



Zoonoses &
Emerging Livestock Systems



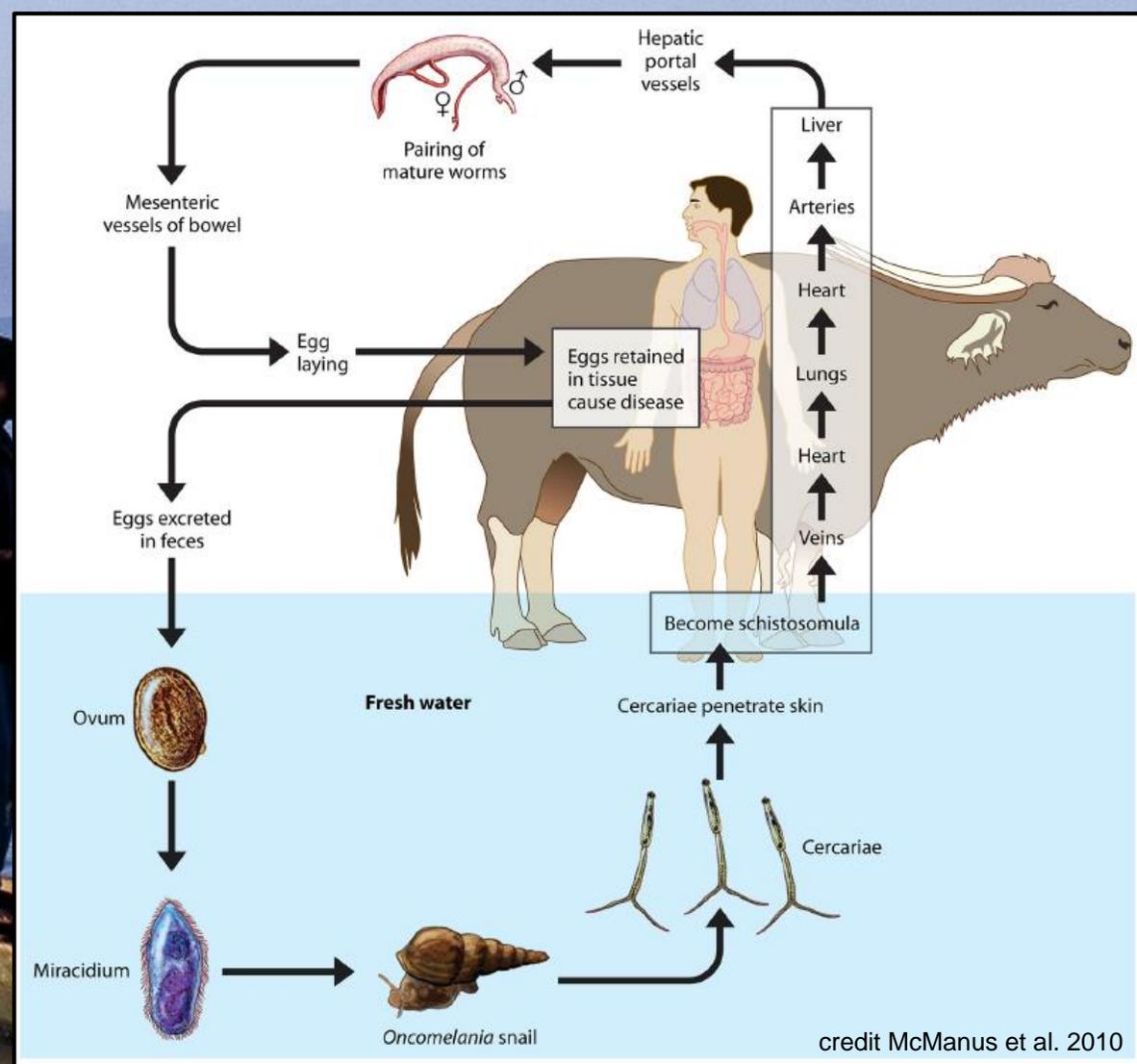
Wild rodents and their role in the epidemiology of human schistosomiasis in Senegal

