



# Klíímaváltozás: nyilvánvaló és rejtett veszélyek



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Ökológiai Kutatóközpont**





# TIME is the most scarce resource

- ❑ We cannot stop climate change
- ❑ We cannot reverse climate change
- ❑ We cannot even slow it very much

**We must buy time to cope with what is coming at us ever more rapidly**

# One threat:

## the Emerging Infectious Disease crisis

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- ❑ EIDs are diseases affecting every species upon which humanity depends for survival and socio-economic development
- ❑ New diseases we have never seen before; diseases we thought we had eradicated

# Where do EIDs come from?

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- ❑ Water, food, air, casual contact, sex, wildlife, pets, anything that bites or feeds on us and the species upon which we rely
- ❑ Rural, urban, and natural settings
- ❑ **Temperate and tropical regions**
- ❑ **Developed and developing countries**

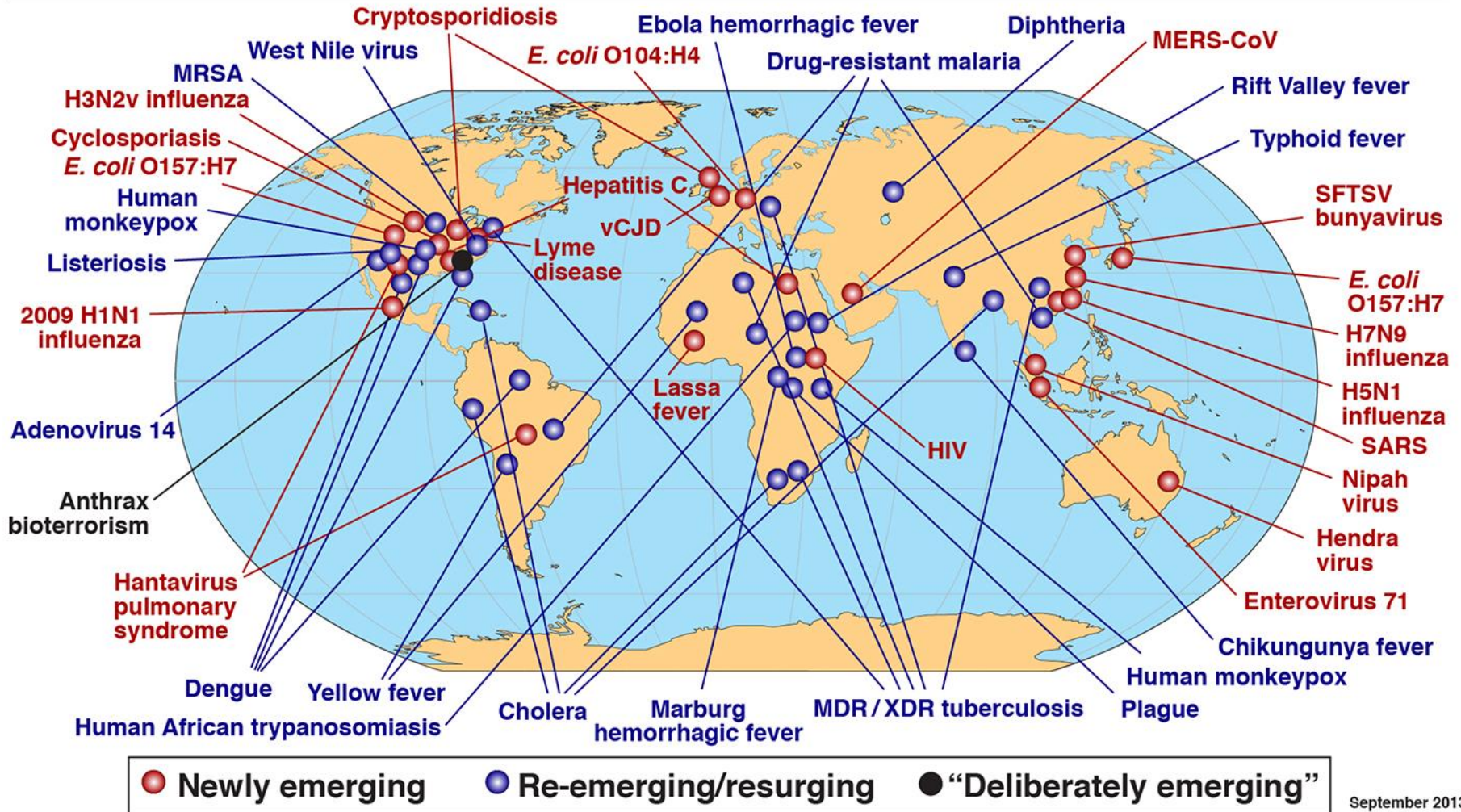
