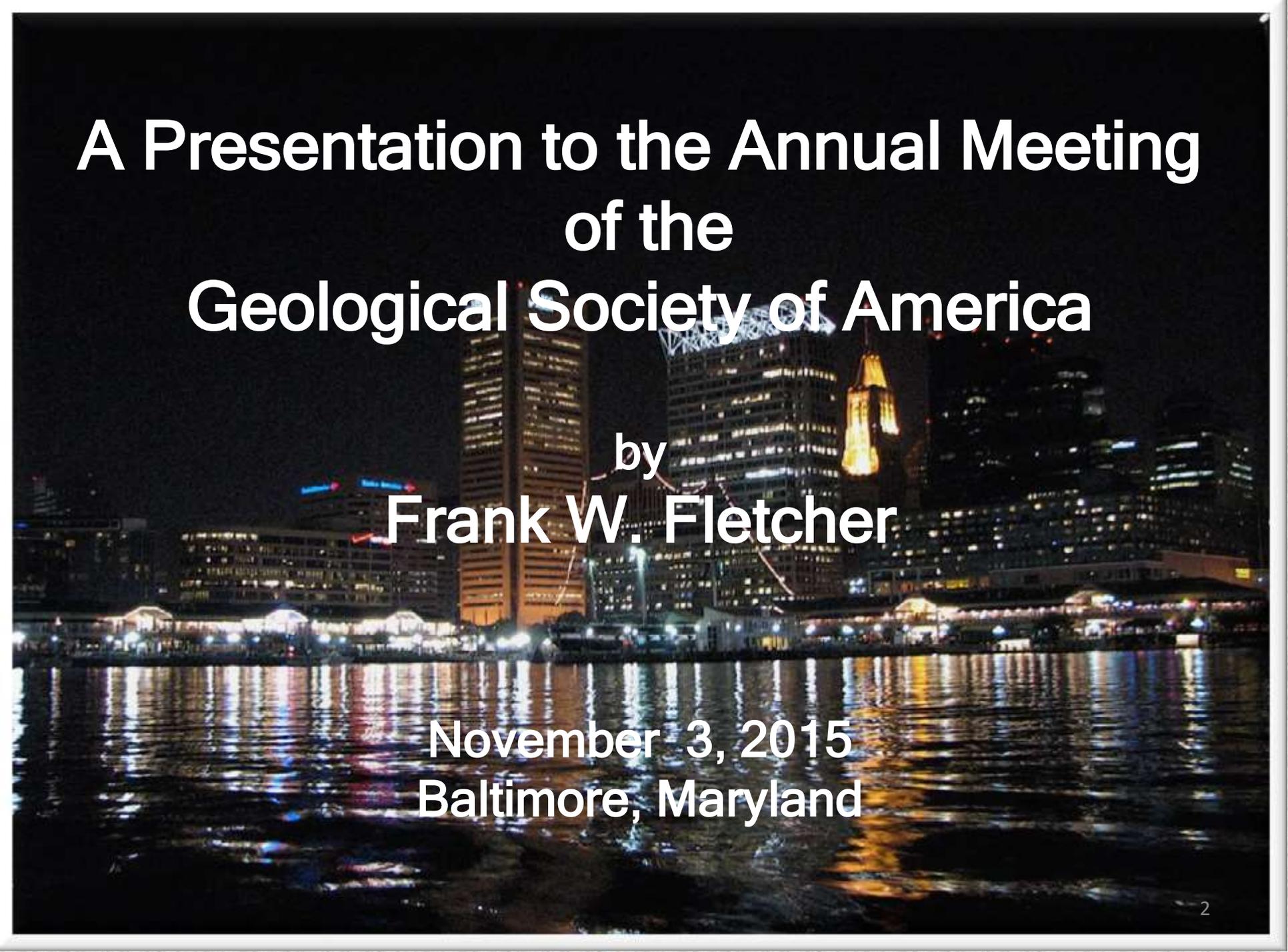


AN AX TO GRIND

How Special-Interests Promote
Pseudoscience, Deceive the Public,
and Subvert Policy Making

