To intervene or not? Implications of models of ebola spread in African apes

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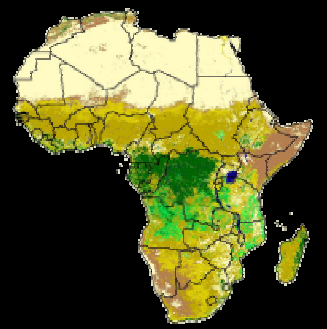


Outline of Presentation

- Priorities of WCS Africa Program
- Ebola & ape decline in Gabon & Congo
- Proposed interventions
- Possibly relevant issues

WCS Africa Program

- Field conservation in 17 nations
- Annual budget
  - Total $16 million
  - $4 million unrestricted
- 900 staff
- Activities include
  - Park & landscape management
  - Capacity building
  - Applied research

WCS Africa Program Priorities

- Preserve intact “wild” ecosystems

  Current long-term sites include

  – In Gabon: Ivindo NP, Lope NP, Loango NP…

  – In ROC: Nouabale Ndoki NP, Odzala NP, Conckouati NP…

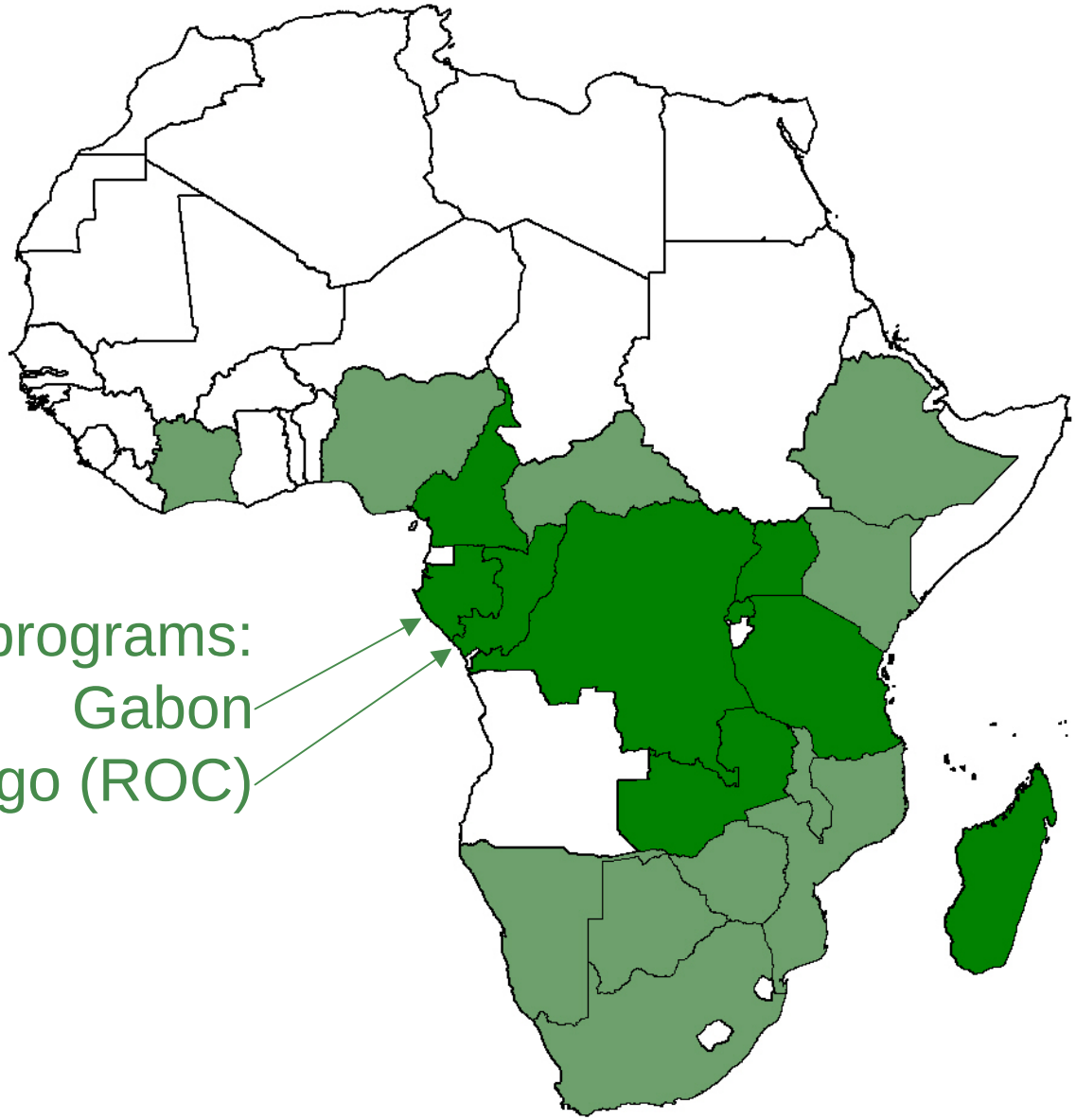
- Prevent extinction in the wild of charismatic and ecologically important species

