

Symptoms MERS-CoV !!!



Dyspnea



Cough



High fever



Diarrhea



Puke



Kidney failure



Pneumonia
and
Severe pneumonia



Symptomatic treatment



No vaccine

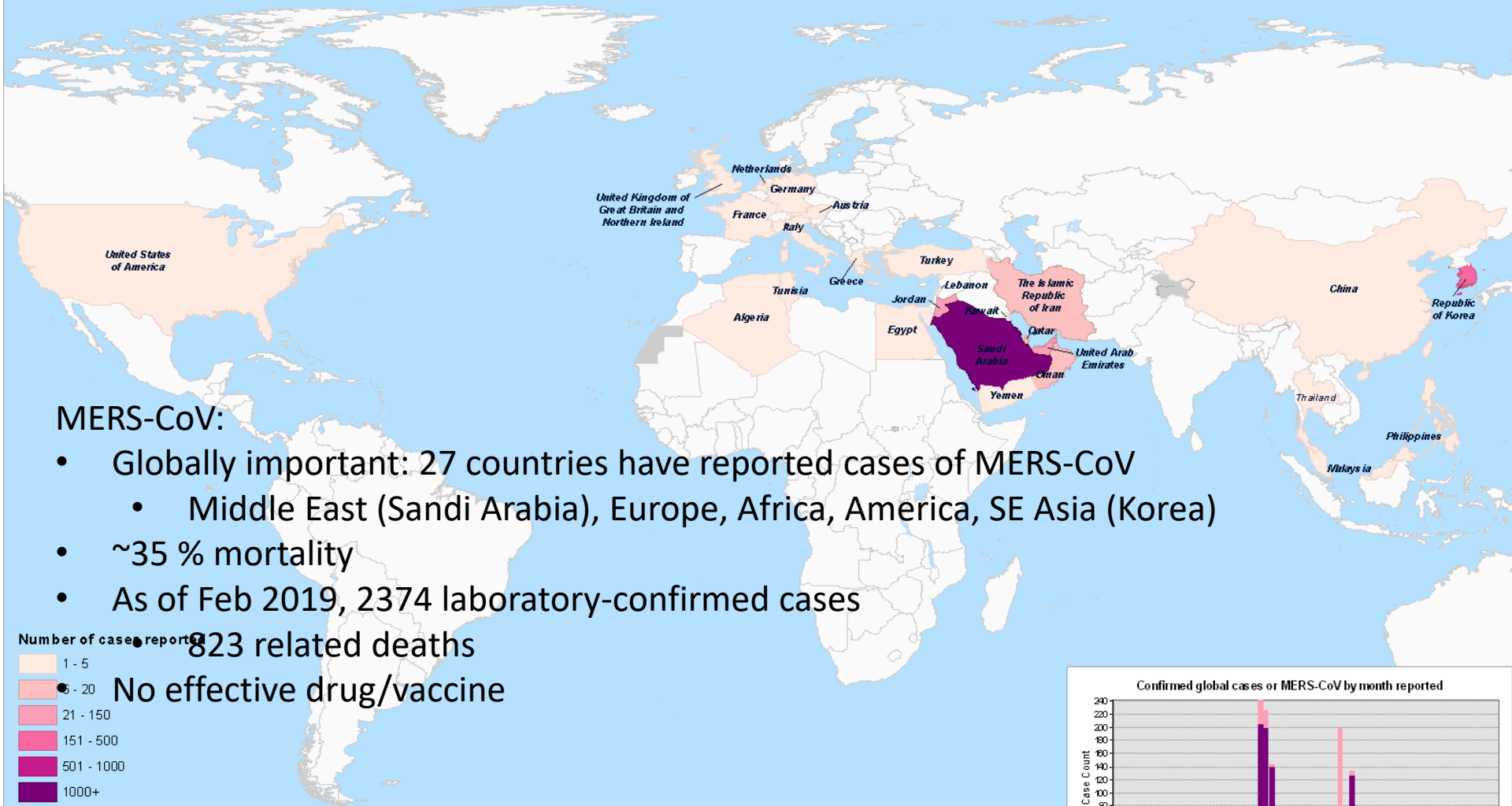
do not closer
do not touch
not eat



 New up date

 Screening

CONFIRMED GLOBAL CASES OF MERS-COV 2012 - 2017

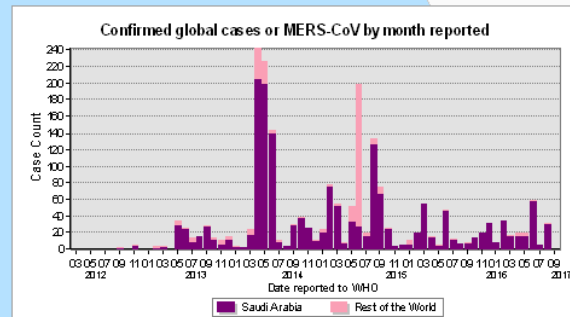


MERS-CoV:

- Globally important: 27 countries have reported cases of MERS-CoV