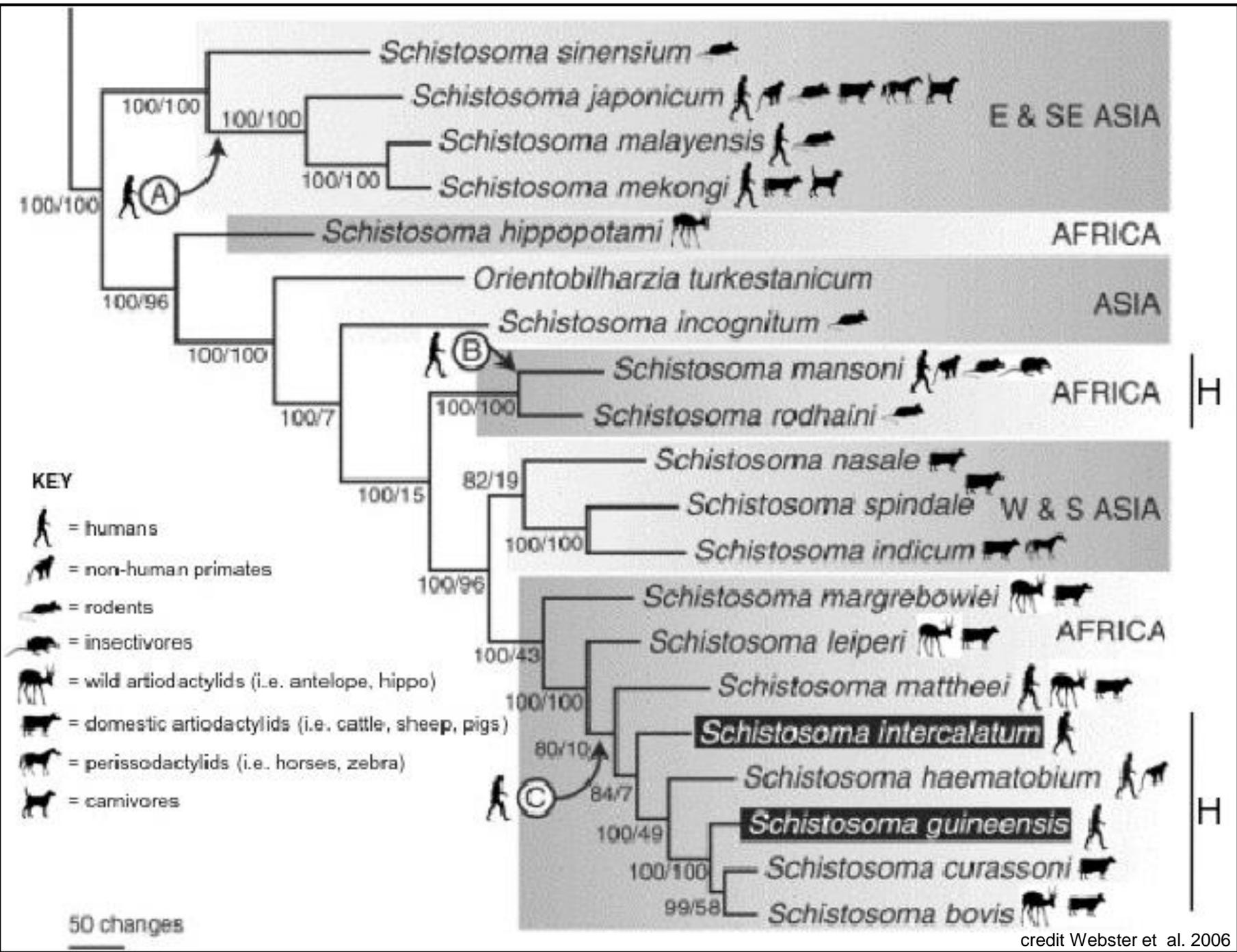
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> 240 million

human cases





- S. mansoni*
- S. haematobium*
- S. intercalatum*
- S. japonicum*
- S. mekongi*
- Mixed *S. haematobium*/*S. mansoni*
- Great rivers and lakes

Rodents as natural hosts of zoonotic *Schistosoma* species and hybrids: an epidemiological and evolutionary perspective from West Africa FREE

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The Journal of Infectious Diseases, jiy029, <https://doi.org/10.1093/infdis/jiy029>

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Schistosoma mansoni in Gabon: Emerging or Ignored?

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Klára Judita Petrželková,^{6,7,8} and David Modrý^{1,8,9}

Schistosomes of small mammals from the Lake Victoria Basin, Kenya: new species, familiar species, and implications for schistosomiasis control

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M. W. MUTUKU², M. L. STEINAUER¹, B. R. AGWANDA³, L. KIGO³, B. N. MUNGAI²,
E. S. LOKER¹ and G. M. MKOJI²

Schistosoma species hybridization

Parasitol Res

DOI 10.1007/s00436-015-4643-4

ORIGINAL PAPER

Introggressive hybridizations of *Schistosoma haematobium* by *Schistosoma bovis* at the origin of the first case report of schistosomiasis in Corsica (France, Europe)

Hélène Moné¹ • Martha C. Holtfreter² • Jean-François Allienne¹ •
Rodrigue Mintsá-Nguéma³ • Moudachirou Ibikounlé⁴ • Jérôme Boissier¹ •
Antoine Berry⁵ • Guillaume Mitta¹ • Joachim Richter² • Gabriel Mouahid¹