  Current top priorities include

  – Four subspecies of gorilla

  – Common chimpanzee

WCS Africa Program



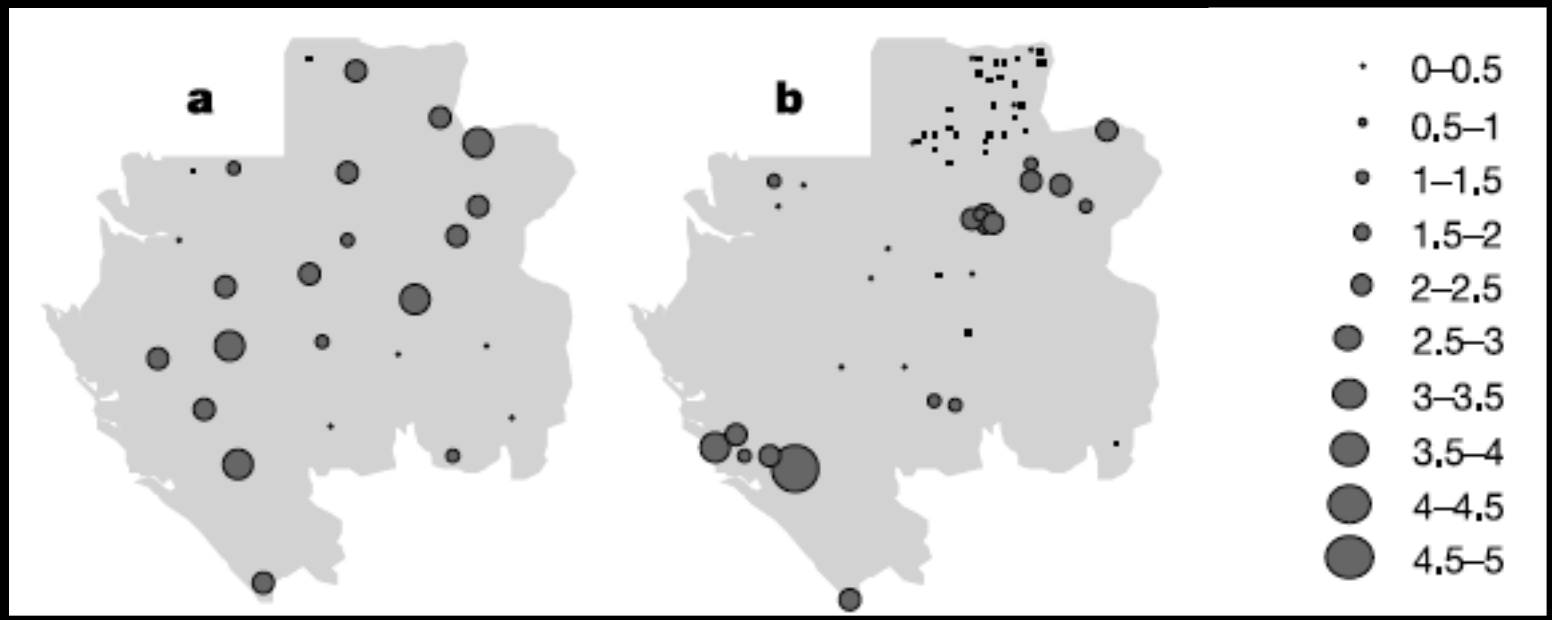
2 largest country programs:

Gabon

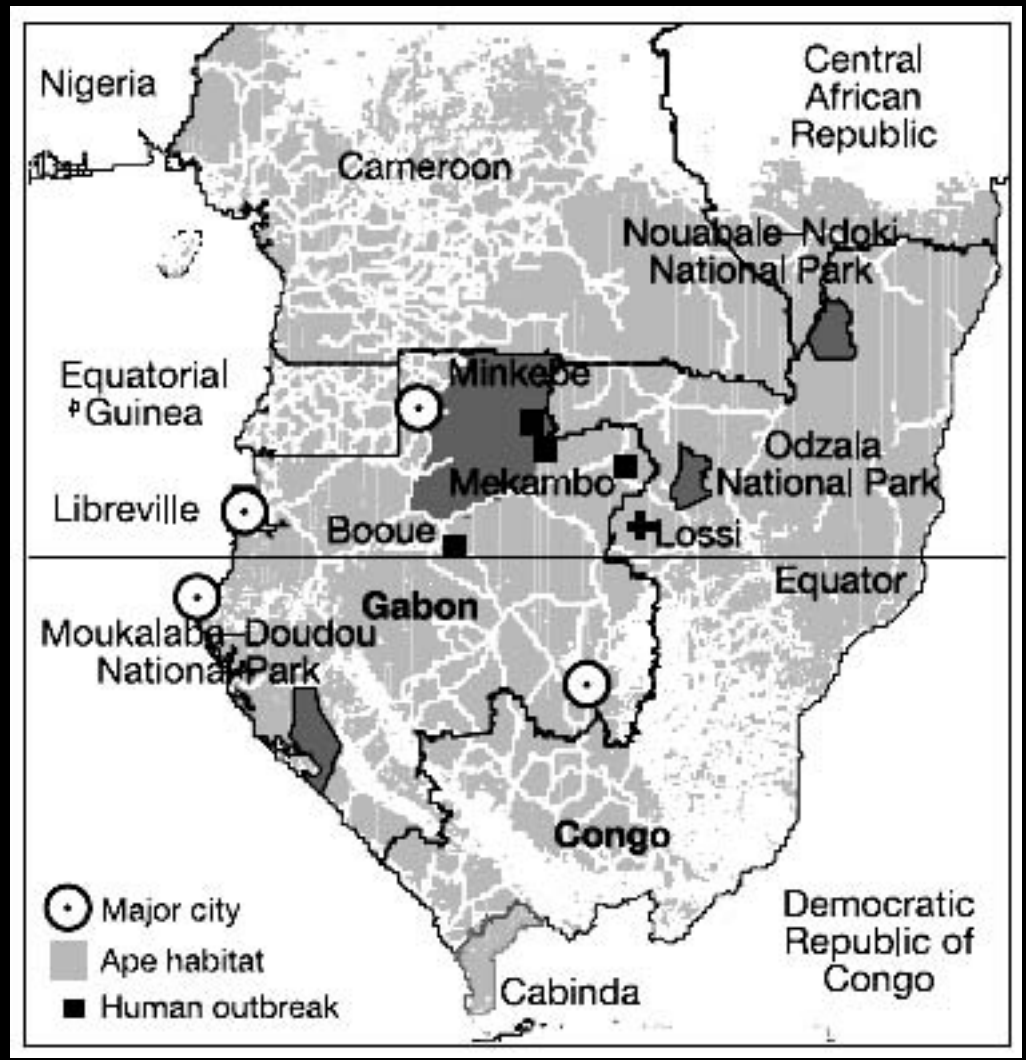
Republic of Congo (ROC)