 - Middle East (Saudi Arabia), Europe, Africa, America, SE Asia (Korea)
- ~35 % mortality
- As of Feb 2019, 2374 laboratory-confirmed cases

823 related deaths

No effective drug/vaccine



Map Scale (A3): 1:1,109,175,783
1 cm = 11,092 km

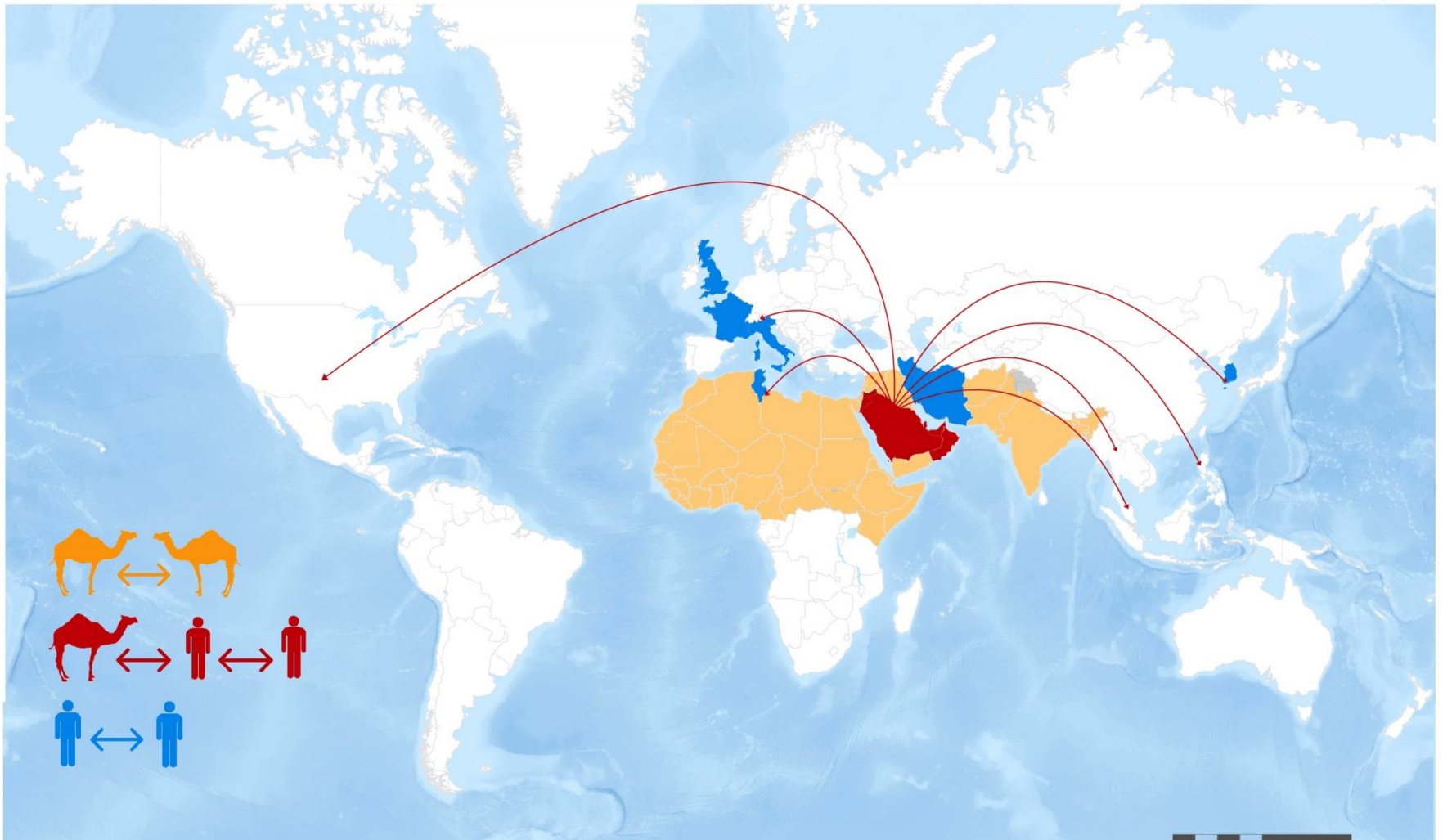
Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: World Health Organization
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Map date: 29/09/2017