-- *and What We Can Do about It*



**A Presentation to the Annual Meeting
of the
Geological Society of America**

by
Frank W. Fletcher

**November 3, 2015
Baltimore, Maryland**



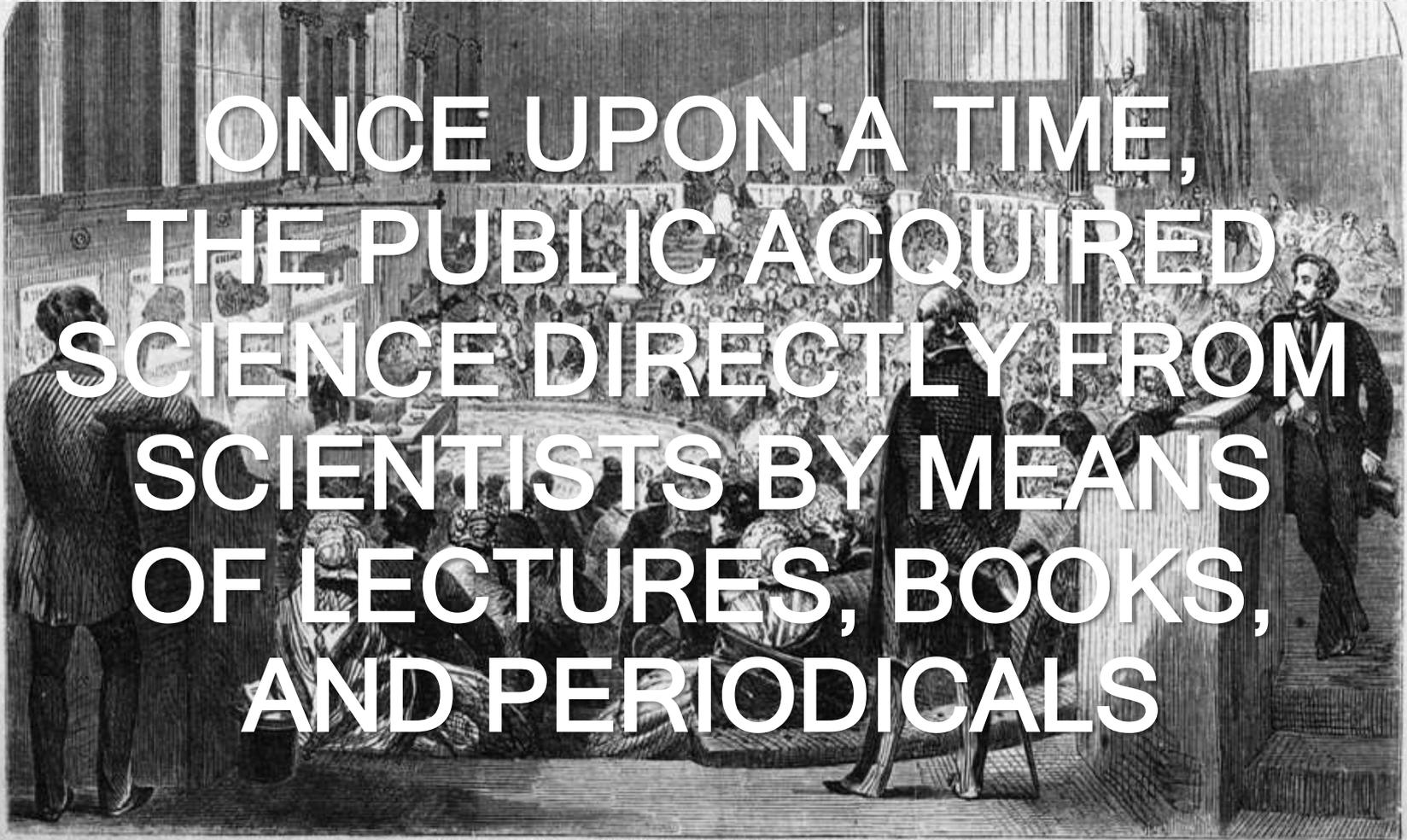
PERICLES

(c.495-429 BC)

“Just because you do not take an interest in politics doesn’t mean politics won’t take an interest in you.”

RICHARD OWEN LECTURES AT THE MUSEUM OF PRACTICAL GEOLOGY

ONCE UPON A TIME,
THE PUBLIC ACQUIRED
SCIENCE DIRECTLY FROM
SCIENTISTS BY MEANS
OF LECTURES, BOOKS,
AND PERIODICALS



PROFESSOR OWEN LECTURING AT THE MUSEUM OF PRACTICAL GEOLOGY.