Encounter Rates of Ape Nests in Gabon
P.D. Walsh *et al.* 2003

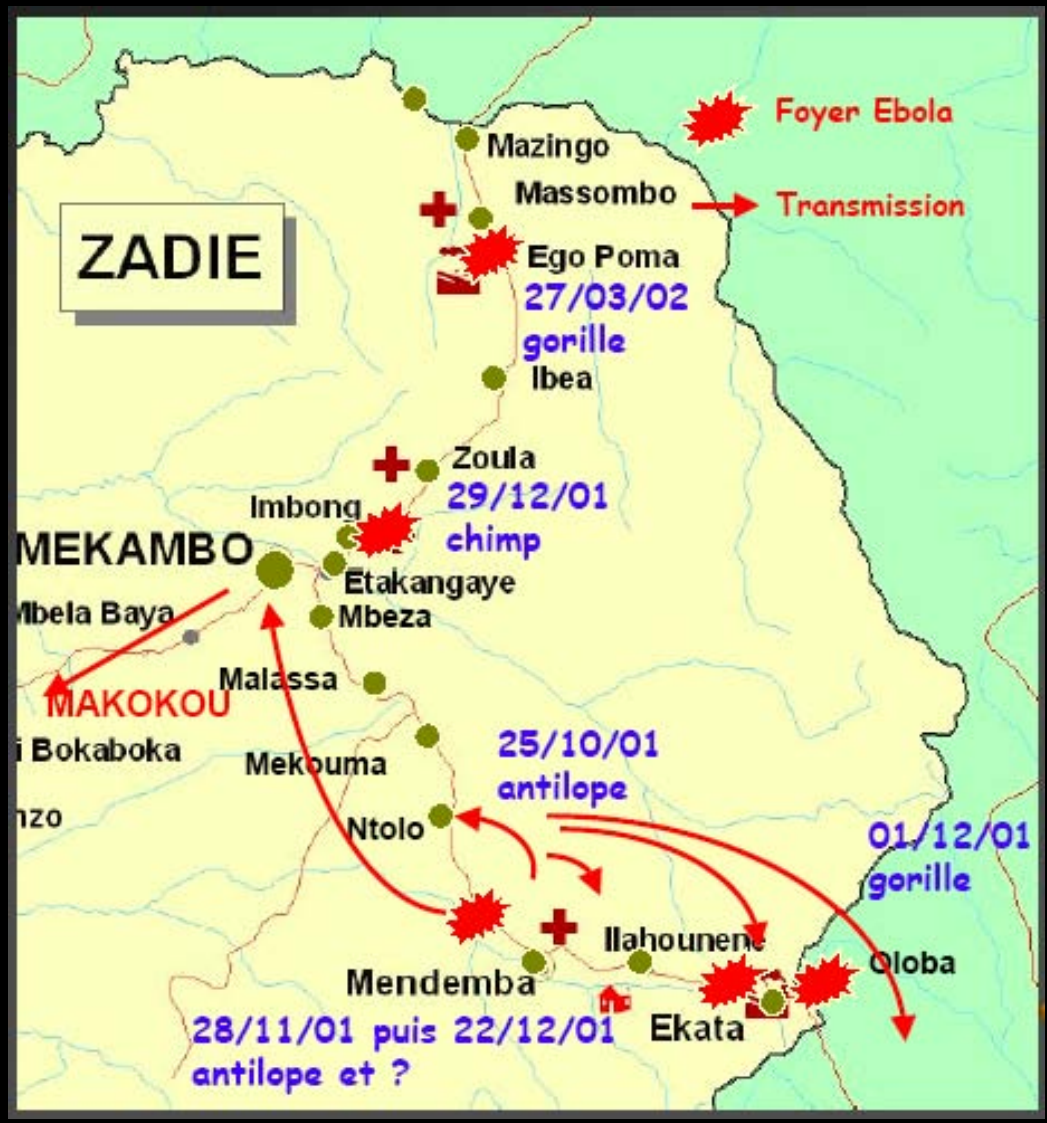
1980-89 2000-03 Nests/ km



Ape Habitat & Ebola Western Central Africa
P.D. Walsh *et al.* 2003



Gabon Ebola Epidemics 2001-2002
Eric Leroy 2003 Presentation



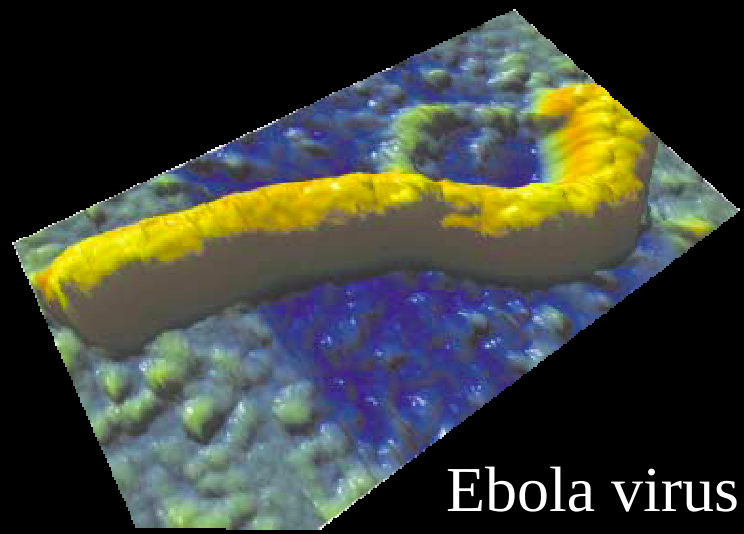
Today's Question:

Should anything should be done *now* to slow the spread of ebola in apes?

- Not research priorities, though vital for future
- Questions to participants, not answers
- Perspective of a conservation manager and funder, not ebola expert

Proposed Interventions

- Community education
- Increased monitoring of apes
- River clearance
- Ape vaccination



Ebola virus

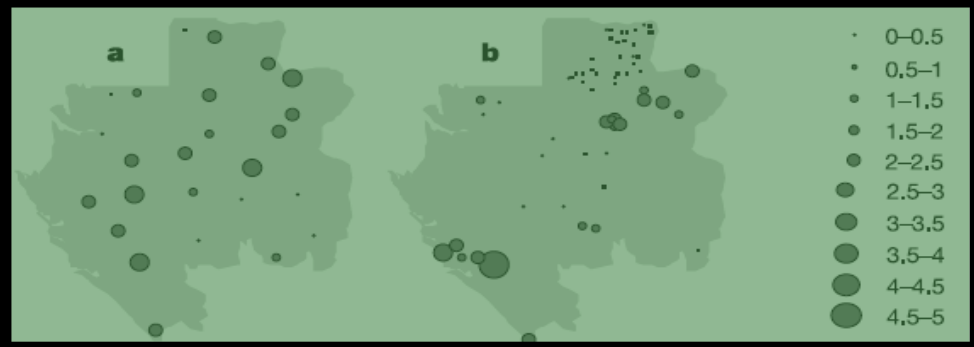
Community Education

Campaign: Health Dangers of Eating Apes

- Will *not* slow ebola spread in apes
- Might protect human health
- Might reduce bushmeat consumption, helping conserve apes

Increased Monitoring of Apes

- Will *not* itself slow ebola spread in apes
- Might protect human health by providing early warning system
- Might increase international support for ape conservation



River Clearance

Removal of natural bridges across rivers forming barriers to ebola spread in apes

- Efficacy of existing rivers unclear
- Availability of candidate rivers unclear
- Costs seem moderate
- Negative impacts seem minor
- Key issues seem to be:
  - Spatio-temporal pattern of ebola spread
  - Ape-ape versus reservoir-ape transmission

5 Ebola Outbreaks Gabon & ROC 2001-2003

With apologies to Leroy *et al.* 2003

Unknown reservoir (bats?)