Introgressed Animal Schistosomes *Schistosoma* *curassoni* and *S. bovis* Naturally Infecting Humans

Elsa Léger, Amadou Garba, Amina A. Hamidou,
Bonnie L. Webster, Tom Pennance,
David Rollinson, Joanne P. Webster

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Niger, Niamey, Niger (A. Garba, A.A. Hamidou); Natural History
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DOI: <http://dx.doi.org/10.3201/eid2212.160644>

To the Editor: Schistosomiasis, a disease caused by infection with parasitic worms (schistosomes), is a neglected tropical disease across many parts of the world. Numbers of infected livestock are unknown, but >250 million persons are infected; the greatest number of cases are in sub-Saharan Africa (1). Schistosome eggs are excreted through urine or feces, depending on the species, and hatch into miracidia upon contact with freshwater. Larvae are transmitted to the mammalian host indirectly through a molluscan intermediate host. Goals to eliminate schistosomiasis by 2020 in select countries in Africa have

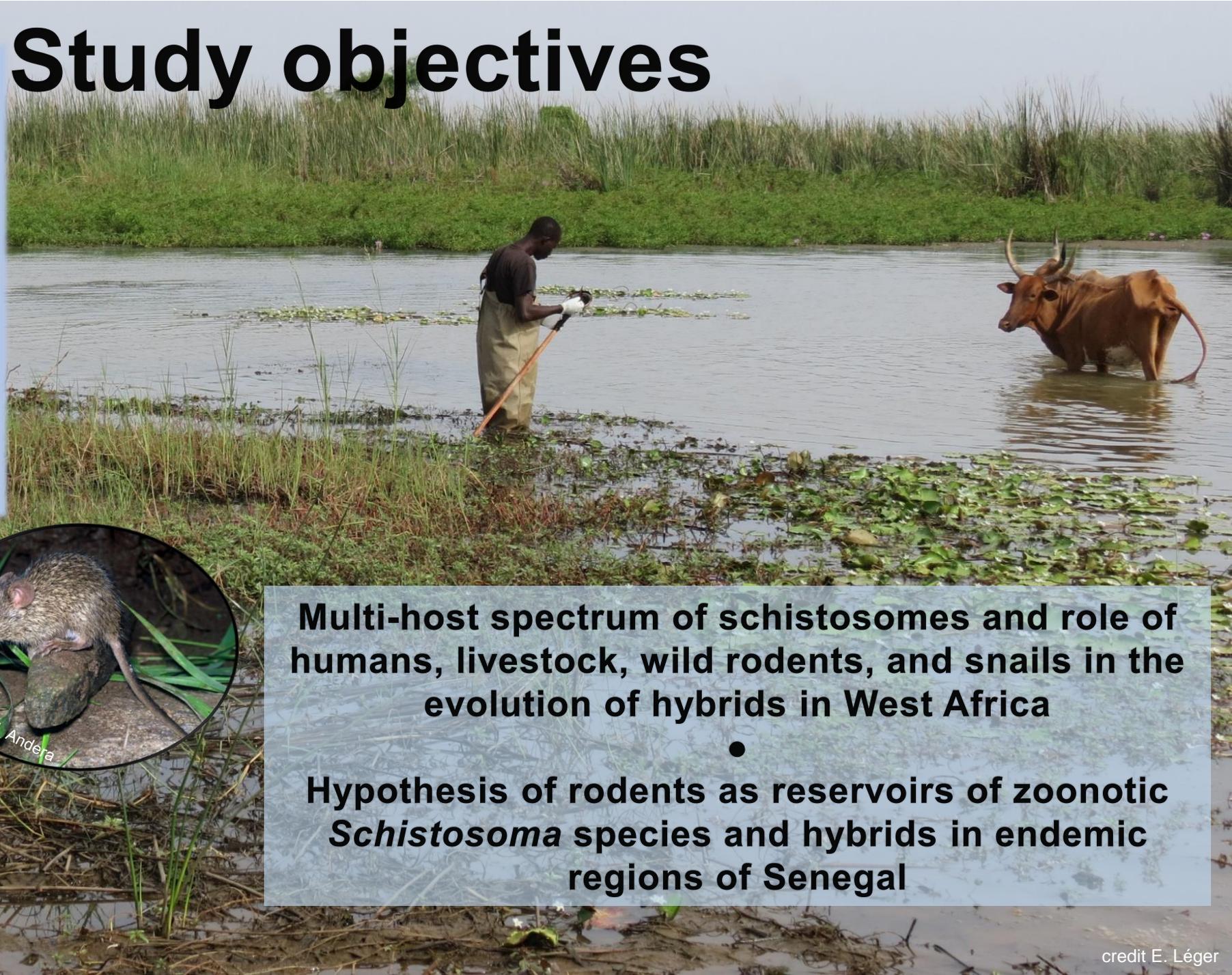
Emerging Infectious Diseases • www.cdc.gov/eid

Anthropogenic changes driving *Schistosoma* spp. hybridization?





