

Basic Science, the Hope of Progress

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Biomedical science

- Major advances: X-rays, antibiotics, noninvasive imaging, genetic engineering
- The pursuit of knowledge for its own sake
- Solve problems indirectly

X-rays



Wilhelm Roentgen

Penicillin



Alexander Fleming



Howard Florey



Ernst Chain

The nature of discovery

- The pursuit of fundamental principles
- The product of untargeted research
- Knowledge is limiting

Roles of government and industry

- Government support of basic research, due to the long time scale
- Small as well as large countries must foster basic research
- Retain local talent
- Support young scientists
- Industrial support of technological development

Science and society

- Science is international
- Knowledge, education will not suffice for addressing societal problems
- Basic science as a paradigm for solving societal problems

Science and religion

- Seek to explain mysteries of life
- Science provides explanations, often in abstract terms
- Science based on objective, verifiable truth

the Rule of Law is “nothing less than the rule of reason, balanced by considerations of equity so that just results may be achieved in particular cases.”

- Aristotle

“a steady, upright, and impartial administration of the laws is essential, because no man can be sure that he may not be tomorrow the victim of a spirit of injustice, by which he may be the gainer today.”

- Alexander Hamilton

“The most beautiful emotion we can experience is the mysterious. It is the fundamental emotion that stands at the cradle of all true art and science. He to whom this emotion is a stranger, who can no longer wonder and stand rapt in awe, is as good as dead, a snuffed-out candle. To sense that behind anything that can be experienced there is something that our minds cannot grasp, whose beauty and sublimity reaches us only indirectly: this is religiousness. In this sense, and in this sense only, I am a religious man.”

- Einstein

Bridges

- Basic science is a literal bridge to understanding nature
- Basic science is a figurative bridge to the solution of societal problems, through the example of rationality and impartiality