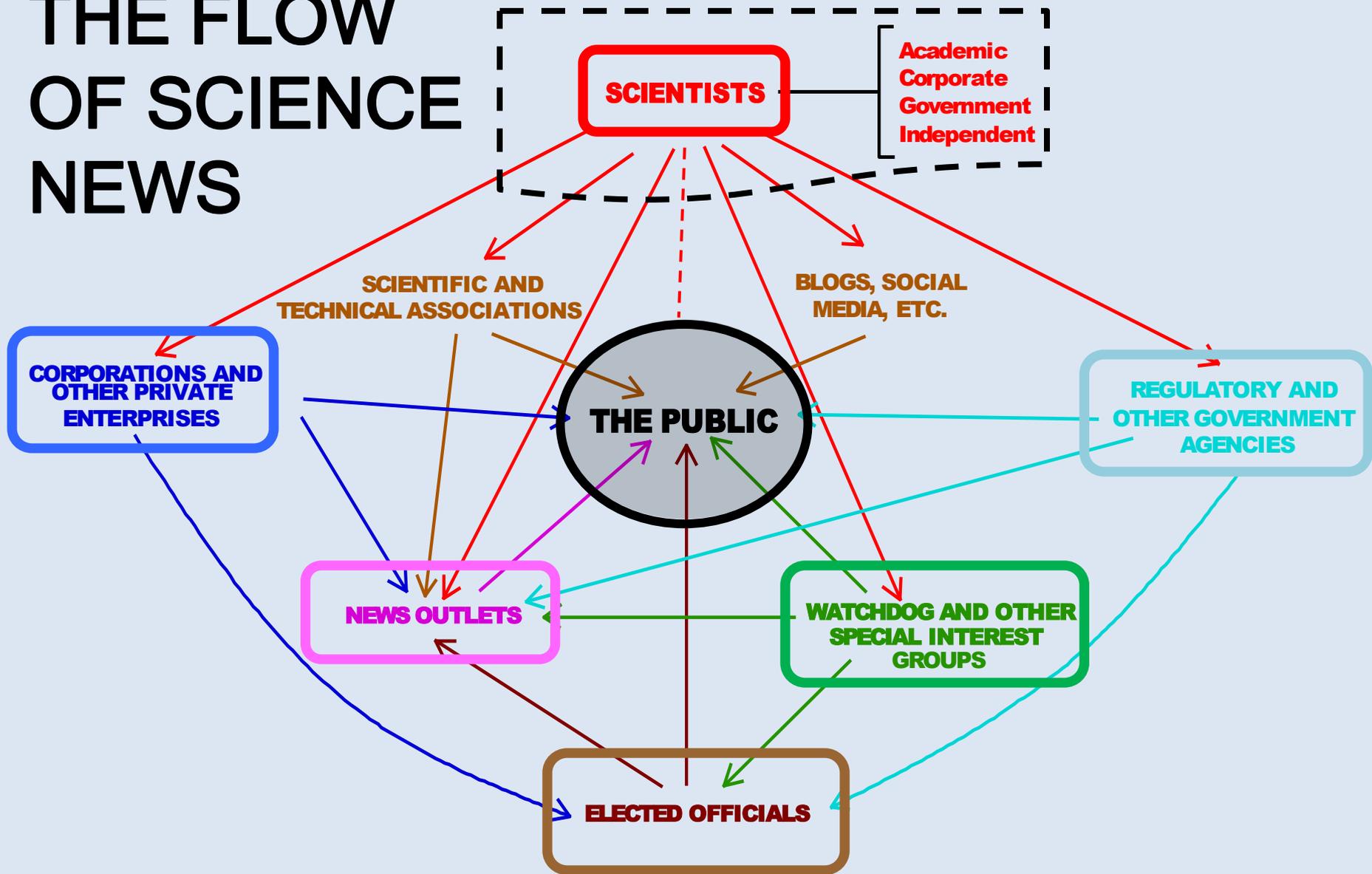
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