# Low probability, high impact EIDs

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- ❑ These frighten us the most, but they are not the major concern and expense
- ❑ Most international initiatives (e.g. OneHealth) target these, usually viral diseases



# Global Examples of Emerging and Re-Emerging Infectious Diseases



# High probability, low impact EIDs: Pathogen pollution

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new pathogen-host association



acute disease



co-accommodation due to selection for  
resistance



chronic disease, retaining the potential for new  
acute outbreaks

**Once established, they never disappear**



# The Parasite Paradox

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Pathogens are ecological specialists strongly co-adapted to their hosts

**BUT**

Emerging diseases occur rapidly  
Shifts to relatively unrelated hosts are common



# Classical co-evolutionary model

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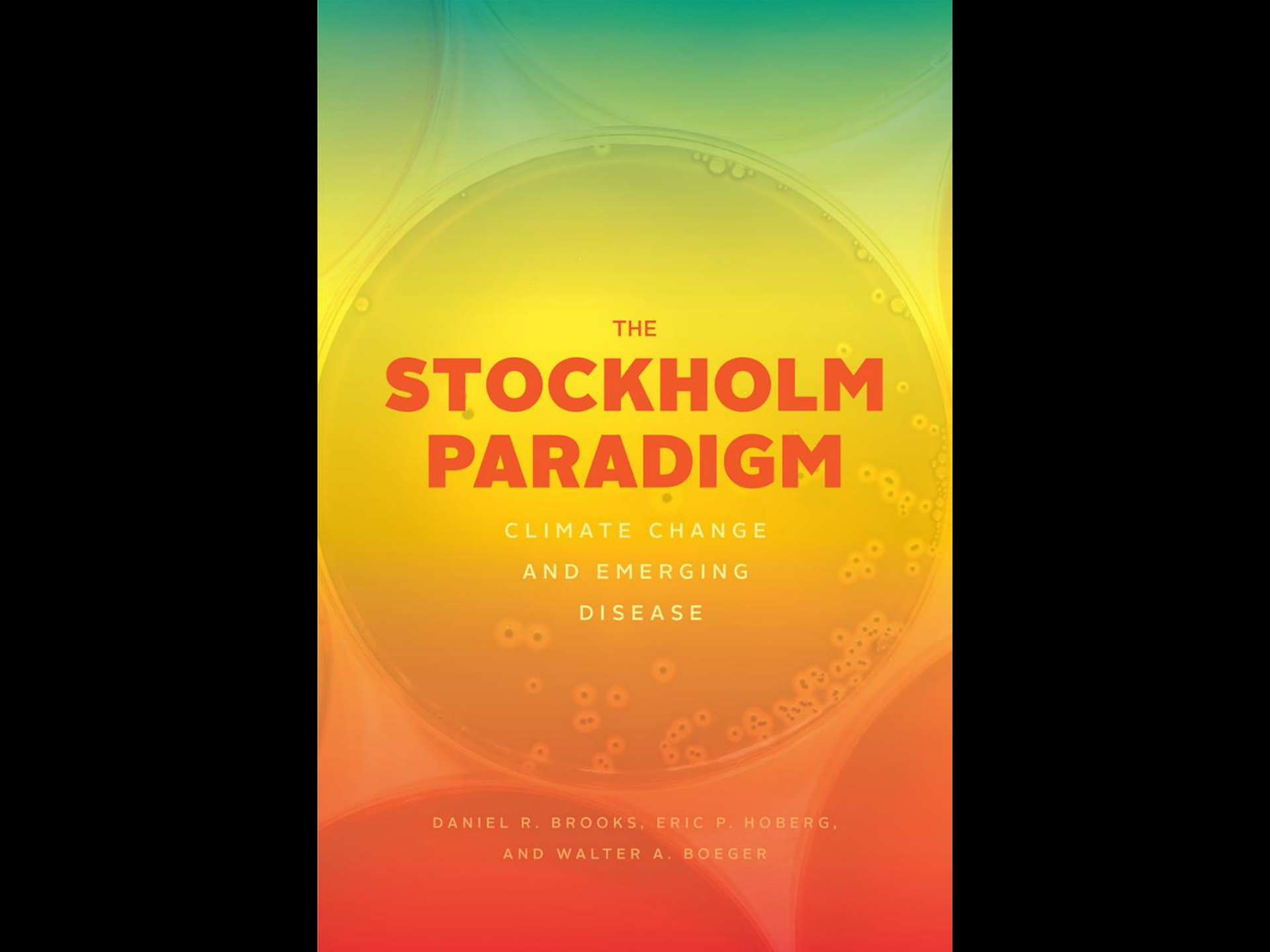
- Parasites become more specialized to their hosts with time
- Host switches are rare
- **A genetic change of the parasite is needed to new host colonization**



