model-building: distance and angle known.

rotating and physical content are not known, but obey rules.

Good for for all models.

base pairs in a crystal.

- ethyl guanine
- methyl cytosine

[AT pair different]
Meselson - Stahl expr

Ultra centrifuge (continuously available - two types)

Various ways to use: boundary sedimentation.

Sucrose gradient

density gradient centrifuge (Viniograd)

Density gradient centrifuge

Density gradient centrifuge

Explain a method.

Use of heavy & isotopes, e.g. N14, N15.

describe experiment: grow many generations in N15.

Time zero: change to N14.

Later time, break open & pur into cell.

DNA "chromosome" broken into pieces, but still high Mw.

Later do we expect?

Results

Show a duplicate.

Subsequent experiment show up end to end and almost certainly a two chain duplicate.

KORNBERG — JOSSE

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Note: Nearest neighbor experiments use of radioactive isotopes

Results: DNA has chain average composition, sequence not random.

design of experiment

result (control can be done twice)

show chemin may go opposite direction...

By mutants

[mutagen]

[mutagen]

how can we pick up mutant

alpha technique

recombination, linkage, mapping

result: map will show

A lot of time do in-house test

To show two genes, e.g., Drosophila
Fine Genetic Mapping

Rearrangement of genes, shown

1. gene, arranged in a linear (circular) array.
2. a set of genes is linear.
3. many distinct sets inside a gene.

Benzer

key example: the 
locus of phage T4. Explain growth cycle

B K

wild mutant, genome
 mutant, genome

cancerous

[acridine]

Now, we can pick up mutant

selective technique

method of genetic cross, using selective technique.

map distance.

deletions mapping

result map with many sites.

If lots of time, do chi-square test.

to show two genes, or cis/ trans.
Eukaryotic vs. eukaryotic

Favroshy's result: A probe of tryptophane synthetase of E. Coli
work of Sarnatli, Stryker & Bremer, and Bolle.

Head protein of phage T4.
Major protein of head protein, major late protein.

More radioactive label goes into this protein.
No need to purify.

Special class of mutant, "amber"

Host A
Host B

Amber mutant.
Mutant "wild" chain.

Chain terminated. Simplified.

This can be grown on host B, but tested in host A.

Series of amber mutants, picked up by hand work. Map - s

Chemical test in host A.
Label in intact cell with radioactive amino acid

Break open, (remove DNA). Digest with trypsin
do one-D paper electrophoresis, to see which
peptide(s) there. Repeat with 1) diff. amino acids; 2) pepchain trypsin; 3) diff. enzymes. Result