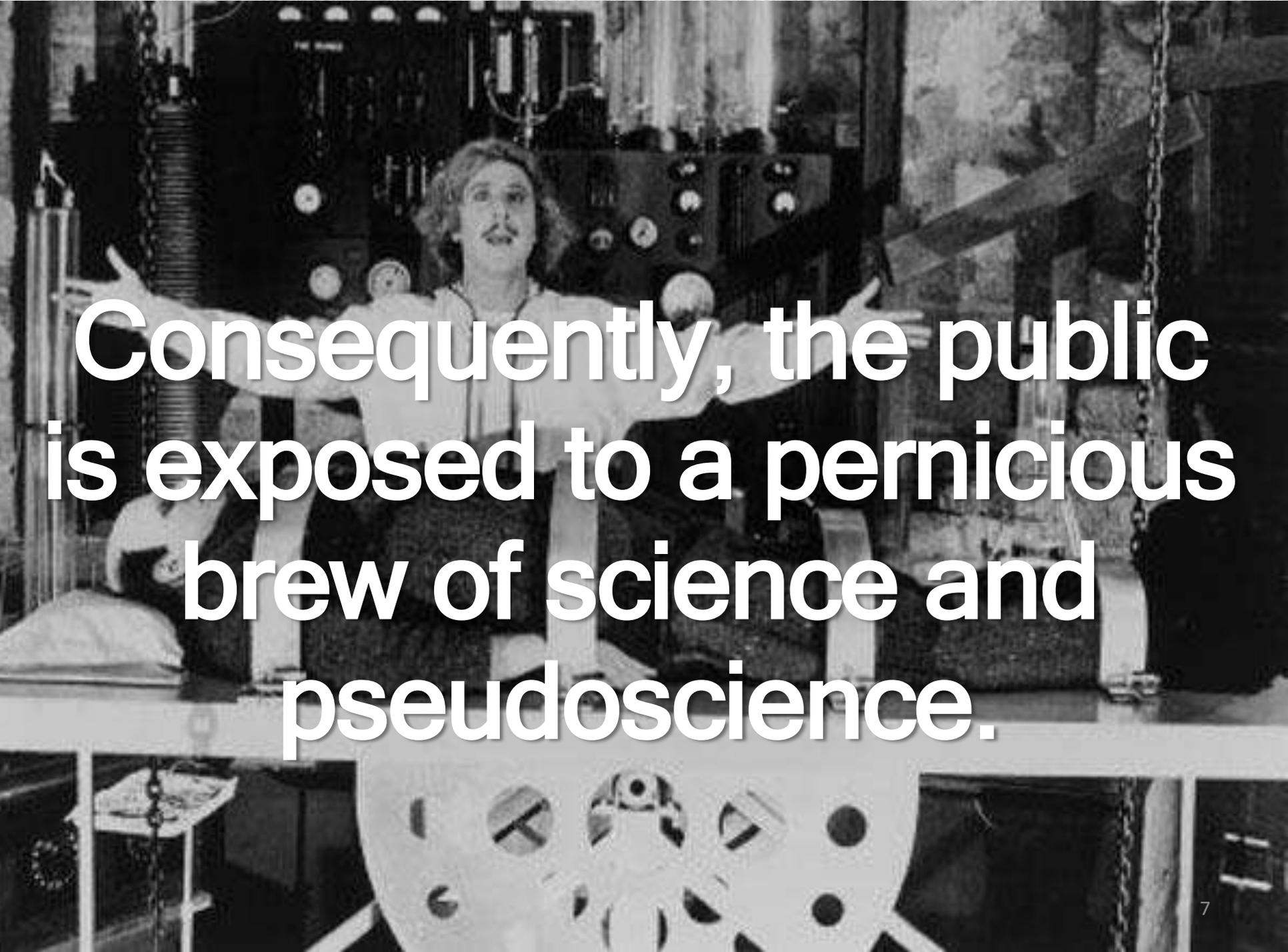