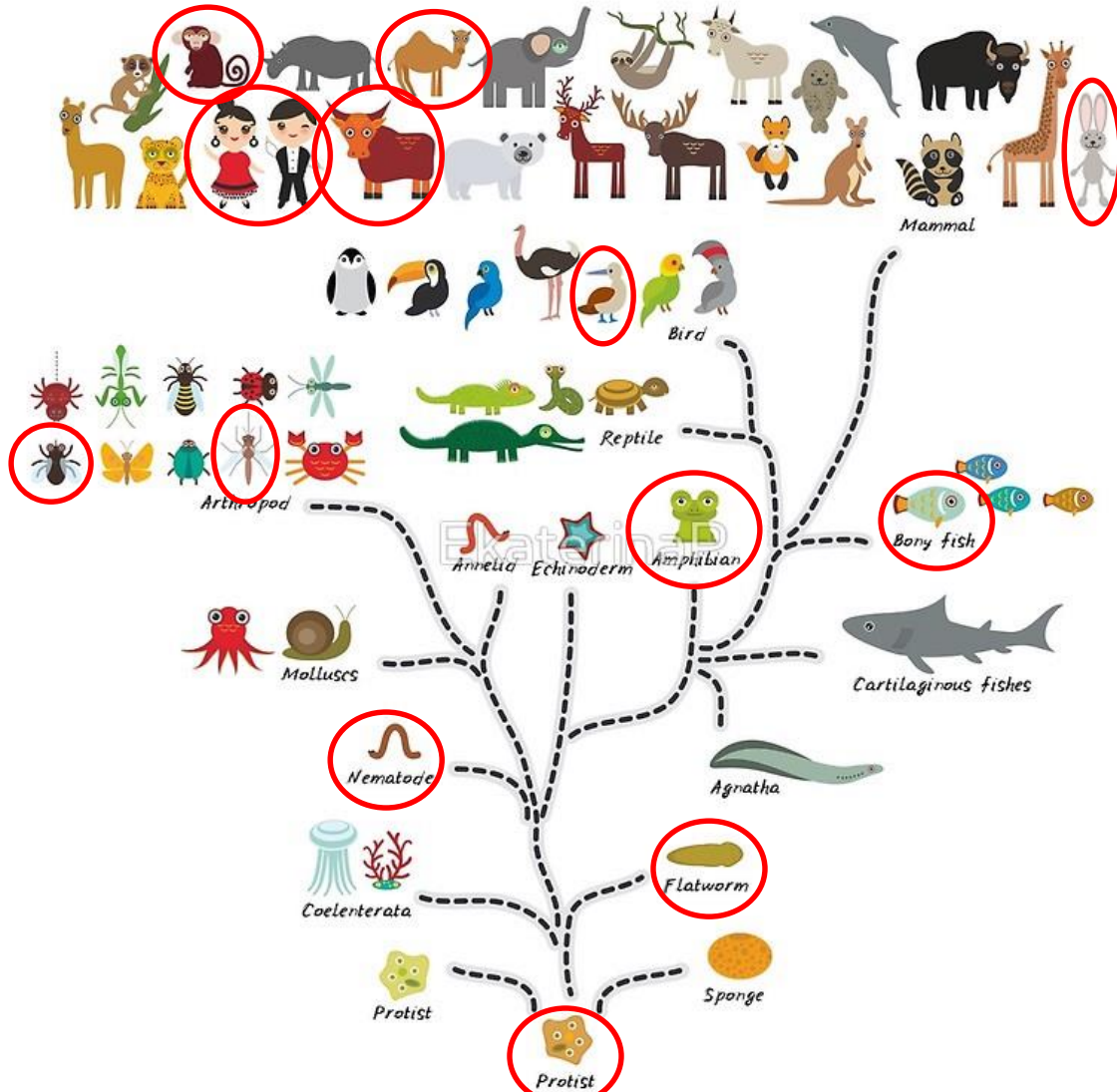
MERS-COV TRANSMISSION AND GEOGRAPHIC RANGE



