An Approach to Developmental Biology

23 Nov 70

Cherish your own enthusiasm

Molecular Biology - what lessons can we carry over to cell biology?

- E. D. Hinde's work

The phase of development is one organism, especially during experiments, the effort starts to often cease.

Our approach - choose one obvious problem, choose one organism for each one.

What problem?

1. Classical molecular biology of eucaryotes, replication DNA, RNA, protein, etc.
2. Membrane: cell membrane, nuclear RNA, protein, etc.
3. Membrane: protein, etc.
4. Cell movement - how it moves, why it moves in a particular direction.
5. Cell shape
6. Cell surface phenomena
7. Protein hormones in chemical signal between cells
8. Postnatal information

Role of genetics can vary widely in molecular biology may have a "logic" of genetics.

Almost always useful as a tool while the whole excepted framework has been done, but not necessarily always much.
Kempshott, Ampthill Road

Bed. Second Hospital
Scurvy

Sailor of Russia

Clinic 4

Man tells me what to do
level of explanation for cell biology

not always necessary to go right down to the molecular level.

e.g. evidence of enzymes - may need to know some molecular mechanism of enzyme action.

but usually useful to go down one level in order to prove a postulated mechanism.

moreover experimental techniques at the molecular level are very powerful

e.g. hyper-purifying to show if two proteins are related.

Example of our work

Sydney Brenner (crick only)

small sort nematode nematode (Caenorhabditis)

1 mm long - 4 week life cycle - 200-300 pupae per egg, months.

Grow on - E. coli, defined medium

- 2 month cool - indefinitely in liquid N2

clone & self-fertilizing hermaphrodite - occurs in males & transferred from

summary

- genetics - excellent - 20 behavior etc.
- nematodes - very hard work
- behavior - not easily defined, not measured
- evolution - not yet started; looks difficult (intermediate) etc., etc.
these cells nearly on our work.

Peter Lawrence
(Mary Murray) ( Wanton)

Michael Locke
Rhodinia

5 larval stage adult
mead of a thorn

result

feed

adult

appendix on adult

linear rather sparse

cur and spine
move sideways

more 

25

25

go

be some "accounting"

simple model: source, sink, feedback (especially soft

concentration gradient: greater slope = wider = more..."

90° + diffusion: pattern depends on

measuring angles of pattern

some model: callus within time:

"pumping" constant parameter

later does + length on time: double adult

"cell division" - doubling

computer simulation
1. Rhodium - 2.5 x 3.5
2. 
3. $\Rightarrow$
4. $\Uparrow$ equiv.
5. $\downarrow$ dith.
6. Go = 111 =
7. $90^\circ$
8. $90^\circ$ sink, expr. dith.
9. $90^\circ$ sink - relaxed.

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Can see the data. $90^\circ$ ok.

Confront sin 2.5, $90^\circ$ makes asymmetrical.

new box on asymmetrical after I am.

try simulation.

Some model - how some such cephean stranger.
Cell mobility - nearly work of others

Hypothetical speculation that due to actin-myosin system.

Hypothetical - actin decorated slime mold.

Hypothetical actin decorated actin with residual heavy meromyosin.

Hypothetical decorated actin with residual heavy meromyosin.

Hypothetical actin decorated with residual heavy meromyosin.

Hypothetical actin decorated.

Dick Fine

Hypothetical bean of chick - decorated cell myosin

Two soluble proteins there in large amount.

One (5,000) has calcium clathrin.

One (45,000) may be actin - hypomann.

Cytodilatans B Carter (Nature, 21967)

Mold: slip movement of foreskin - quick.

Tends to slatter cells - reversibly.

Lew cells & co-worker (Pepe...)

Hypo movement of growth cone of nerve cell, enhanced by us.

Now you know for - adherent slime molds, plant, etc.

Claim choangomas

Thus two issues.

1) Find (molecular) site of actin of cytodiilatans in the test tube.

2) Natural history of adherent elements in cells.
Ream to meet: to initiate a second discussion, team in the private discussion held earlier.

our interest,

mainly development (no. nervous system)

also, but less so at the moment, other of

approach

1. avoid classical problems

2. such problems e.g.,

- cellular and organ (nervous)
- protein, information
- smell, product
- cell movement
- cell shape
- cell division

3. components: cell surface, membrane enzymes, specialized molecules

chosen here topic for each subproblem

(fibre, unspontaneous division).

The perfect problem

- significant
- no long question
- techniques available, a can be done
- expected results certain
- no one else working

Our work: our immune system

no one else working

1. where else, how are we? results - helicin, pol

- deoxynucleosome

2. how much? preliminary test

- assume 15% hits - obtained?

often working:

- antibody, cloning
- importance of total antibody
- cell fusions
- hybrid cell surface
- FdR
level at which cancer begins
no more in molecular context unless it helps on
its cellular level
my answer can be how deep to probe
(ultimately, all molecular processes are of interest)
Embryology of multicellular organisms

Many problems - eg. gene control - under and hormon, cell migration - eg. pigment cells, motility and of.

but also how to determine shape and specific position of two nerves.

Neuronal specificity

- Adult: Spermatagonia or neurons - rotated eye, studied 1) behaviour, 2) histology.
- Gaze: fixation, on developing Xenopus.
  1) Early
  2) Later.

found different time for the two cases.

so. not due to function.

prohibited two systems of coordinates in eye.

[recess rend, or displaced junction]

how does or set up "coordinates"?

1. phase model of Mendel et al. & Baran Schedar.
   ec send a current relative, ynd.

2. "gradient" model: [historical - for a bad name]
   
   for example, due to diffusion.
   
   source + sink -> steady state change.

   never mind how.
Is diffusion far enough? Vector with $A \frac{L^2}{t}$.

Value of $D$: water 20°C: small molecule, $5 \times 10^{-6}$

Small protein, $1 \times 10^{-6}$

Vectors a cell? between cells?

Time, p.m. 3-4 hrs.

Suggest distance about 1 mm.

Contact theorem (Sperrai)

Half-saturation:

Typically 50 cells; 500 mm = 1 mm (mm 6 100)

Size quoted 20 cells.

Note: law of the process.

In diffusion, this means mean actual path of a marked molecule.

May happen both in field, for 2 cell walls.

- e.g. Stone coldness (muslim path)

After competition:

Stress water (low area):

- pumping mechanisms.

- all cells become some sour side.
very unlikely to be accessible

A model by results from simple mechanisms (e.g., sphere)
became easier and more complex models.

These are valuable because they suggest new types of
experiment.

- e.g., try to see what goes from cell to cell
e.g., tight junction,

- can cells polarize?
  - membrane?

- can added chemicals control an assay?

Model systems

3D looks too complicated

2D - sheet of cells, tissue culture, one layer of cells.


Lipski, want - Peter Lawrence

1D System - Sydney, Richard Lewis

also - not at all relevant

too early, too many

Finally, the main issue, the problem:
- the sudden of the audience
  - confusion & strain arisen (the idea of
    the audience)
  - expression & make right intext.

Lewis, Bristles ete.