NRP Feb 9, 1968

A. Questions

Molecular Rules for Cell Communication

1)
1) Kinds of molecular signals?
2) " " " receivers?
3) " " signal-receiver pairs?
4) " " translation?
5) Mechanisms for modifying translation?
6) Rules for Cell Assembly?
7) Kinds of cells?

B. Expt Approaches

2) In Vivo • Genetics as a tool to dissect function.
1) Mutation
2) Clones - Nematodes - Fruit fly
3)
4) Fixed cell # ~800 / mm
5) Constant cell position ~ 170 Nerve cells
6) Generation time = ~ 10 hr
7) Techniques
1) Removal
2) Behavior
1) Normal Response
2) No
3) Neg.

4) In Vitro "pure"
1) Obtain populations of each kind of cell. (& / or symptoms)
2) Dissociate & fractionate cell A population
3) Others
B
C

Questions

1) Kinds of signals

2) Kinds of receptors

3) Kinds of signal-reception combinations

4) Kinds of cells

5) Kinds of signal translation by cell

6) Mech. for modifying "

7) Rules for cell-cell assembly

Approaches

1) In Vitro.

1) Methods for separating populations of cells A B C

2) Others

2) In vivo

Genetics of Dict - correlate function & molecule.

Review NRP Ch 4

Systems

1) Adler – Escherichia coli – Light
2) Delbrück – Phycomyces – Light
2) Brenner – (Myelb) Nematode

3) Benzer – Drosophila

4) Myelb – Tissue Culture
1) Cell segment
2) Oncogene
3) Bacteriophage Markers

5) Eto – Glioblastoma

6) Lipmann – Protein Synthesis
7) Magasanik – Effect on Uptake of Nitrogen on E. coli
Hela cells.

8) Receptor Proteins – Oncogenes.
1) Affinity labeling

1. Strategy

2. Objective

3. What are the rules for expression

4

5. Where is interest the problem of diff. stage of development

6. Basic problem - ~~Discovery~~ for programming info by
~~molecular~~ Discovery the ~~code~~ rule for ~~complex~~
~~communication~~ communication of molecular

1. ~~How simple?~~ How low or evolutionary rank?
2. ~~Probability~~ of Universal rule?
   Universal Logic and
   ~~Computer~~ Logic Codes ~~Computer~~
3. ~~Triplet~~ ~~coding~~ guidline ~~Universal~~ genetic code
   10 ! Russian Code evolved. Prob. for
   2. Predict ~~language~~ ~~universal~~ Logic
   ~~Genetic~~ Genetic Codes
   ~~Kauffman~~ logical schemes.
   ~~Pattern~~ ~~Organization~~ ~~neural~~ neural net (Memory)
   3. Age of neural code Code vs genetic code

6). Use simple system.

1. Logic

2) Molecular mechanics

3)

4) (Provided setting)

5) Wiggle until $\circ \to 8 \to \infty \to$

2. Selective

gene amplification 1) Select Gene Regulation. Enzyme

1) Zeal 2) Cell → 2) Select cell population. Immune

response amplification 3) Select a set of synapses.

7) Strategy — function of tools. What is doable.

1. Adapt a function

Build molecules and

(Creating)

is the function of molecules. The step in

2.

1) In Vivo
2) In Vitro

1) Genetics - Genetics
2) Embryology
3) Tissue Culture
4) Biochemistry

8) Experimental Approaches
1. Genetic Mutations to dissect physiology
a) Look for differences in Genetics, Embryology, Biochemistry, Cell Biology
1. In Vivo, Test genetic
2. Easier to Genetically manipulate
2. Generation time

4) Nematodes

c) Drosophila

[redacted]

2. Embryology
1. Useful. Developmental abnormality
2. Restrictions -

3. Cell Cultures
1. Cell types Differentiated Nutrition
2. Tumor cells not differentiated functions
3. Organ cell - [redacted]
fibro

4. Biochemistry
Cell free system
identify [redacted] single molecular components.

1) [illegible] DNA-RNA-Protein [illegible]

1) [illegible]

1) [illegible]

2) [illegible]

2) a) [illegible]

b) Number of [illegible]

c) Relation [illegible]

Units

A. 1. Kinds

2) Number of [illegible]

3. Unit-Unit Relation

1) Cells

2) Organs

3) [illegible]

4) [illegible]

1) Memory.

2) Dependence.

3) Training.

5)

Strategies Planned

1. Genetics ~~is not~~ for ~~complex~~ ~~complex~~ traits.
   1. Mutants in Conditional lethal ts 240K
      30 Mutants.
   2.