Model organism

- A non-human species for studying particular biological phenomena
- Common descent of all living organisms
 - Conserved metabolic pathways
 - Conserved developmental pathways
 - Conserved genetic materials
- Human diseases
 - Allows understanding the disease process without the added risk of harming an actual human
 - Drug development

The tree of life



How to choose a good animal model

- Relevance
 - Disease progression (e.g. lethal model; tissue tropism)
 - Evolutionary close to human or the diseased animal
 - Support infection (in our case)
- Short life-cycle
- Genetic manipulation
- housing

Animal models for MERS-CoV



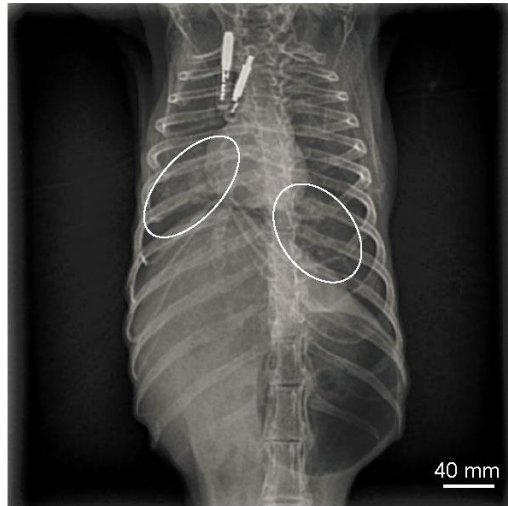
	Rhesus macaque	Common marmoset	Camel
Infection	√	√	√
Disease development	Somewhat similar to human	Highly similar to human	Highly similar to human
Virus production	Low	High	High
Cost	High	High	High
Housing	Difficult	Difficult	Difficult
Availability	Low	Low	Low
Genetic manipulation	Difficult	Difficult	Difficult

