Gene in lower and higher organism

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<th>10 mm</th>
<th>1 in</th>
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What are genes made of nucleic acid?

Nucleic acid. Two great families.

DNA
(small thin double chain molecule)

RNA

Each a backbone + side groups = Base, 4 types.

(Nucleic acid)

Double Helix Base-pairing only

Life instructions written in a language with 4 letters

How big are the instructions?

 hunts: how many bases (≈5p) in the nucleic acid.

a very small virus SV40 ~ 5000 bp

often E. coli 3 x 10^7

Drosophila 10^6

Man 3 x 10^9

Amphiuma ~ large eel. 10^11 bp.
In lower organisms eg bacteria
( yeast is a 'higher' organism : 20 is man)

- code for protein
- code for gene
- code for triplet
- code for chemical family
- code for 'machine tool of the cell'
- genetic dictionary

S. u. to has gene length 5-6 (??) gene
E. coli has prob. has 2000 genes.

man has 3 billion genes

Brain gene estimates only approximate gene 2-50,000

Why this difference? (some sort of problem in morpho etc.)

Other major problem is

What is all that extra DNA for?

1. Some must be "junk" ie have a less specific function (newspaper for wrapping up fish and chips)

Some e.g. have lot of ATAAA up to 40%

In another there jnjk DNA is simple sequence
but only 10-20% (name of cell organism)
2. Some DNA of intermediate complexity

function also unknown.

Is it for regulation?

complexity of higher organisms?

does this mean more DNA needed for control?

be more administration at the DNA level?

don't you know.

3. Much of this DNA is 'unique'

but not all code for protein

le "specific" DNA

also repetition of sequences.

but not in all cases, e.g. hemoglobin

Thus, this is a major area of our ignorance.

Many approaches

in order only two A's need to sequence it and find

the gene and test its function in the test-tube.

But, much more amount is need by multiple way.

use cloning techniques (genetic engineering) that use a "virus" (plasmid) make many copies (danger)
B packages.

Total length of DNA per cell = 2 x 10^9 cm.

How to package a cell with a nucleus 2.10 μ

Need to package for cell division

DNA multiplexed into the chromosomes divided into cells divide.

Better picture of chromosomes (mouse) (White Sands)

Contracting ratio (package ratio) 2 x 10^4 : 1

How is this done.

Arce of Rapid Progress

Special proteins used to help the folding up.

Main type called "histone."

4 main types, Mr 7,000-13,000 (~1000 amino acids + H)

Go together (H2) 8 make a full octamer to the cent
DNA wound on outside of ball

Balls are called nucleosomes. [Griffiths] 5040 5

Fifth type of histone. When added, make balls pack together. 5040 5

6 to form a filament. 2100 Å diameter.

Balls + their DNA (~7600 - 1140 bp) have been crystallized same template nature milk spacer repeat is ~200 bp 2

Approx 2 DNA turn/ball contrafre ratio ~ 1:7 5040 5

Must be more levels of winding

next level less certain: called a "sister" 5

a filament wound around 6 form a tube Mitchell-ell

1/2x (pick 5 to 6 balls /turn)

2040 Å diameter 7 300 Å Total contraction ratio 240
New level
very new, somewhat speculation
(Roh + Zercher in Denmark)
2500 Kappa cm, even finer time

Heated tube 4000 A (rare 300 A)
there can be seen in the light microscope

family regular (not double hook)

The picture, congested, appear to support this

Wicker

sort of shape.

The last makes a big contrast ratio \( n \times 40 \)
\[ n \div 40 \times 1600 \]

the tube... small kid: prob. film (in a collapsed \( \times 4 \) times)
prob. to se... another tube coil
hence showing in early photo.

perturb \( \times 5 \)
\[ 7 \times 6 \times 40 \times 5 \times 800 \times 8000 \]
what is figure required.
Then may now understand packaging for
mitotic chromome. But then an "exit"
really liberate one, are function ones. These
are or leave partly uncoiled.

How is packaging done?

due to special proteins e.g. histone
and other proteins help.

Cross - tie ??
do some of these persist in function? help
or is packaging used to control function
be to keep some set of gene active in
those where they're not needed?

Don't know: some proteins are likely to be
removed. Might have general answer within 5 years.