

THE CASE FOR GOF EXPERIMENTS

Arturo Casadevall

Albert Einstein College of Medicine

Bronx, NY

BACKGROUND, DISCLAIMERS, ETC

- **I AM A WORKING SCIENTIST** (MYCOLOGY, IMMUNOLOGY)
- **I AM NOT A VIROLOGIST**
- **I SERVED ON NSABB FOR 9 YEARS (2005-2014)**
- **I AM THE EDITOR-IN-CHIEF, *mBio***
- **I SERVE ON THE ASM PUBLICATION COMMITTEE ON DURC**
- **I AM A BOARD-CERTIFIED INFECTIOUS DISEASE SPECIALIST**
- **I SIGNED THE CAMBRIDGE WORKING GROUP STATEMENT BUT STRONGLY OPPOSE(D) MORATORIUMS OF GOF EXPERIMENTS**
- **I CARE DEEPLY ABOUT SCIENCE AND ITS METHODS**

GOF EXPERIMENTS SHOWING H5N1 TRANSMISSIBILITY IN FERRETS

'this finding is of great value to humanity, because it suggested that a human H5N1 pandemic might be able to occur if and when similar mutations occurred spontaneously, as is characteristic of influenza viruses, along with conditions favorable for bird-to-mammal transmission'

Risks and Benefits of Gain-of-Function Experiments with Pathogens of Pandemic Potential, Such as Influenza Virus: a Call for a Science-Based Discussion

Arturo Casadevall,^a Founding Editor-in-Chief, mBio, Michael J. Imperiale,^b Editor, mBio

Department of Microbiology and Immunology, Albert Einstein College of Medicine, Bronx, New York, USA^a; Department of Microbiology and Immunology, University of Michigan Medical School, Ann Arbor, Michigan, USA^b

GOF EXPERIMENTS

- **TOOLS FOR HUMAN INQUIRY**
- **EPISTEMOLOGICALLY POWERFUL**
 - **NORMATIVE IN MOLECULAR MICROBIOLOGY**
 - **YIELD CAUSE-EFFECT RESULTS**
 - **DIRECTLY IMPLY CAUSALITY**
 - **REPRODUCIBLE** (SIMILAR RESULTS IN KAWAOKA, FOUCHIER AND PEREZ LABORATORIES)
- **ESSENTIAL FOR PROBING CERTAIN QUESTIONS**
- **NO ALTERNATIVES CURRENTLY AVAILABLE**

An Epistemological Perspective on the Value of Gain-of-Function Experiments Involving Pathogens with Pandemic Potential

Arturo Casadevall,^a Founding Editor-in-Chief, *mBio*, Don Howard,^b Michael J. Imperiale,^c Editor, *mBio*

Department of Microbiology & Immunology, Albert Einstein College of Medicine, Bronx, New York, USA^a; Department of Philosophy, University of Notre Dame, Notre Dame, Indiana, USA^b; Department of Microbiology and Immunology, University of Michigan, Ann Arbor, Michigan, USA^c

FOCUS ON SCIENTIFIC QUESTIONS RATHER THAN METHODS

- **WHAT ARE THE FACTS THAT WE NEED TO KNOW?**
- **WHAT IS THE RELATIONSHIP BETWEEN TRANSMISSIBILITY IN ONE MAMMAL TO THAT IN ANOTHER?**
- **WHAT IS THE RELATIONSHIP BETWEEN TRANSMISSIBILITY AND VIRULENCE IN HPAIV?**
- **WHAT IS THE RELATIONSHIP BETWEEN LABORATORY-ENGINEERED AND NATURALLY SELECTED INFLUENZA VIRUSES WITH REGARD TO PATHOGENICITY?**

FOCUS ON SAFETY AND NOT MORATORIUMS

- **THE INFLUENZA RESEARCH COMMUNITY IS HUMANITY'S BEST DEFENCE AGAINST FLU PANDEMICS**
- **THE 'PAUSE' ANNOUNCED ON 10/17/14 USED AMBIGUOUS WORDING: *What can be "reasonably anticipated" to result in GOF?***
- **MORATORIUMS ARE HIGHLY DISRUPTIVE TO RESEARCH AND COULD LEAVE HUMANITY MORE VULNERABLE TO FLU PANDEMICS**
 - WEAKEN FIELDS
 - ELIMINATE RESEARCH TOOLS
 - DISCOURAGE INVESTIGATORS
- **THINK CREATIVELY WITH REGARDS TO SAFETY**
 - SAFER STRAINS
 - STRAIN SPECIFIC VACCINES FOR LAB PERSONNEL

AVOID THE APOCALYPTIC FALLACY

'Repeatedly invoking the apocalypse can create a sophistry that we call the apocalyptic fallacy, which, when applied in a vacuum of evidence and theory, proposes consequences that are so dire, however low the probability, that this tactic can be employed to quash any new invention, technique, procedures, and/or policy.'



The Apocalypse as a Rhetorical Device in the Influenza Virus Gain-of-Function Debate

Arturo Casadevall,^a Founding Editor-in-Chief, *mBio*, Don Howard,^b Michael J. Imperiale^c, Editor, *mBio*,

mBio 2014