

FACTORS FAVORING THE EMERGENCE AND SPREAD OF NEW MICROBIAL AGENTS

1. POPULATION GROWTH, ESPECIALLY IN URBAN
CENTERS

2 INTERNATIONAL TRAVEL

3. GROWTH OF HOSPITALS, ESPECIALLY IN THE
THIRD WORLD

4. CHANGES IN THE FOOD SUPPLY

+ Industrialization

+ Internationalization

INDUSTRIALIZATION OF FOOD SUPPLY

- o **An airline flight kitchen epidemic**

**240 documented (9000 est.) cases of Shigellosis
on 219 flights**

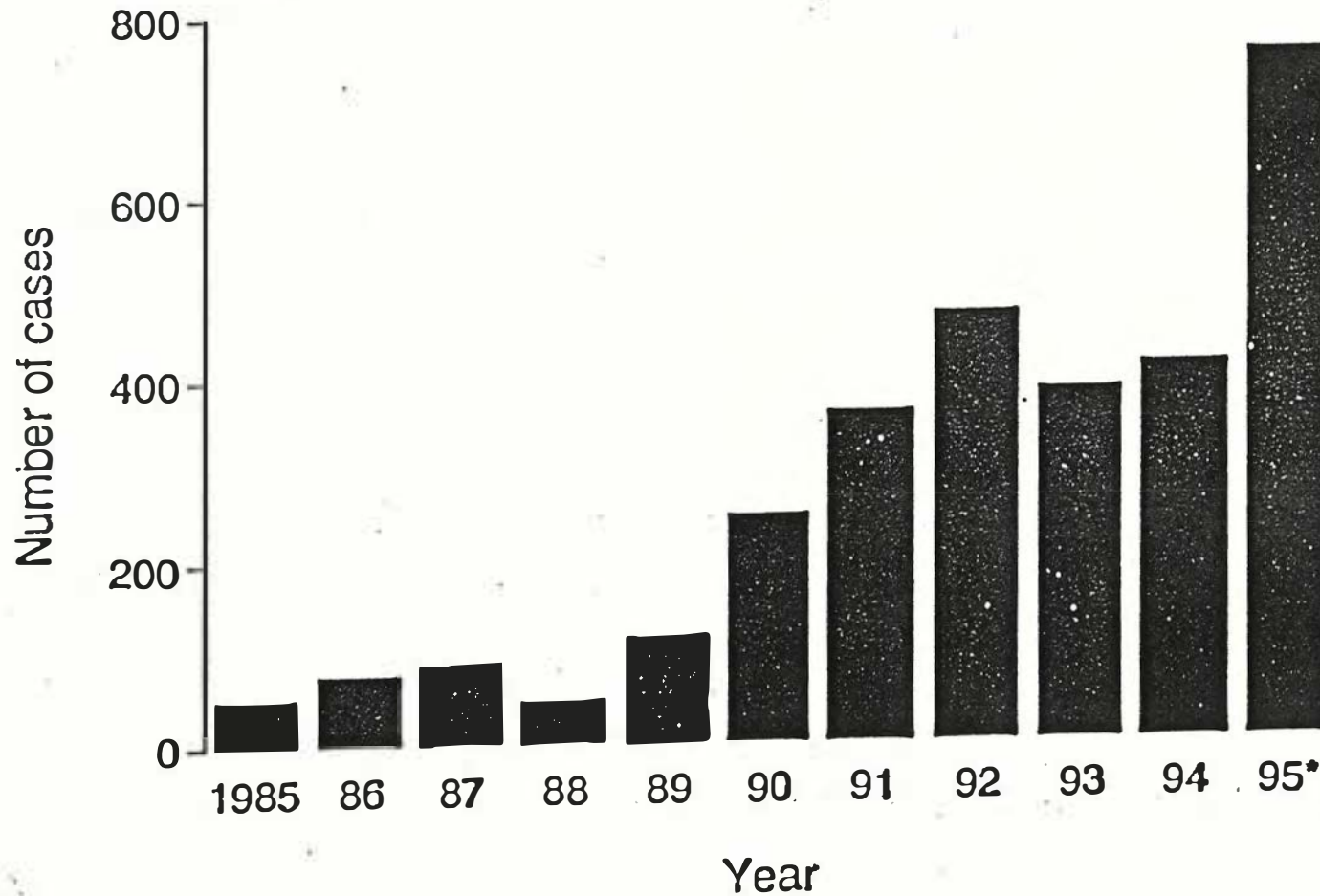
going to 24 states and 4 foreign countries