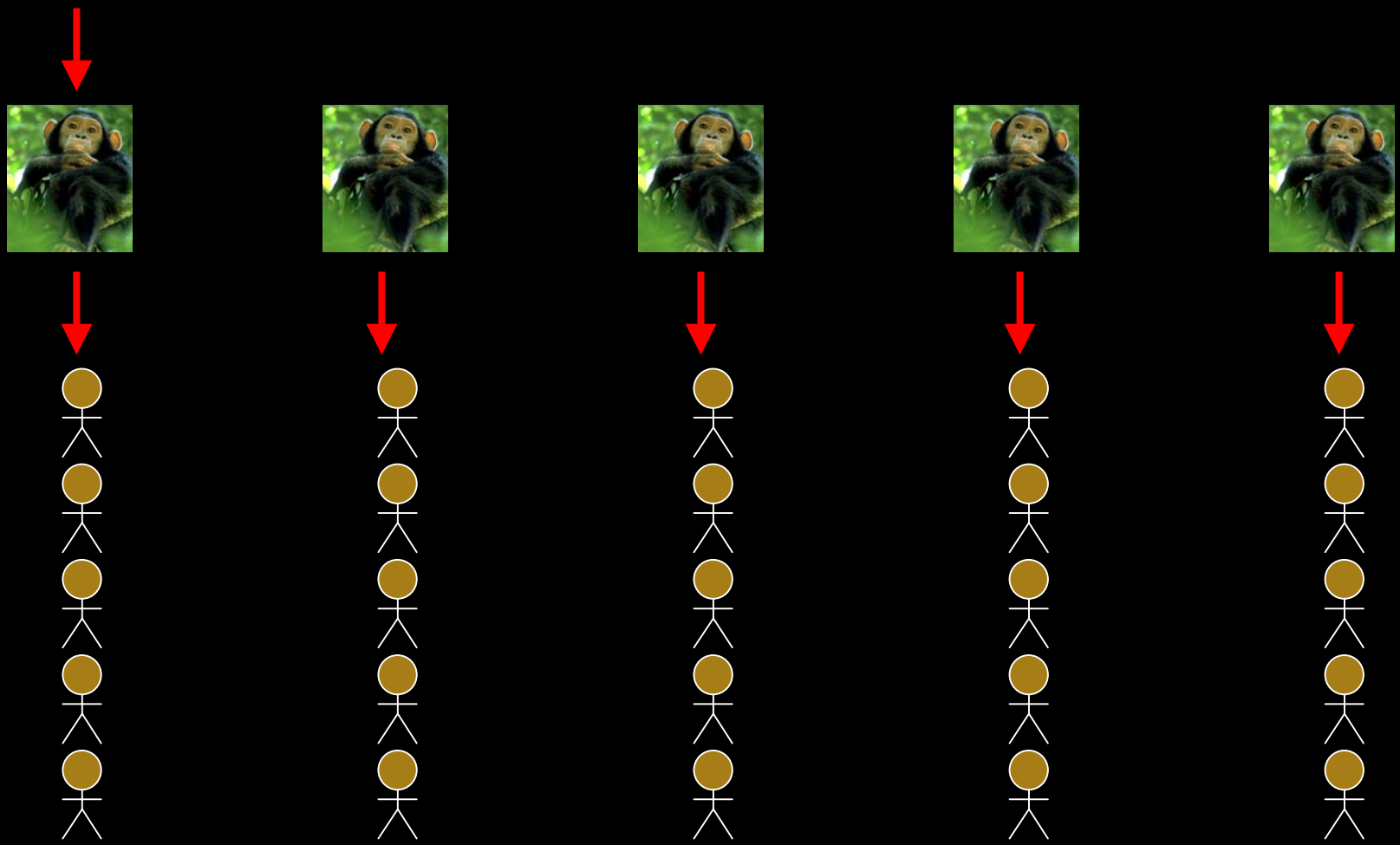




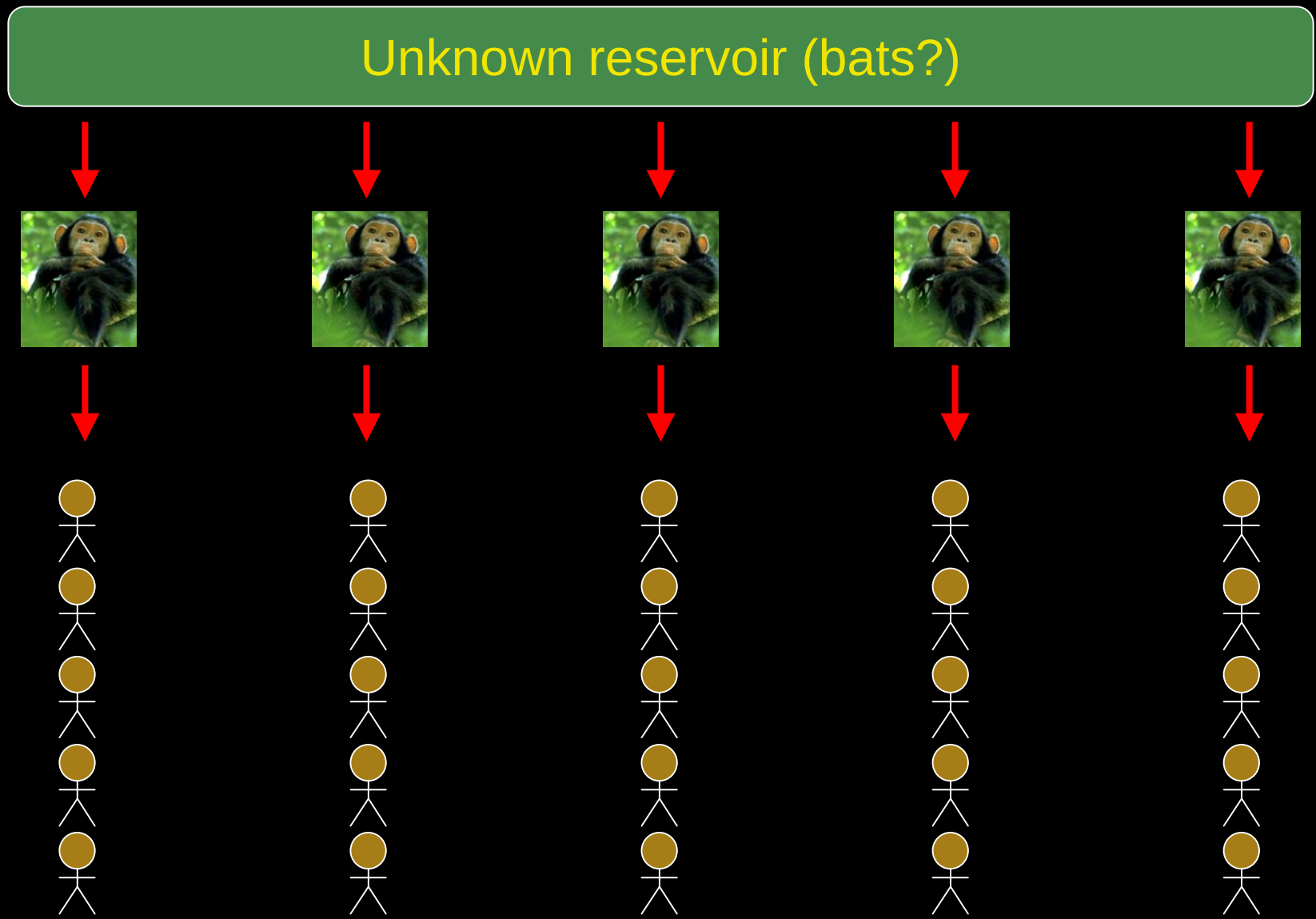


Uncontroversial:
Reservoir to Ape to Human Transmission

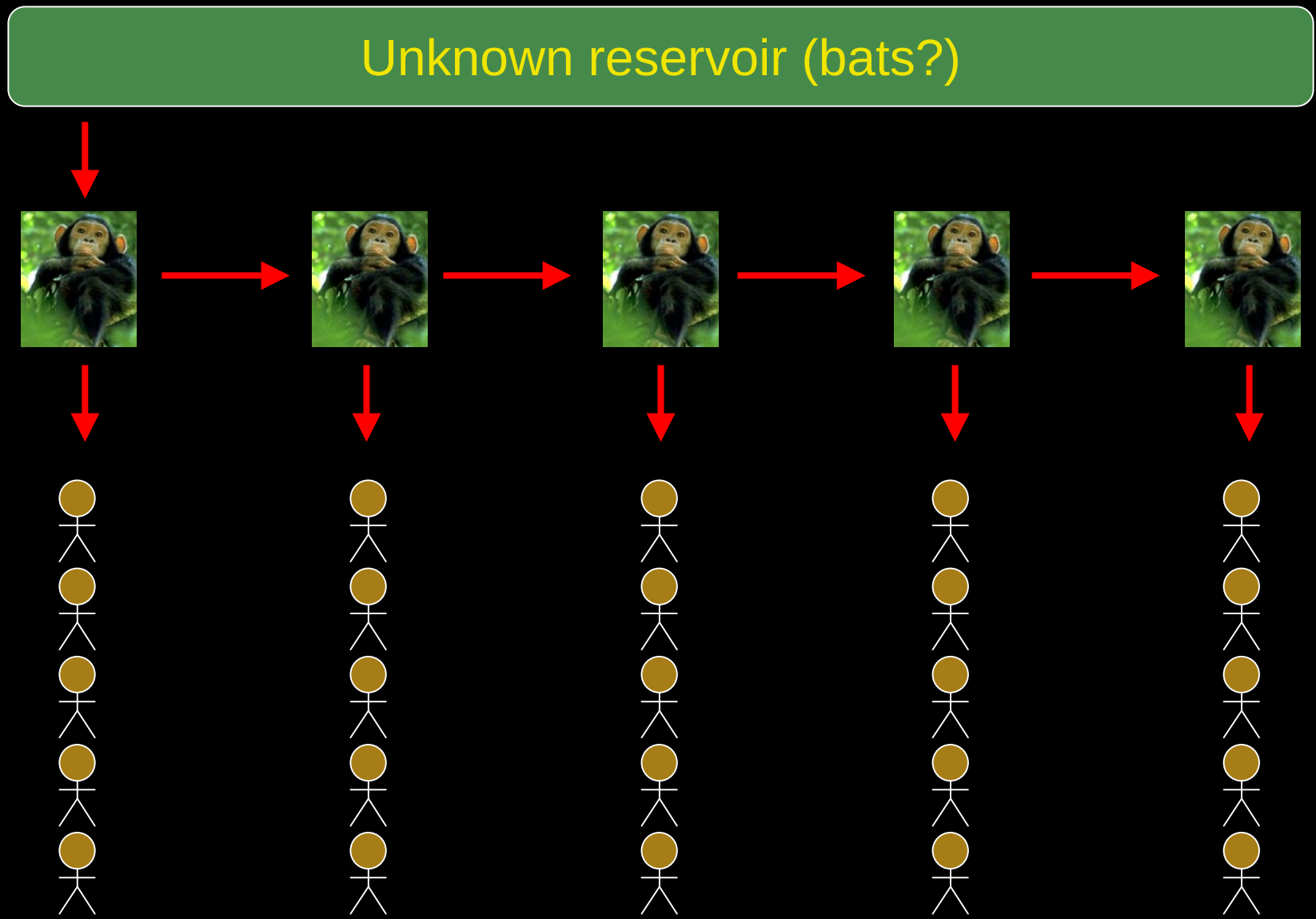
Unknown reservoir (bats?)