**TODAY, SCIENCE NEWS
FLOWS TO THE PUBLIC
FROM A WIDE RANGE OF
DIVERSE SOURCES**

– EACH WITH AN AX TO GRIND

THE FLOW OF SCIENCE NEWS



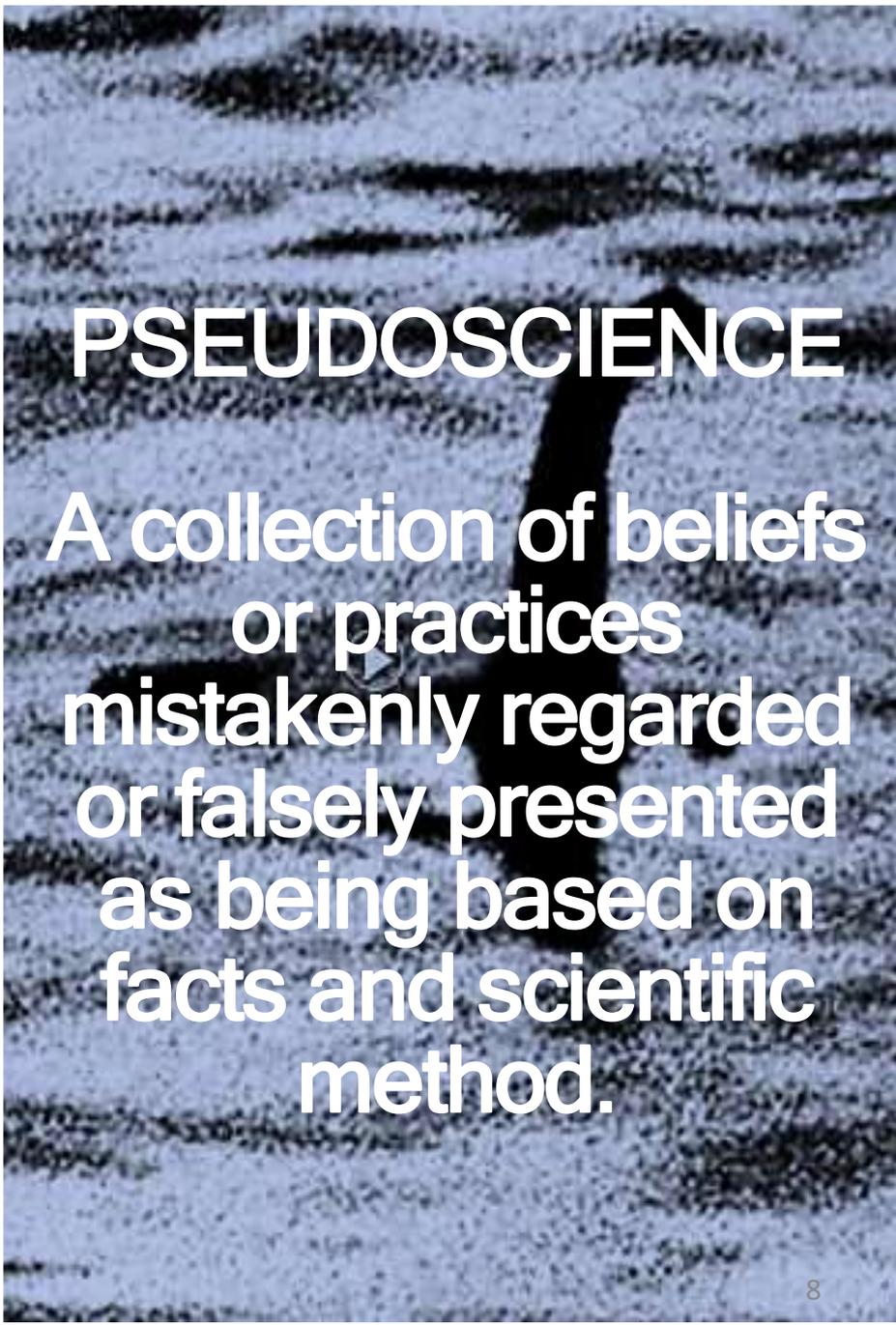


Consequently, the public is exposed to a pernicious brew of science and pseudoscience.



SCIENCE

The study of the natural world based on facts gained by observation and measurement and on general principles that describe and predict the relationships among the facts.