- o **The Jack in the Box hamburger outbreak**

**Contaminated lots contained beef from
New Zealand, Canada, and U.S.**

**Tracing beef from most likely supplier led to
6 states and 5 different slaughter houses
443 cattle**

Figure Laboratory reports of infections with Vero cytotoxin producing *Escherichia coli* O157 in England and Wales

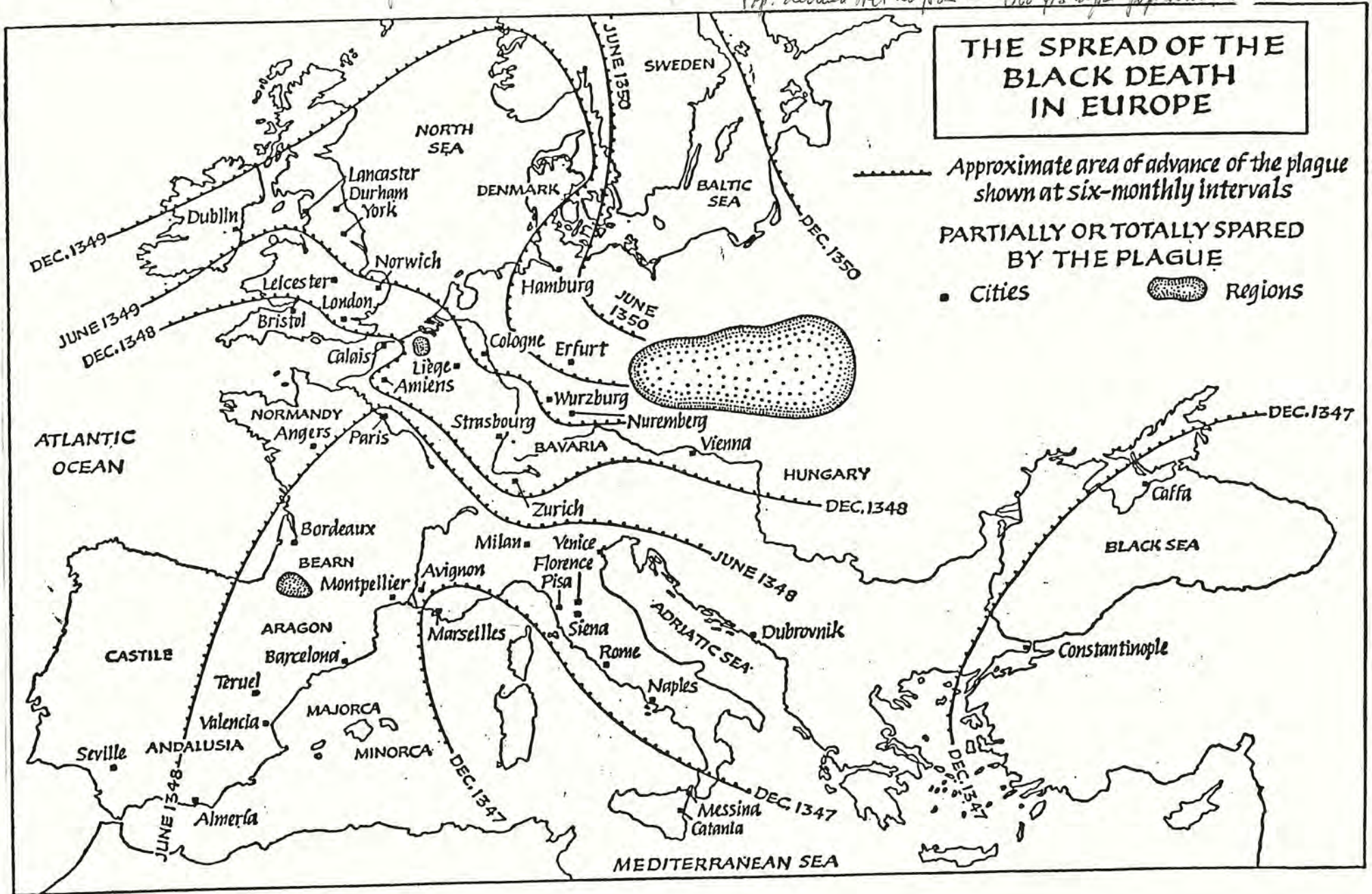


E. coli O157 - first recognized 1982
 30-50% of diarrhoeal cases as hospitalised, 5% develop haemolytic-uraemic sx
 ID = 50 organisms (1 *B. subtilis* - 000s)

Man around for a long time.