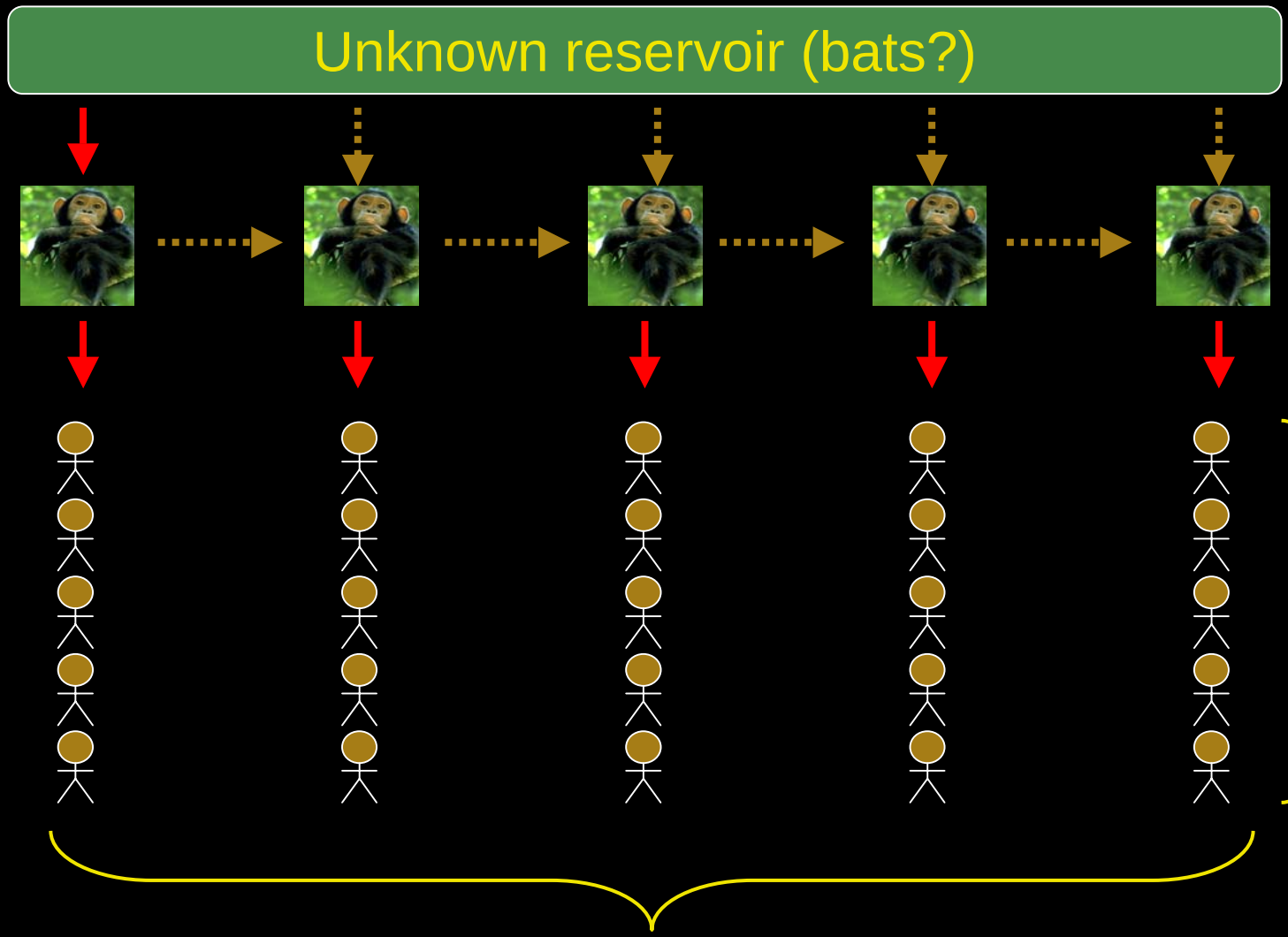
Hypothesis 1: Multiple Reservoir to Ape Transmissions