Common marmoset as a MERS-CoV infection model

a

MERS-CoV-inoculated

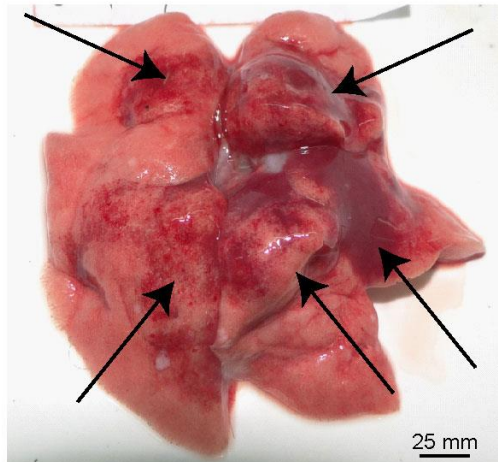
Mock



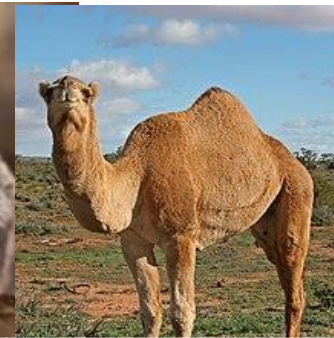
b

MERS-CoV-inoculated

Mock

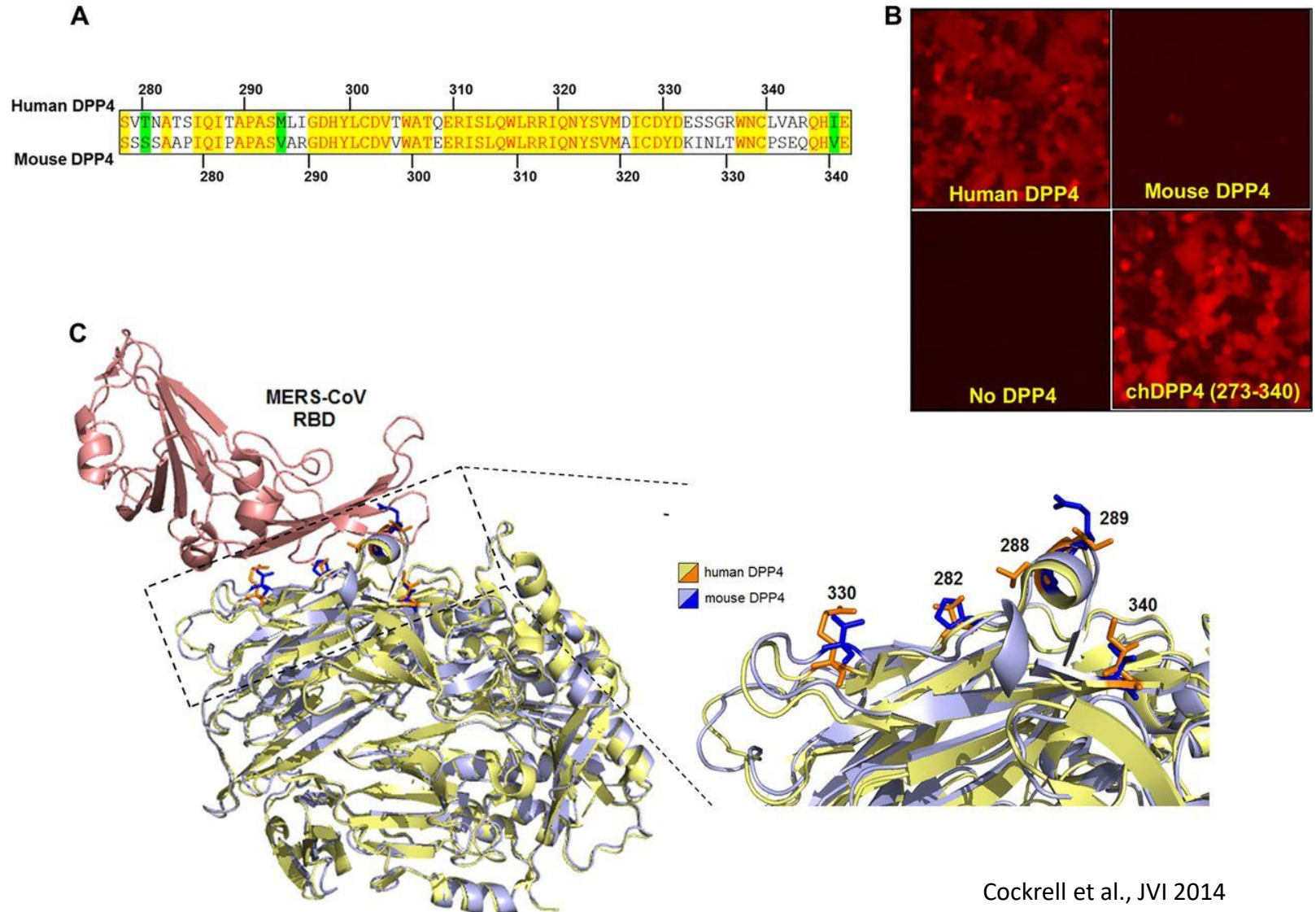


Animal models for MERS-CoV



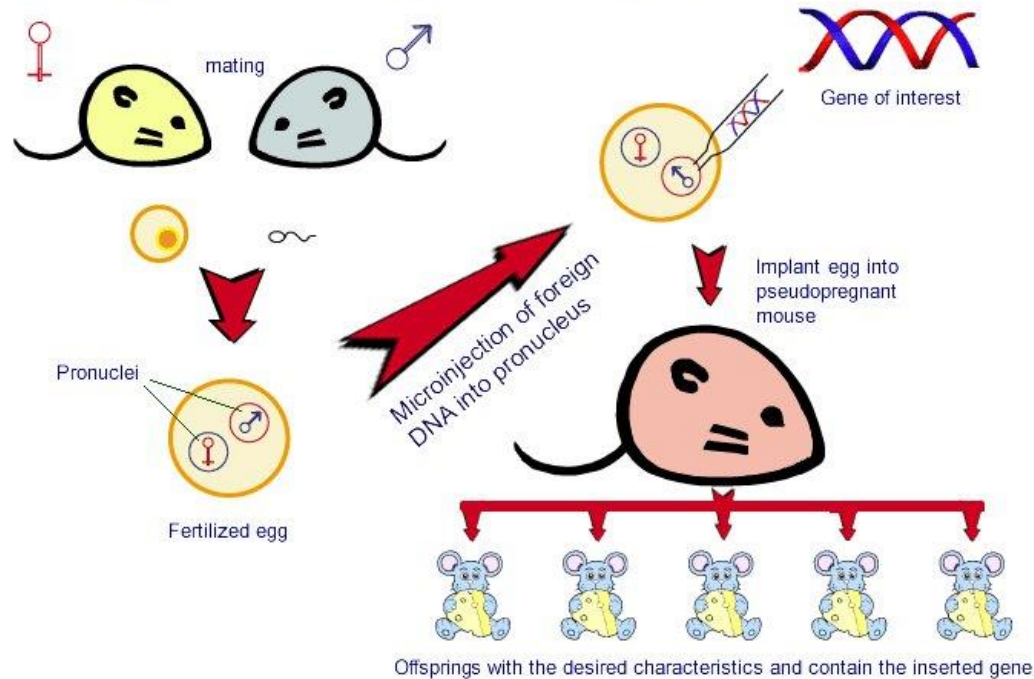
	Rhesus macaque	Common marmoset	Camel	Mouse
Infection	√	√	√	X
Disease development	Somewhat similar to human	Highly similar to human	Highly similar to human	X
Virus production	Low	High	High	X
Cost	High	High	High	Low
Housing	Difficult	Difficult	Difficult	Easy