Strategy (ies)

1. Systems
   1. Requirements
      1) Mathematical analysis, Determination of changing
      2) Modeling at systems:
         a) E. coli as organism
         b) [redacted]
         c) Evolution of rules.
2. Tools of Molecular Biology - Quantitative vs Descriptive
   a) Genetics
      1) Base sequencing
      2) Genetic Engineering
      3) Eucaryotic genetic analysis
      4) Create biological
   b) Biochemistry
      a. Homogeneity
      b. Assays
      c. Cell Markers
   c) Embryonic Development
      a) Life cycle mutants. Age dependent
      b) Antibodies
      c) Homogenates
      d) General Immunology
      e) Cell Synchrony
   4) Tissue culture
      1) Extracellular Synapse formation

I'd like to describe the problems that we're
studying currently. Until all the questions related
to the mechanism of generation + function are solved,
the genetic dissection of pole regulation of pole regulation
will be difficult.

NRP talk
2/8/07

Problems in lab -

1) Regulation - Differentiation
2) Differentiation of Neuron system
a) single cell -
1) Axon
2) dendrite (s)
3) Dendrite

3) Problems in lab - fellows
1) Cell - Development largely completed
1) Unmyelinated
1) Length unmyelinated
2) Synapses.
3) Synapses.
2) SRMN - Most diff. between myelin + Ecdysone
1) Onset pupa SRMN vs Ecdysone
1) B. regulation upon-reg.
2) Xenopus neural - adult
Xenopus adult 17 mth vs larvae

3) SRMN Ratio 3) 3) Chick embryo vs adult
AASRMA
4) Axolotl T2 low SRMN
1) Transdifferentiation

5) ← 5) low SRMN recovery of A

1) Axon Skeleton

Zebrafish

SRMN

Cerebellum

Coupled Reporter

RNA plasmid Tumor - Knockdown - Injection

6) Behavioral & Developmental neurotox parameters

4) Sum up.

1) Different ~~[illegible]~~ species ?!

2) ~~[illegible]~~ - ~~[illegible]~~

1) Simple system

* 1) Nematode

(2) Artemia

* 3) Insect

* 4) Tissue culture

* 2) ~~[illegible]~~ - Mutants

NRP Answers Talk. (Final)
Strategies of Simple Systems
2/5/09

Strategy

2. Objective: ~~Deduce~~ on the basis of explicit data
a) Digital ~~multivalued~~ ~~symbolic~~ information processing: ~~the~~ molecular rules, the logic ~~of~~ the ~~brain~~ ~~Artificial~~ ~~Intelligence~~
~~Rules~~, logic at molecular level ~~of~~ the brain
~~Sequential~~ ~~system~~
1. Yes
2. No.
Maybe

2. Rules for construction of brain.
1. Genetic Program.
a) ~~Differentiation~~. Eclipse
b) Evolution of new genetic principles.
~~for Brain~~.

~~20 years~~ ~~Limitations~~ ~~sequential~~ ~~random~~ ~~restrictions~~ ~~the rules~~ ~~in~~ ~~program~~ ~~the~~ ~~cell~~
1. Nodes of ~~questions~~
2. Order
3. Length of the gene

2. Analysis of genetic information
a) 1) Eclipse 3000
2) Drosophila 175,000
3. Chick 750,000
4. Man 2,000,000

b) Duplication

c) ~ 500,000,000 cells / generation

d) Simple rules seem possible

~~Would~~ ~~be~~ ~~possible~~
2. ~~Is~~ ~~it~~ ~~likely~~ that the logic will be numerical?
1. Genetic code.
2. Cellular Metabolism — Computing brain
3. Predict largely numerical logic
Eclipse

4. Age of genetic code vs neural code.
   1. Event vs population events
5. Predict ~~protein~~ sequence (sequence of events) in ~~wiring~~ diagram
   a) Boxes must embed in ends ~~to~~ ~~be~~ ~~seen~~ machine code.
   b) ~~neural~~ kinds of units may evolve. Allow ~~or~~ experimentation. ~~upset~~ the ~~wiring~~ and ~~approach~~ approach. (or more) ~~until~~ ~~will~~ ~~be~~ ~~an~~ ~~element~~ ~~will~~ ~~be~~ ~~sufficient~~ ~~to~~ deduce ~~the~~ rules ~~to~~ ~~prove~~ ~~that~~ ~~the~~ deductions are correct ~~in the simplest, most elegant way~~.

6. Problem is to ~~identify~~ molecules ~~and~~ ~~the~~ ~~system~~ ~~that~~ ~~will~~ ~~be~~ ~~called~~ ~~upon~~ ~~to~~ ~~handle~~ ~~the~~ ~~incoming~~ ~~and~~ ~~outgoing~~ ~~messages~~.
   1. Genetics ~~powerful~~ tool. Create Bridge
      a) How ~~can~~ ~~we~~ ~~use~~ manipulate ~~and~~ ~~control~~ ~~the~~ ~~genetic~~ ~~material~~
         1. ~~Recombinants~~
         2. ~~Mutants~~
         3. ~~Clones~~
         4. Prosthetic
         5. Mammal.
   2) Tissue Culture
      1. Cell types – Different Problem
      2. Tumors
      3. Organ
      4. Hybrid
   3) Embryology