Hypothesis 2: Ape to Ape Transmission

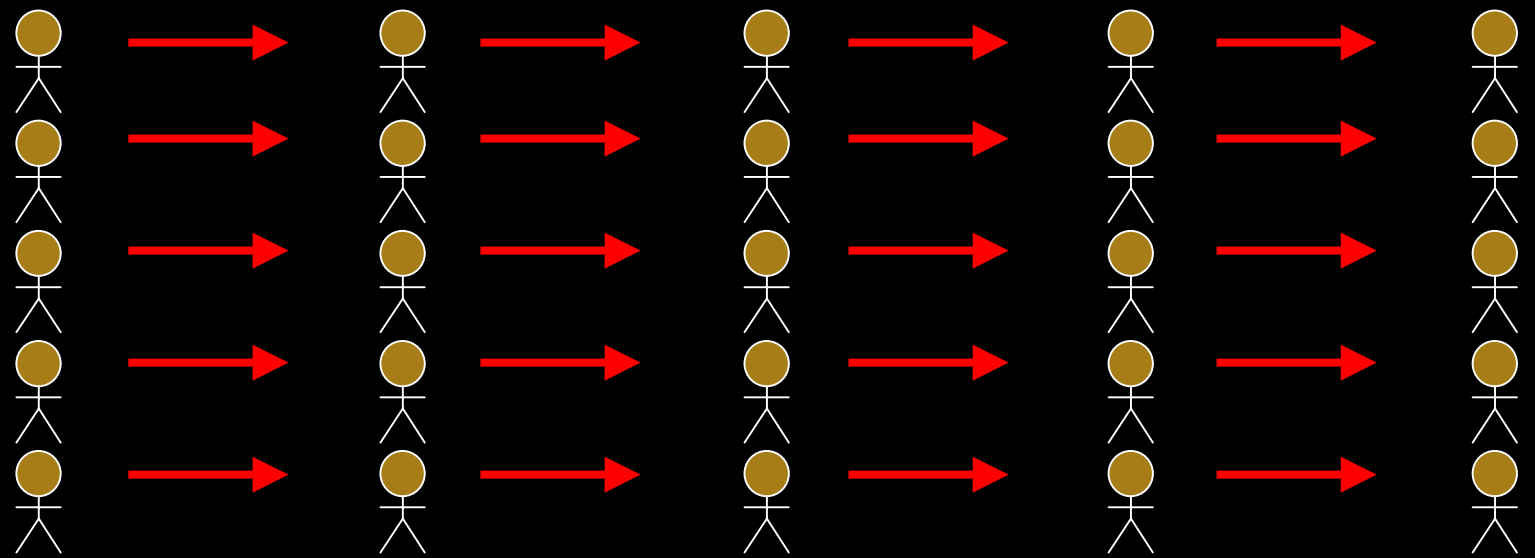


Evidence: E.M. Leroy *et al.* 2003

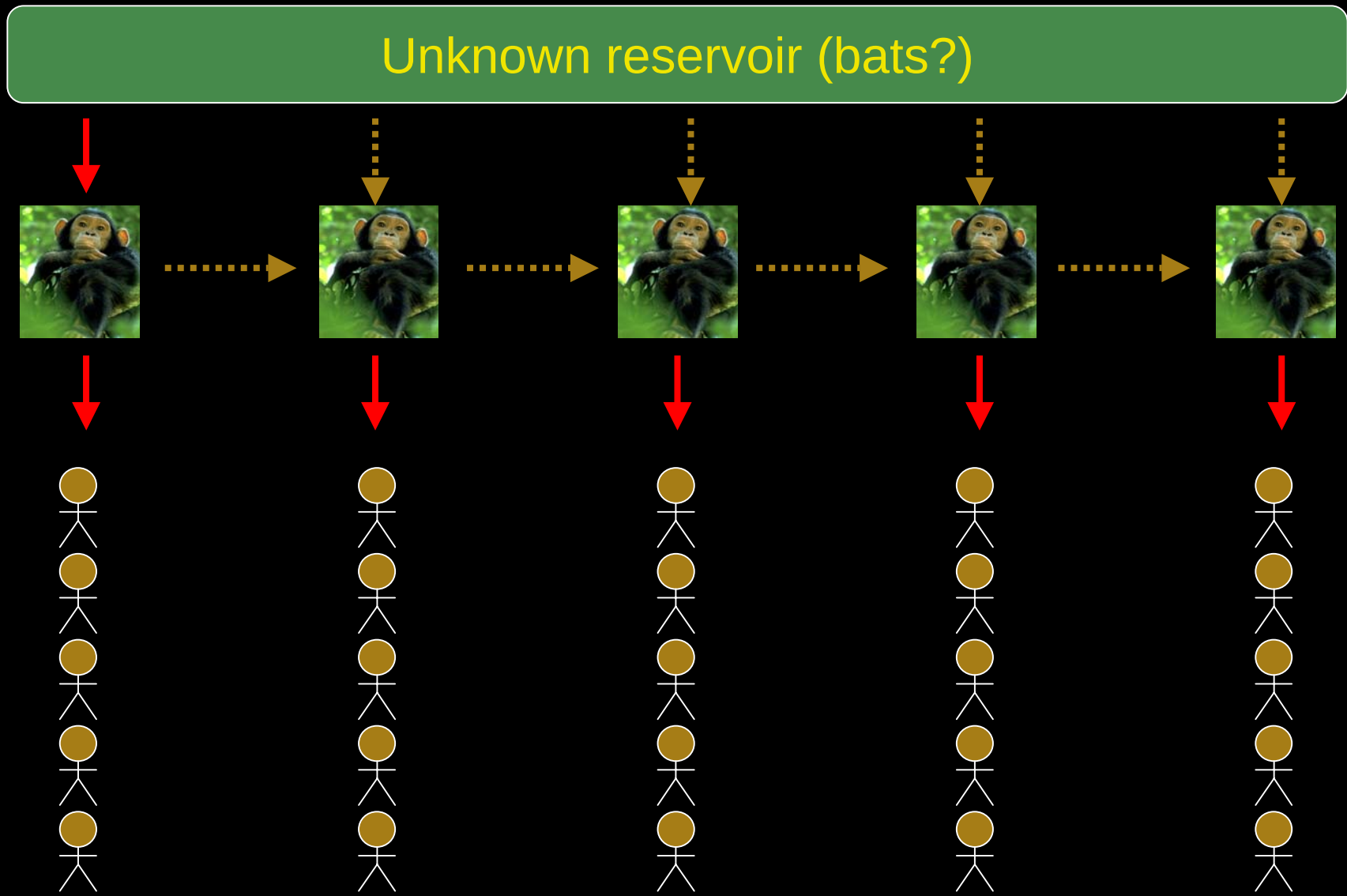


Excluded Hypothesis: E.M. Leroy *et al.* 2003

Unknown reservoir (perhaps bats)



Neither Hypothesis Excluded

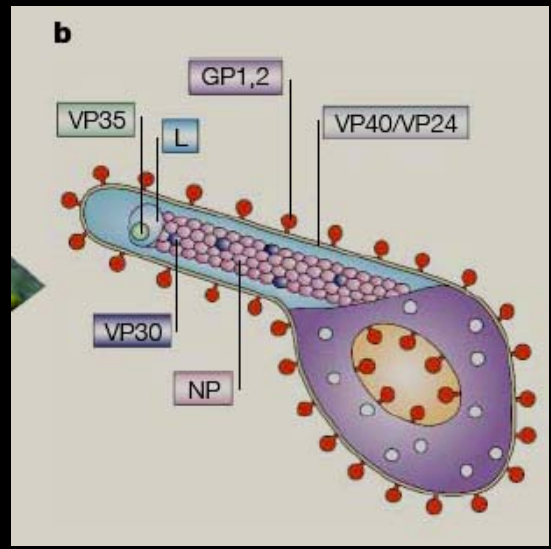


Apparently Unanswered Questions

- Relative importance to ape epidemic of ape-ape transmission versus reservoir-ape transmission
- Whether reservoir is terrestrial vertebrate
- Whether river clearance could slow ebola spread by preventing ape or terrestrial vertebrate dispersal
- How could theoretical issues be resolved?
  - More thorough spatio-temporal GIS analysis?
  - Epidemiological modeling?

Ape Vaccination

- Aims: to prevent extinction of sub-species in the wild and maintain sample intact ecosystems
- Not to end ebola epidemic
- Either
  - 1) vaccinate barrier to prevent spread or
  - 2) vaccinate populations in sample ecoystems
- Previous theoretical issues relevant to 1)
- Possible access to apes at bais



Tentative Conclusions

- Key ape populations in model ecosystems threatened by ebola
- Education and monitoring valuable but will not directly prevent spread of ebola in apes
- River clearance depends on relative importance of ape-ape transmission versus reservoir-ape transmission but might be worth trying
- Vaccination might slow spread or preserve sample populations

Thank you for your attention.

Comments, clarifications, advice very welcome!