Availability	Low	Low	Low	High
Genetic manipulation	Difficult	Difficult	Difficult	Easy

Mouse lacks MERS-CoV receptor (DPP4)



Generation of a transgenic mouse model

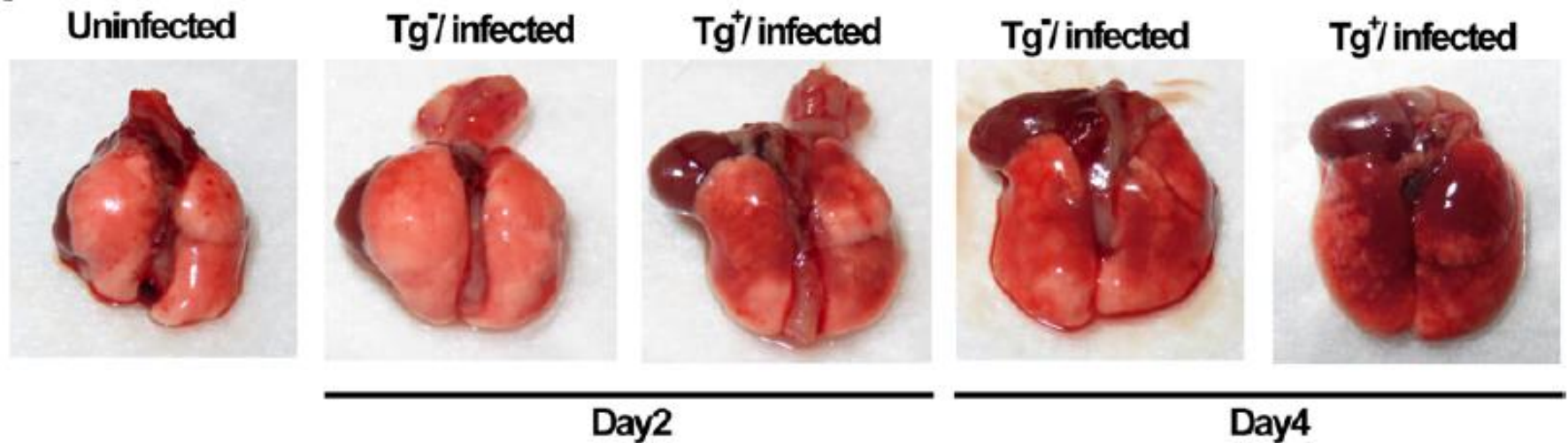
Transgenic Mice by Microinjection



Transgenic mice expressing a green fluorescence marker



DPP4-transgenic mice is susceptible to MERS-CoV infection



Application of animal models for studying infection

- For studying MERS-CoV pathogenesis
- For developing anti-MERS-CoV drugs
- For developing MERS-CoV vaccines