Study objectives



Multi-host spectrum of schistosomes and role of humans, livestock, wild rodents, and snails in the evolution of hybrids in West Africa

- **Hypothesis of rodents as reservoirs of zoonotic *Schistosoma* species and hybrids in endemic regions of Senegal**



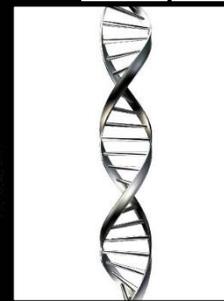
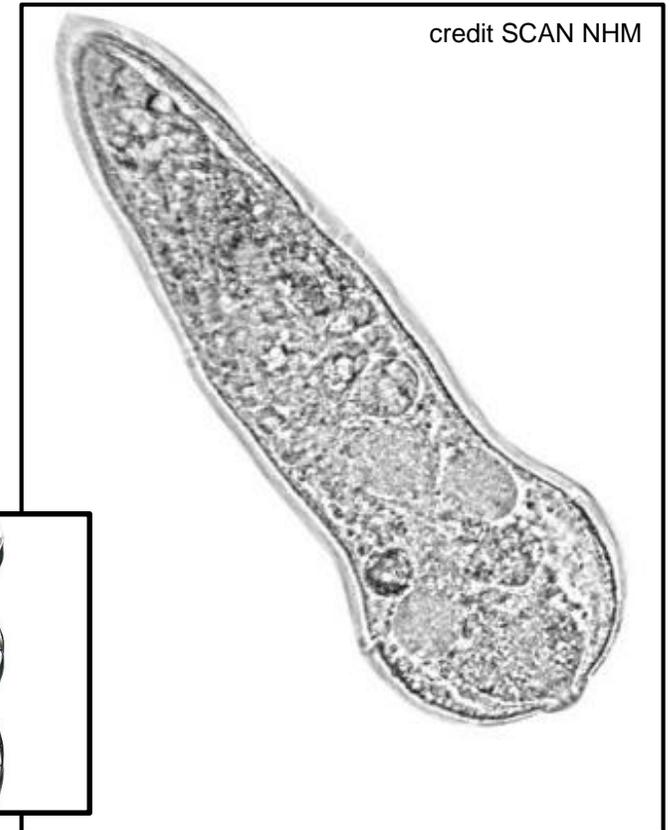
For each individual

- GPS coordinates
- Habitat
- Capture date
- Species
- Gender
- Anatomical measurements



Specimens

- Plasma (stored at -20°C)
- Brain and heart in RNAlater®
- Kidneys in 90% ethanol
- Blood smears
- Whole blood in 90% ethanol
- Faeces in 10% formalin
- Parasitological analysis of:
 - cardiovascular system
 - respiratory system
 - digestive system
 - liver
 - urogenital system