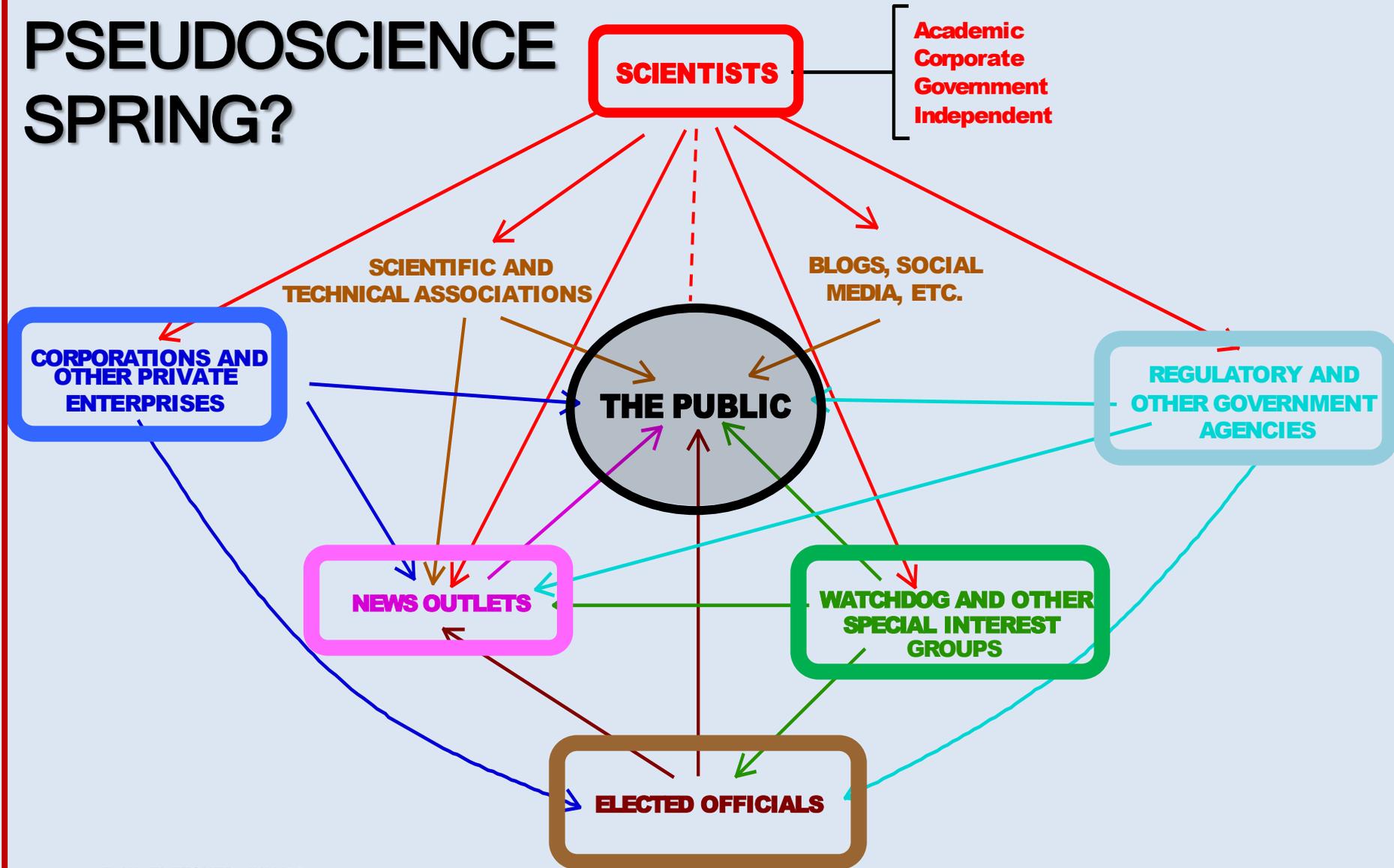
PSEUDOSCIENCE

A collection of beliefs or practices mistakenly regarded or falsely presented as being based on facts and scientific method.

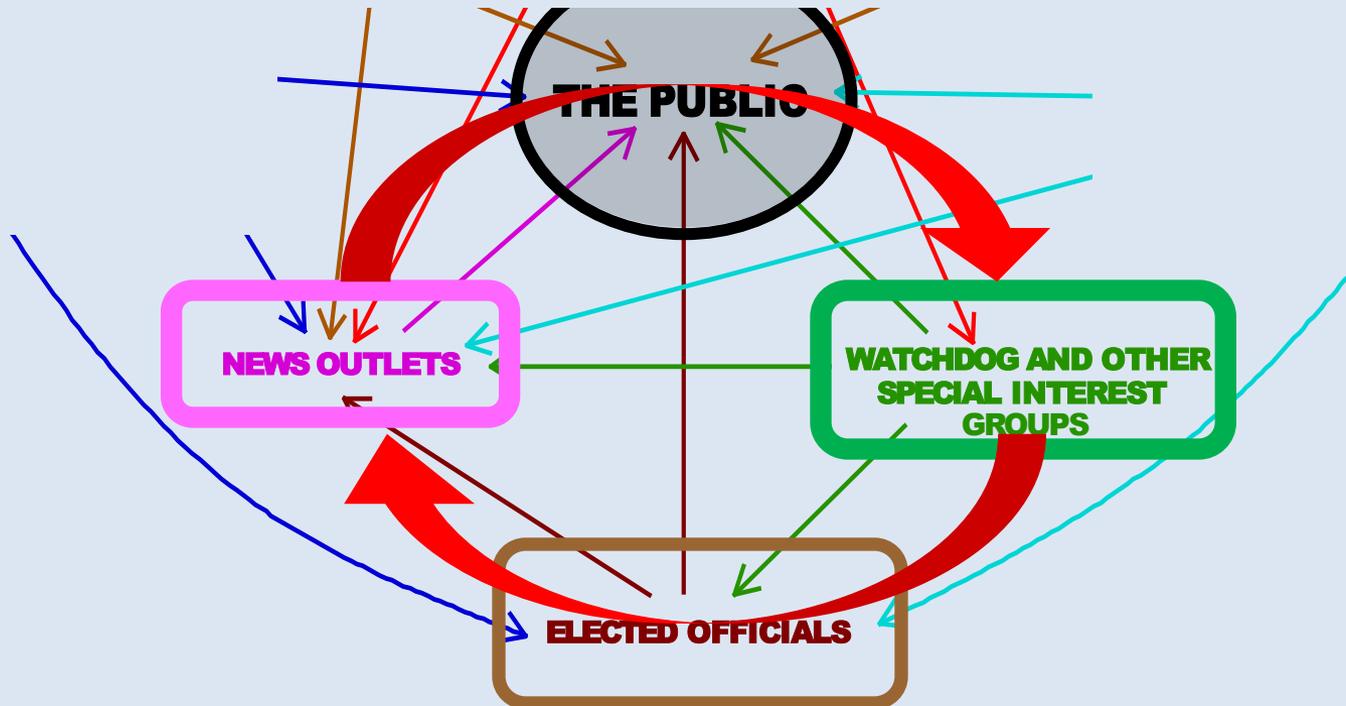
WHAT'S THE HARM?