1/3 - 1/2 died

Pop. declined over 100 yrs - 300 yrs before pop. rose



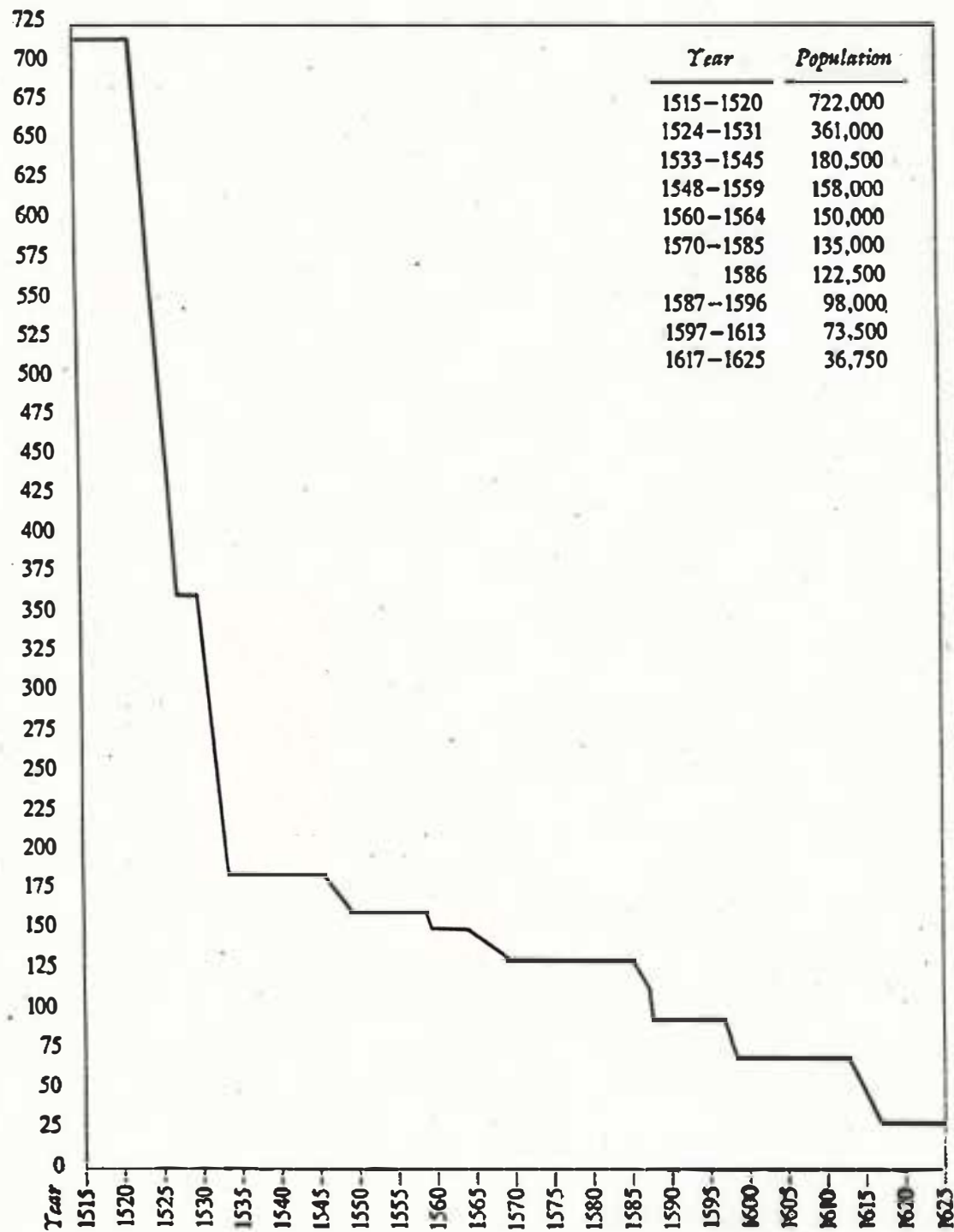
A SMALLPOX EPIDEMIC IN PERU

“They died by scores and hundreds. Villages were depopulated. Corpses were scattered over the fields or piled up in the houses or huts. All branches of industrial activity were paralyzed. The fields were uncultivated; the herds were untended; and the workshops and mines were without laborers. It was only with difficulty that the ships could be manned. The price of food rose to such an extent that many persons found it beyond their reach. They escaped the foul disease, but only to be wasted by famine.”

from: Hopkins 1983

Estimate of Timucuan-Speaking Population from A.D. 1515 to 1620 Based on Reconstructed Depopulation Trend

Population
(thousands)



PLYMOUTH, MASS -- 1620

“Thus farre hath the good hand of God favored our beginnings...In sweeping away great multitudes of the natives..., a little more before we went thither, that he might make room for us there”

THREATS TO THE FRONTIER-1838

“We have, from the trading posts on the western frontier of the Missouri, the most frightful accounts of the ravages of smallpox among the Indians...The number of the victims within a few months is estimated at 30,000 and the pestilence is spreading... The vast preparations for the protection of the western frontier are superfluous...Every thought of war was dispelled and the few (Indians) that are left are as humble as famished dogs. No language can picture the scene of desolation which this country presents.”