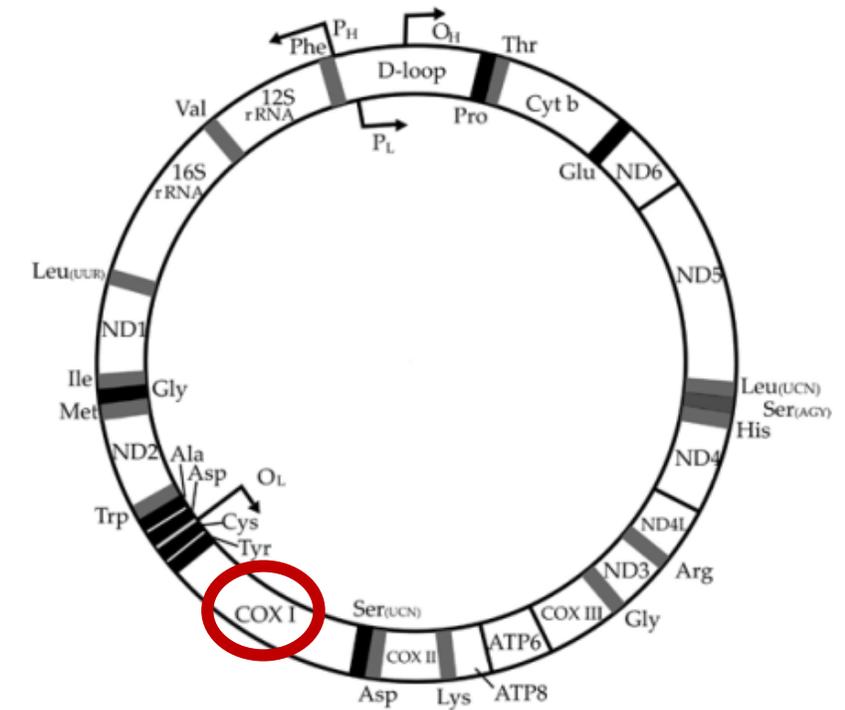
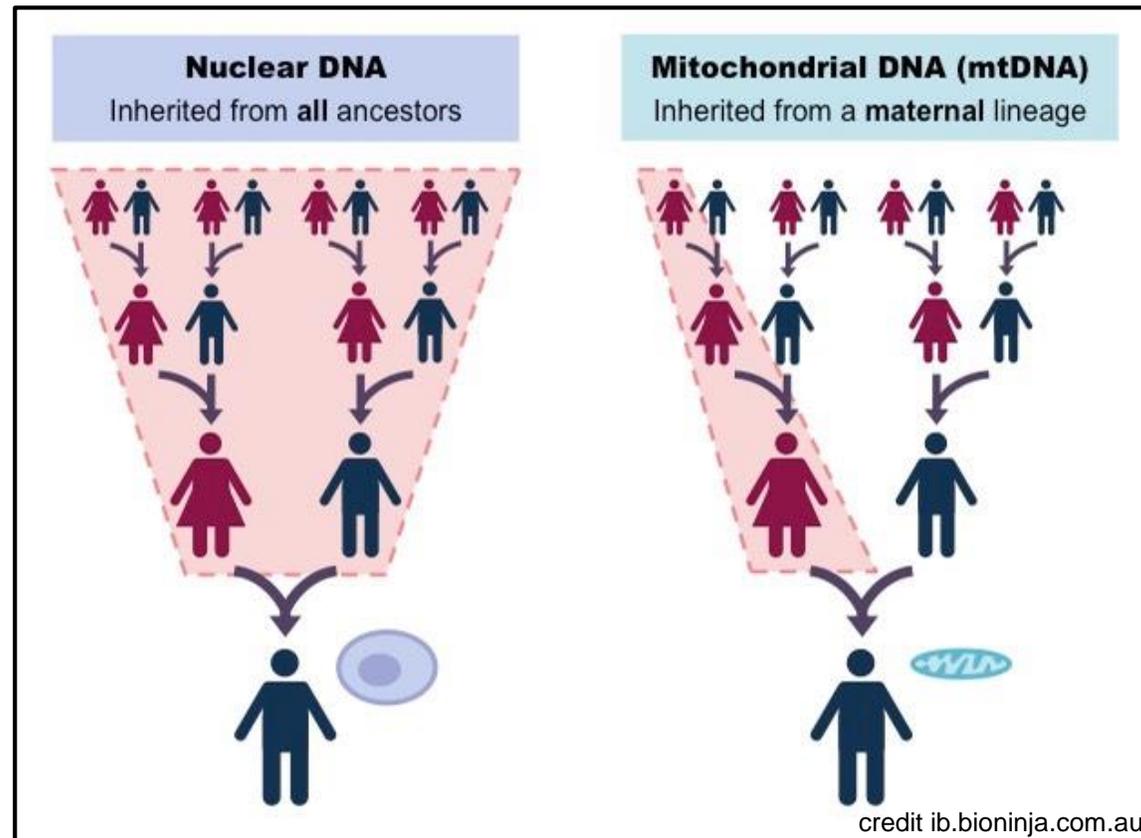
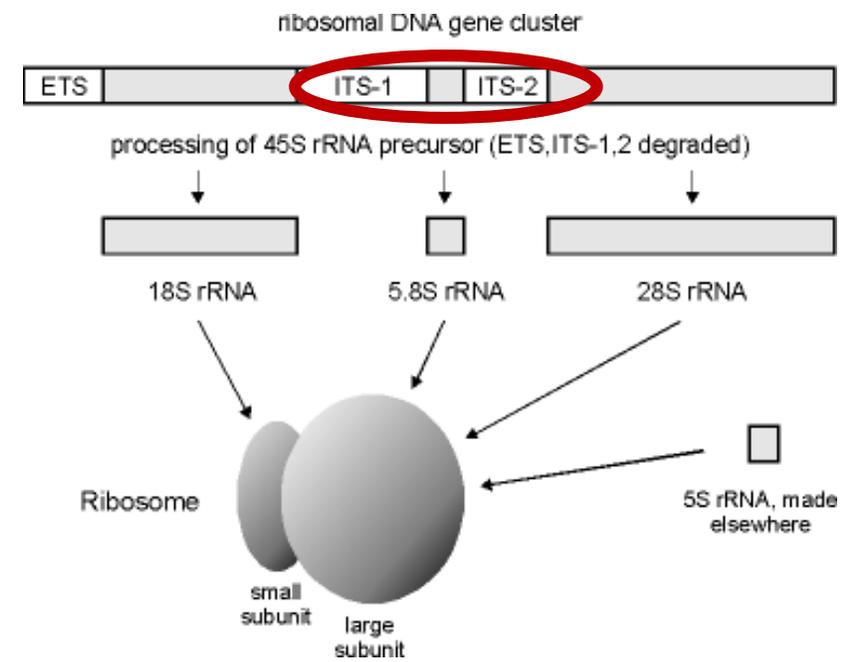
mtDNA COI + rDNA ITS region