# The Stockholm Paradigm

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- **Ecological fitting** (Janzen, 1985)
  - traits related to the use of broad-based resources have phenotypic flexibility and are phylogenetically conservative
  - prior to the evolution of novel capabilities for host exploitation there are substantial opportunities for accelerated host colonization
- **Emerging Infectious Diseases will be common** rather than rare **events during episodes of climate change**

The background of the cover is a microscopic view of cells in a petri dish. The image is a circular inset showing various cells, some with distinct nuclei and others appearing as smaller, more uniform shapes. The overall color palette is a gradient from green at the top to red at the bottom, with the central text area being a bright yellow. The text is centered and uses a clean, sans-serif font.

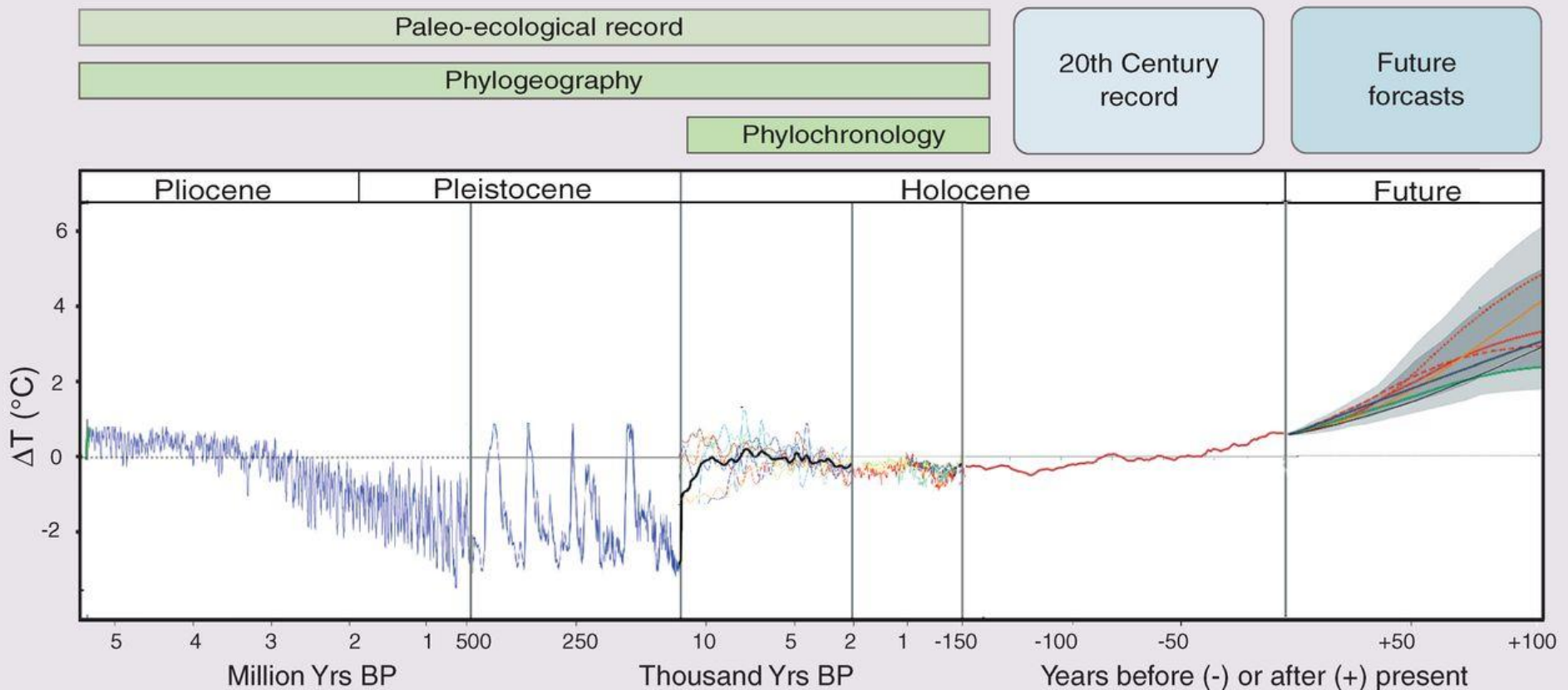
THE  
**STOCKHOLM  
PARADIGM**

CLIMATE CHANGE  
AND EMERGING  
DISEASE

DANIEL R. BROOKS, ERIC P. HOBERG,  
AND WALTER A. BOEGER

# Late Holocene (7kya-150ya): relative climate stability... until the Anthropocene

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# Climate change leads to movement

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- ❑ Movements of humans and their crops and livestock
- ❑ Movements of pathogens and their vectors catalyzed by climate change lead to exposure to pathogens to which they are susceptible but have never seen before

**This is the direct link between climate change and EID**



# We are hemorrhaging money and resources with responding after EID crises

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- ❑ Crisis response to EIDs after they have emerged is not sustainable
- ❑ Treating Emerging Disease and Production Losses from EIDs conservatively cost the world **\$1.000.000.000.000 per year**



# What is most at risk?

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- ❑ **Not the biosphere:** evolution has always been capable of generating new complex biospheres following even massive extinction events
- ❑ **Not *Homo sapiens*:** we are too numerous, too widely distributed, and occupy too many habitats to go extinct as a species
- ❑ **Technological Humanity is most at risk**

**Civilizations affected by the climate change events were destroyed**



In 1950

30%

of population  
lived in cities



In 2050

70%

of population  
will live in cities







\*Ordered by scheduled international passenger kilometres  
flown in 2010 (source Wikipedia).  
Only routes in the OpenFlights database are plotted.

Map: James Cheshire, [spatialanalysis.co.uk](http://spatialanalysis.co.uk)  
Flights Data: [openflights.org](http://openflights.org)  
Basemap Data: [naturalearthdata.com](http://naturalearthdata.com)

# What can we do?



*finding them before they  
find us*

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**Document**

**Assess**

**Monitor**

**Act**