from Stearn and Stearn 1945

Parallel situation - rabbit pox. - 55% CFR

INTERNATIONALIZATION OF FOOD SUPPLY

DIVERSITY OF SOURCES

Average number of food items on grocery shelf

1950	300
1990	25,000

FOREIGN PRODUCE

% of selected produce items from Mexico (89-92)

	<u>Canteloupe</u>	<u>Cucumber</u>	<u>Tomato</u>
Jan-Mar	52	74	42
Apr-Jun	32	16	20
Jul-Sep	1	1	9
Oct-Dec	38	27	15

- ① A brief perspective on ID
- ② Social, Tech. and dem. factors bearing on the problem
- ③ What does he tell us.

INFECTIOUS DISEASES CONQUERED

1945-1970s

Sulfa / Penicillin / Other antibiotics

Vaccines

Polio, measles, rubella, hepatitis

Better housing and nutrition

1970's

“Victory over the infectious diseases has been won...it is time to turn to the chronic diseases”

April, 1984

“Today's discovery represents the triumph of science over a dreadful disease”

Secretary Heckler

1 b. / yr. Rx 5 drug 5 voc. in phase III

NEW AND EMERGING INFECTIONS

May, 1989 "Emerging Viruses: The Evolution of Viruses and Viral Diseases"

What if AIDS had spread like flu - ? possible - ultraviolet radiation (BSE)
what do we know of disease in other parts of the world (origins of HIV)?
Microbial world & metabolism
Viruses of special concern!