A comparison between mitochondrial DNA and the ribosomal internal transcribed regions in prospecting for cryptic species of platyhelminth parasites

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(Received 25 March 2005; revised 12 May and 31 May 2005; accepted 31 May 2005)



Results

671 small mammals

- 367 mice *Mastomys huberti*
- 257 rats *Arvicanthis niloticus*
- 41 shrews *Crocidura* sp.
- 6 gerbils *Taterillus* sp.

23 *S. mansoni*
1 *S. haematobium/S. bovis*
6.3%

5 *S. bovis*
1 *S. mansoni*
2.3%

Village	Host	Prevalence
Gueo	<i>M. huberti</i>	52.6% (10/19)
Ganket	<i>M. huberti</i>	50.0% (2/4)
Temey	<i>M. huberti</i>	18.6% (8/43)
Merina Guewel	<i>M. huberti</i>	8.3% (1/12)
Djidiery	<i>A. niloticus</i>	5.8% (4/69)
Keur Momar Sarr	<i>M. huberti</i>	5.3% (1/19)
Richard Toll	<i>A. niloticus</i>	2.7% (2/73)
Nder	<i>M. huberti</i>	1.7% (1/60)



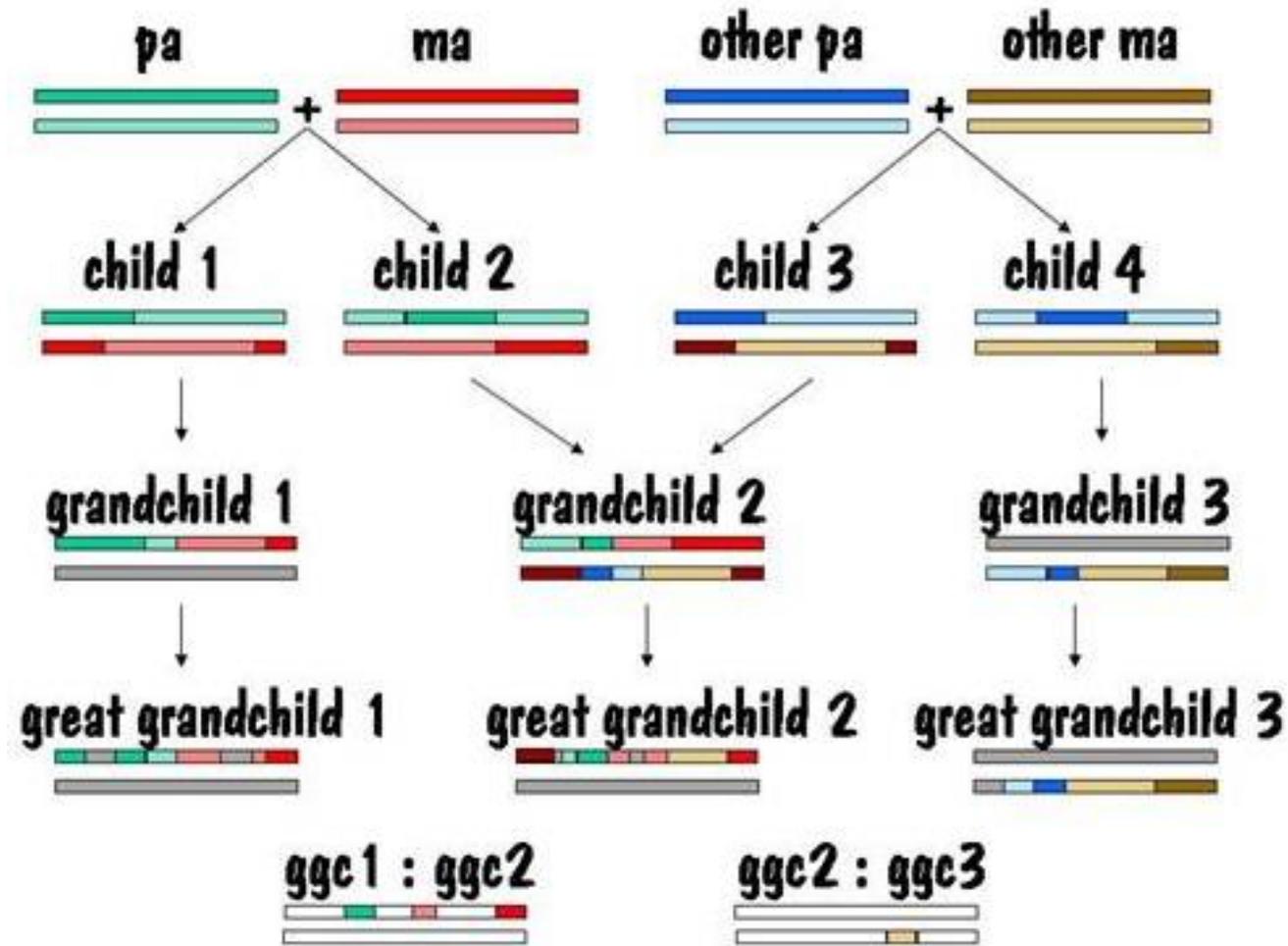
Reservoir of zoonotic *Schistosoma*



Spillover of circulating *Schistosoma*

Limitations

NGS and WGS to understand hybridization events, gene flow, and introgression



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Parasite

*S. bovis**

S. haematol

MF919405 (

MF919406-1

MF919411 (

MF919412-5

S. mansoni

*S. rodhaini**

MF919419