- Pseudoscience is intellectually dishonest and a danger to health, safety, and the general welfare.
- It distorts our understanding of the natural world, creating false accounts of environmental and technological hazards and faulty assessments of their risk.
- It corrupts public policy and wastes money.

FROM WHERE DOES PSEUDOSCIENCE SPRING?



A PARTICULARLY INFLUENTIAL SOURCE OF PSEUDOSCIENCE IS AN *AD HOC* COALITION



THE HEART OF THE PROBLEM

When advocacy groups sacralize their missions, the lines between objective evidence and the promotion of their political and commercial agendas become blurred.



EXAMPLES OF PUBLIC POLICY ISSUES WARPED BY PSEUDOSCIENCE



**KEYSTONE
XL PIPELINE**



SEA LEVEL RISE



**HYDRAULIC
FRACTURING**



**COAL ASH
DISPOSAL**

Report: Dan River 'highly toxic' due to Duke Energy coal ash spill

POSTED 3:57 PM, FEBRUARY 6, 2014, BY WEB STAFF, UPDATED AT 11:06AM, FEBRUARY 7, 2014

FACEBOOK TWITTER GOOGLE+ PINTEREST REDDIT EMAIL



EDEN, N.C. — A certified laboratory analysis of water samples taken from the Dan River on Feb. 4 reveal that the water immediately downstream of Duke Energy's ash spill is "contaminated with extremely high levels of arsenic, chromium, iron, lead and other to metals" typically found in coal ash, according to a report from Waterkeeper Alliance.

Pseudoscience thrives. . .

When MEDIA OUTLETS accentuate the sensational and the confrontational, warping narratives in order to advance ideological or commercial aims

When SPECIAL-INTEREST ADVOCATES promote their efforts as sacred causes and put commercial interests before legitimate science

WHAT CAN GEOSCIENTISTS DO?

Rebut pseudoscience not by challenging its champions or their ideologies but by exposing the errors in fact and reasoning.

A person in a dark jacket is shown in profile, looking through a telescope or similar instrument. The background is a blue, hazy landscape with bare trees. The overall tone is serious and focused.

FALLACIES OF PSEUDOSCIENCE

APPEAL TO EMOTION

The use of emotion, particularly fear and threat, in place of rationality in order to attempt to win arguments.

CONFIRMATION BIAS

The tendency for persons to favor and seek out information that supports their beliefs.

HASTY GENERALIZATION

A claim or conclusion based on insufficient evidence.

BIASED SAMPLE

A biased sample systematically favors some outcomes over others. E.g., cherry-picked facts.

FAULTY CAUSATION

The erroneous assumption that one event must cause another just because the events occur together.

WHAT CAN GEOSCIENTISTS DO?

Advocate narratives based on facts and legitimate science in the news media and with policy makers.