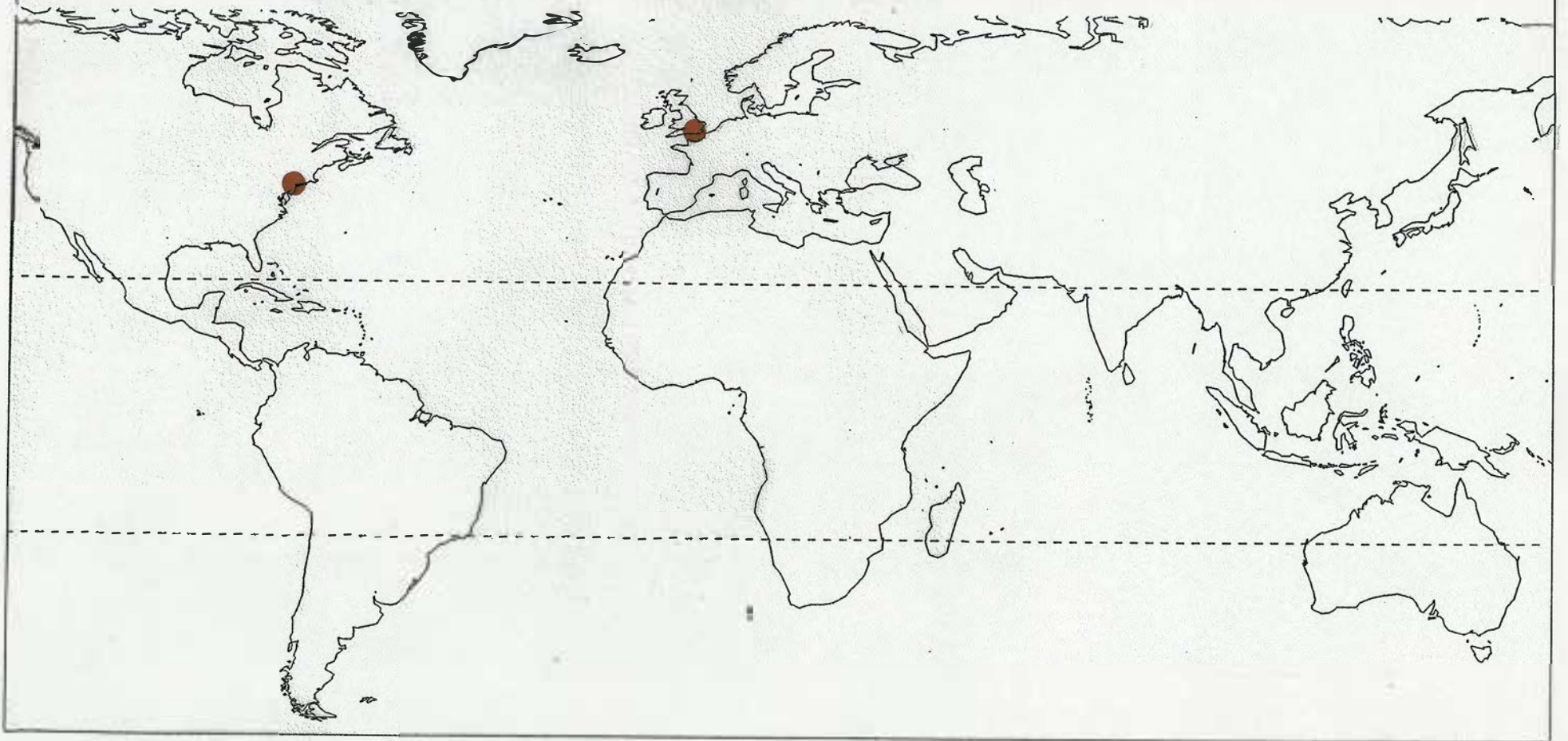
+ Rockefeller University

+ Natl. Inst. of Allergy and Infectious Diseases

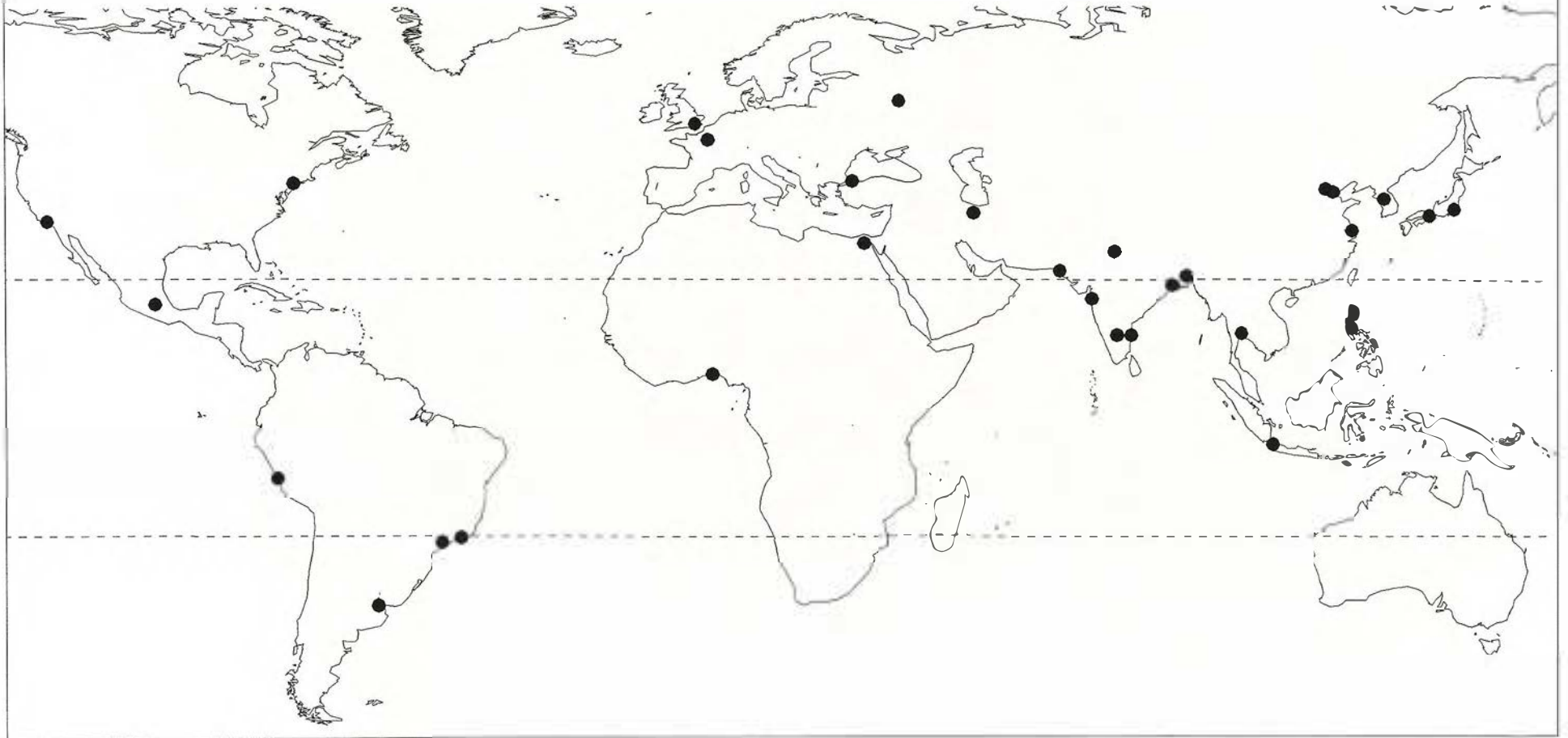
+ Fogarty International Center

Ref: *Emerging Viruses*, ed. SS Morse, Oxford, 1993

Urban Areas with Population 7.5 Million and Greater, 1950



Urban Areas with Population 7.5 Million and Greater, 2000



NEW AND EMERGING INFECTIONS

Urbanization -- an international phenomenon

1800	2 %
1950	20 %
1997	50 %
2010	67 %

Recombinant Organisms

The Australian experience -- published January 2001

Mousepox virus + ZP3 (mouse egg shell protein) = mouse contraceptive

Interleukin 4 gene added to increase antibody response

Result: Virus grew out of control -- all died

Vaccinated mice -- half died; others had skin ulcer

Conclusions:

Recombinant experimentation is comparatively simple.

It will be increasingly common in many laboratories.

The results cannot always be predicted

It is clear that man's only competitors for the dominion of the planet are the viruses -- and the ultimate outcome is by no means fore-ordained.

Lederberg