MF919420

MF919421

MF919422

MF919423-5

MF919426

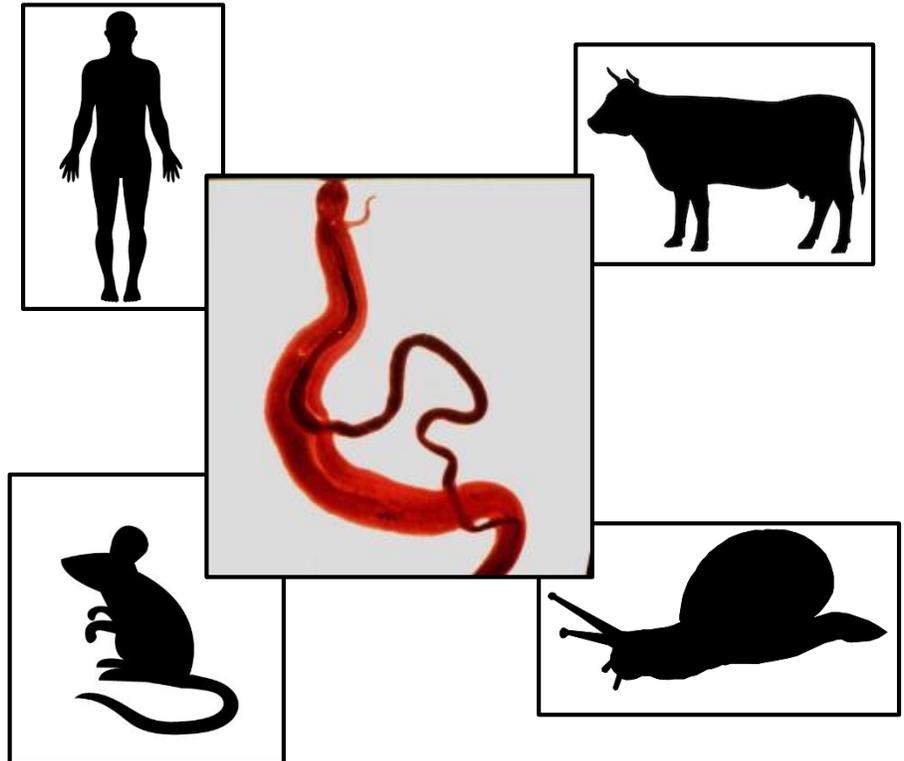
MF919427

MF919428

Significance

Understanding multi-host transmission dynamics and evolution of hybrids

•
Small mammals as sentinel and reservoir hosts of circulating *Schistosoma* spp.



SIXTY-FIFTH WORLD HEALTH ASSEMBLY

WHA65.21

Agenda item 13.11

26 May 2012

Elimination of schistosomiasis

The Sixty-fifth World Health Assembly,

Having considered the report on the elimination of schistosomiasis;¹

Recalling resolutions WHA3.26, WHA28.53, WHA29.58 and WHA54.19 on schistosomiasis;

Noting the resolution EM/RCS4/R.3 on neglected tropical diseases: an emerging public health problem in the Eastern Mediterranean Region, adopted by the Regional Committee for the Eastern Mediterranean, which called on Member States, inter alia, to sustain successful control activities in areas of low transmission in order to eliminate schistosomiasis;

Expressing concern that schistosomiasis remains a major public health problem in countries endemic for the disease, and that the goal set in resolution WHA54.19 of attaining a minimum target of regular administration of chemotherapy to at least 75% of school-age children at risk of morbidity was not achieved by 2010;