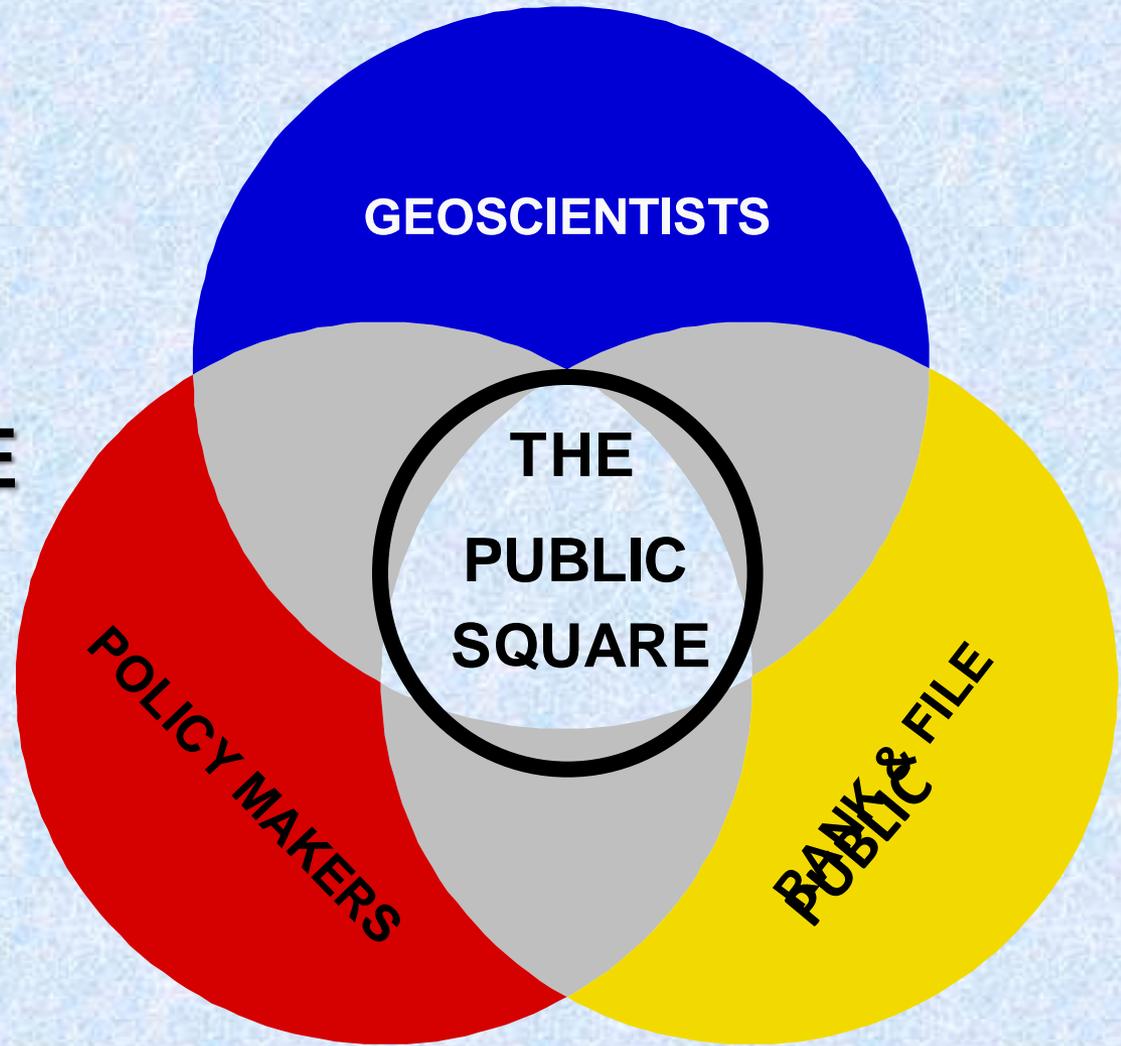
Uphold the reliability and trustworthiness of scientific findings.

WORKING THROUGH PROFESSIONAL SOCIETIES AND ACADEMIC DEPARTMENTS, GEOSCIENTISTS CAN

- Endorse legitimate science in mission and policy statements;
- Sponsor courses, workshops, and other educational instruments that examine the deceptive use of pseudoscience in the public square;
- Work with special-interest groups to promote the practice of sound science;

- **Fact-check media reports for scientific accuracy and communicating corrections of errors to reporters, editors, and news producers;**
- **Establish or strengthen partnerships with journalism schools/departments and conduct joint programs that promote accurate science reporting; and**
- **Use social media (e.g., Facebook, Twitter, or blogs) to publicize the abuses of pseudoscience, correct falsehoods, and support legitimate science.**

**GEOSCIENTISTS
PROTECT THE
GENERAL WELFARE
WHEN THEY
PROMOTE SOUND
SCIENCE IN PUBLIC
POLICY**



“Just because you do not take an interest in politics doesn’t mean politics won’t take an interest in you.”

Is it any wonder that every existing statue of Pericles portrays him wearing a helmet?

