Science Education & Communication

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Biology

• The framework for understanding the function of an organism
• The "theology" of our profession
Mentorship

New, multidisciplinary, rigorous approach to the education of the physician-scientist
Biology

An elegant expression of chemistry, physics, and mathematics
What is the biological basis of consciousness?

Why do humans have so few genes?

To what extent are genetic variation and personal health linked?

How much can human life span be extended?
What controls organ regeneration?

How can a skin cell become a nerve cell?

How does a single somatic cell become a whole plant?

What genetic changes made us uniquely human?
Is an effective HIV vaccine feasible?

What is the nature of gravity?

Are there limits to rational chemical synthesis?

Can we predict how proteins will fold?
How many proteins are there in humans?

How do proteins find their partners?

How many forms of cell death are there?

What keeps intracellular traffic running smoothly?
What enables cellular components to copy themselves independent of DNA?

What roles do different forms of RNA play in genome function?

What role do telomeres and centromeres play in genome function?
Why are some genomes really big and others quite compact?

What is all that "junk" doing in our genomes?

How much will new technologies lower the cost of sequencing?
How do organs and whole organisms know when to stop growing?

How can genome changes other than mutations be inherited?

How is asymmetry determined in the embryo?
How do limbs, fins, and faces develop and evolve?

What triggers puberty?

Are stem cells at the heart of all cancers?

Is cancer susceptible to immune control?
Can cancers be controlled rather than cured?

Is inflammation a major factor in all chronic diseases?

How do prion diseases work?

How much do vertebrates depend on the innate immune system to fight infection?
Does immunologic memory require chronic exposure to antigens?

Why doesn't a pregnant woman reject her fetus?

What synchronizes an organism's circadian clocks?

How do migrating organisms find their way?
Why do we sleep?

Why do we dream?

Why are there critical periods for language learning?

Do pheromones influence human behavior?

How do general anesthetics work?
What causes schizophrenia?

What causes autism?

To what extent can we stave off Alzheimer's?

What is the biological basis of addiction?

Is morality hardwired into the brain?
How are memories stored and retrieved?

How will big pictures emerge from a sea of biological data?

How far can we push chemical self-assembly?

Can we selectively shut off immune responses?
Physician-scientist Education

- Begins in undergraduate programs
- Understanding of the human organism is the ultimate goal
Undergraduate Education of the Future Physician-scientist

- Chemistry, physics and mathematics departments need to come together and teach biologically relevant content, in a RIGOROUS way.
- Strengthen requirements in science for medical school admission
Systems biology is the “study of biological processes using a combination of mathematics, computation and empirical observation.”

- Peter Sorger, Harvard Medical School
Physician-scientist Education

- MD - 17,000/year
- MD/PhD - 200/year
- Other – new programs to embed rigorous scientific training in MD matriculants
Physician-scientist Education

• Complement traditional MD and MD/PhD training by informing the study of the human organism
• New leaders of “translational” research
• Multidisciplinary approach
• More rigorous education in defined scientific discipline (a major)
• 5-6 year program
Physician-scientist Education

• The next generation of physician-scientists, whatever degree or degrees we impart on them, must be unquestionably credible and credentialed.

• The focus on the human organism should **NOT** be an excuse for warm and fuzzy science.
Physician-scientist Education

• The training of the physician-scientist does not begin and end in the classroom and laboratory

• The greatest inspiration for the inquiring mind should be the clinical setting
Physician-scientist trainees, with wonderful inquiring minds, enter a busy residency program and see a necessity to suspend intellectual curiosity.
Search results for: Intellectual Function, Altered

Adult Medicine, Obstetrics and Gynecology (1 title)

Most Relevant Topics:

•Just Rx Mrs. Jones and get her out of the hospital
No matter how creative we are in educating the physician-scientist, all will be for naught if we do not regain for them their most precious resource: the patient
Time for reflection
Medicine is more than simply the compassionate application of received wisdom, it is also the challenging of old customs, and the development of new insights.
Communication of science to the public, Congress, and the press
Training new physician scientists will be a hollow achievement without society’s understanding, celebration, and investment in their endeavors.
The Good News

2/3 of the public supports increasing public funding for biomedical research.
The Bad News

Less than 10% of the public can identify a research institution in their area
2/3 of Hill staffers don’t know where NIH funding goes
So who is to blame for this appalling lack of understanding of the investment in biomedical research?

We have to take much of the blame.
Media reporting presents two sides to every argument, giving the impression that there is a balanced debate about science, when in fact equal time, space, or credibility is given to a minority point of view.
Solutions

• Make education of the public about science an equal priority with the education of the physician scientist.
• Let our trainees know that it is not only alright to educate the press, but a responsibility.
• Equip our trainees with skills to write and communicate their science not only to their peers, but to the lay public.