Noting the extension in coverage of treatment of schistosomiasis from 12 million people in 2006 to 32.6 million people in 2010, the greater access to praziquantel as a result of donations, and increased support from partners to countries endemic for the disease for control of neglected tropical diseases;

Congratulating Member States, the Secretariat and partners for increasing access to praziquantel and resources to scale up schistosomiasis control;

Encouraged that some countries endemic for schistosomiasis have interrupted its transmission;

Congratulating those countries endemic for schistosomiasis that, with strengthened control programmes and surveillance, have reported no new autochthonous cases of schistosomiasis,

1. CALLS ON all countries endemic for schistosomiasis:

(1) to attach importance to prevention and control of schistosomiasis, to analyse and develop applicable plans with progressive targets, to intensify control interventions and to strengthen surveillance;

¹ Document A65/21.

Future work



1659: First European settlement



1800-1890: Other European ports



1850-1950: Expansion of river trade



1930-1990: Expansion of overland trade



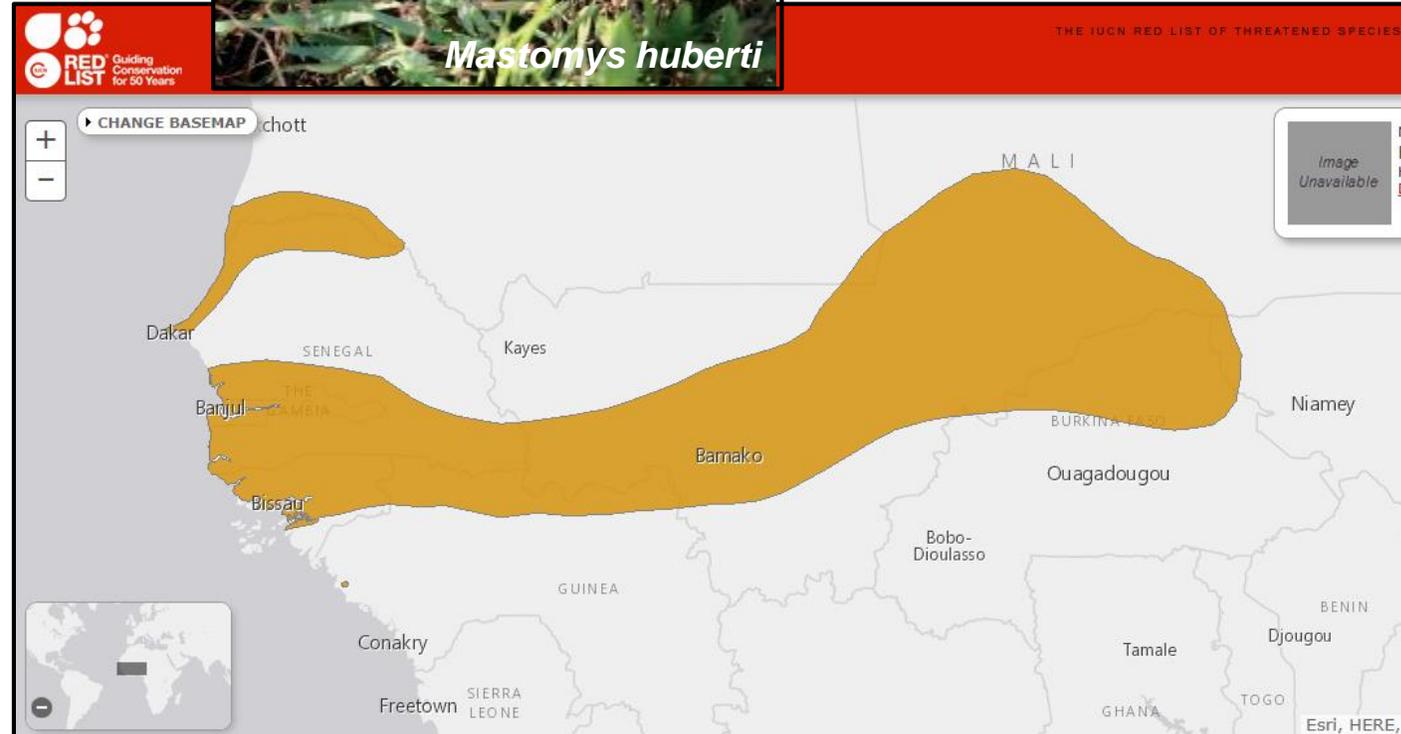
1990: Extension of tarred roads to the northeast



1995: Extension of tarred roads to the southeast



credit Konecny et al. 2013





Zoonoses & Emerging Livestock Systems



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Mapaté Gaye
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Alassane Ndiaye
Amelia Seymou
Cheikh Thiam
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