Trypanosoma evansi and *Trypanosoma vivax* in Brazil. Status of trypanosomes still neglected

Prof. Dr. Luiz Claudio Miletti
OIE Non Tsetse Transmitted Animal Trypanosomosis group member

Trypanosoma evansi - overview

- ✓ Originally observed by Griffith Evans in 1885
- ✓ Belongs to subgenus Trypanozoon (section salivaria)
- ✓ Widespread geographical distribution
- ✓ Wide range of wild and domestical hosts
- ✓ Cause a disease known as “Surra”
- ✓ Mechanically transmited by bitting flies (mainly Tabanus genera)

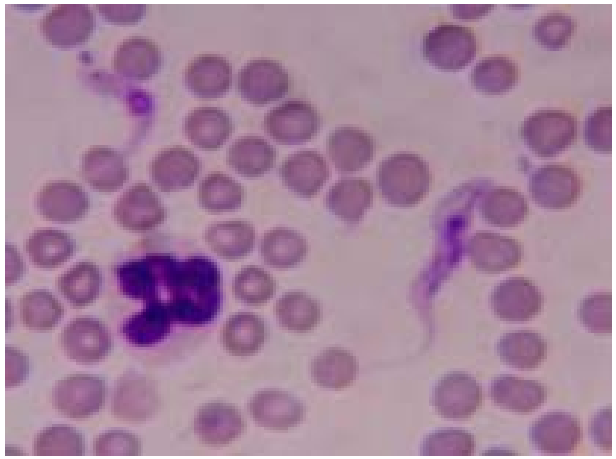


Foto: Armando Reyna

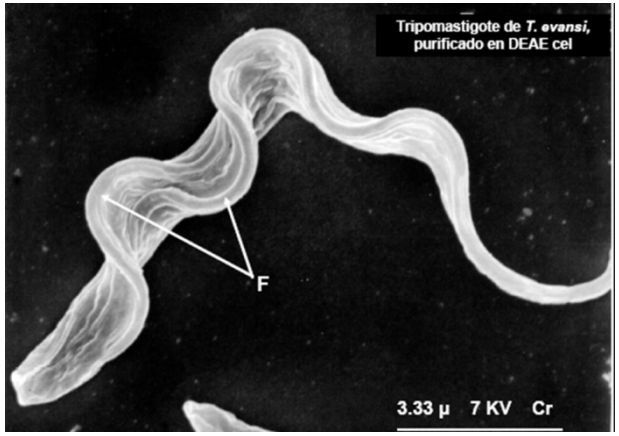


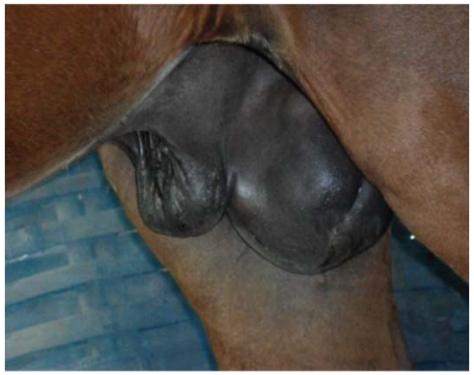
Foto: Antonio Bretaña

Trypanosoma evansi

- ✓ Signs: fever, anaemia, loss of appetite and weight, loss of condition and productivity, nervous signs and/or abortion, cachexia, and death.
- ✓ "it may stumble at the fore legs and drag the hind legs" (L. Stephen, *Trypanosomiasis: A Veterinary Perspective*, Pergamon Press, New York, NY, USA, 1986)
- ✓ Variable intensity of signs, from totally unapparent to lethal.
- ✓ Immunosuppression

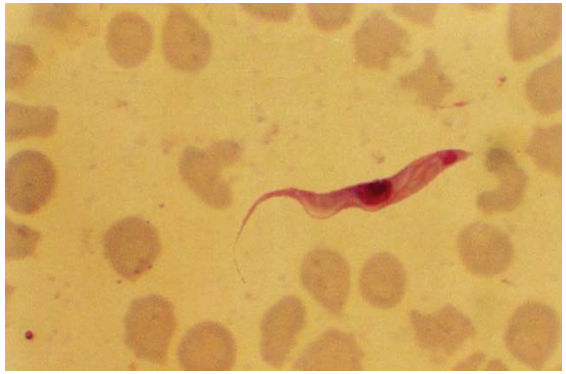
Fonte: Rodrigues et al., 2009

Fonte: Desquesnes et al http://dx.doi.org/10.1155/2013/194176



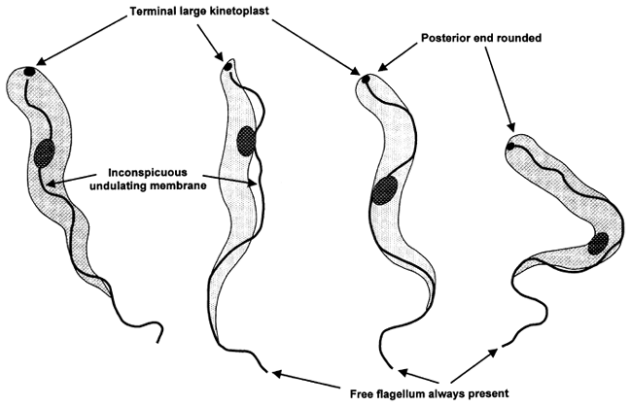
Trypanosoma vivax - overview

- ✓ Originally described by Hans Ziemann in 1905
- ✓ Belongs to subgenus Dutonella (section salivaria)
- ✓ Distribution: Africa and Latin America
- ✓ Host: bovines, bubalines ansd some other ungulates
- ✓ Cause a disease known as “Secadera” in Latin America
- ✓ Mechanically transmited by tabaniade and *S. calcitrans*



Fonte: http://dx.doi.org/10.1590/S0074-02762008000100001

Fonte: www.biolib.cz



Fonte:http://www.fao.org/docrep/006/x0413e/X0413E02.htm

Trypanosoma vivax

- ✓ Signs: high, persistent parasitemia, fever, very pronounced anemia, generalized visceral and mucosal hemorrhage, nose discharge, edema, and progressive weight loss;
- ✓ Immunosuppression.

Fonte: http://www.vet.ufmg.br/noticias/exibir/1943/professores_da_escola_investigam_surto_de_trypanossomose_bovina_em_mi

http://www.afrivip.org/sites/default/files/Tryps/diagnosis.html

Fonte : http://www.cruesp.sp.gov.br/?p=1637

Little economic importance

Few specific studies on biochemistry

Non zoonotic

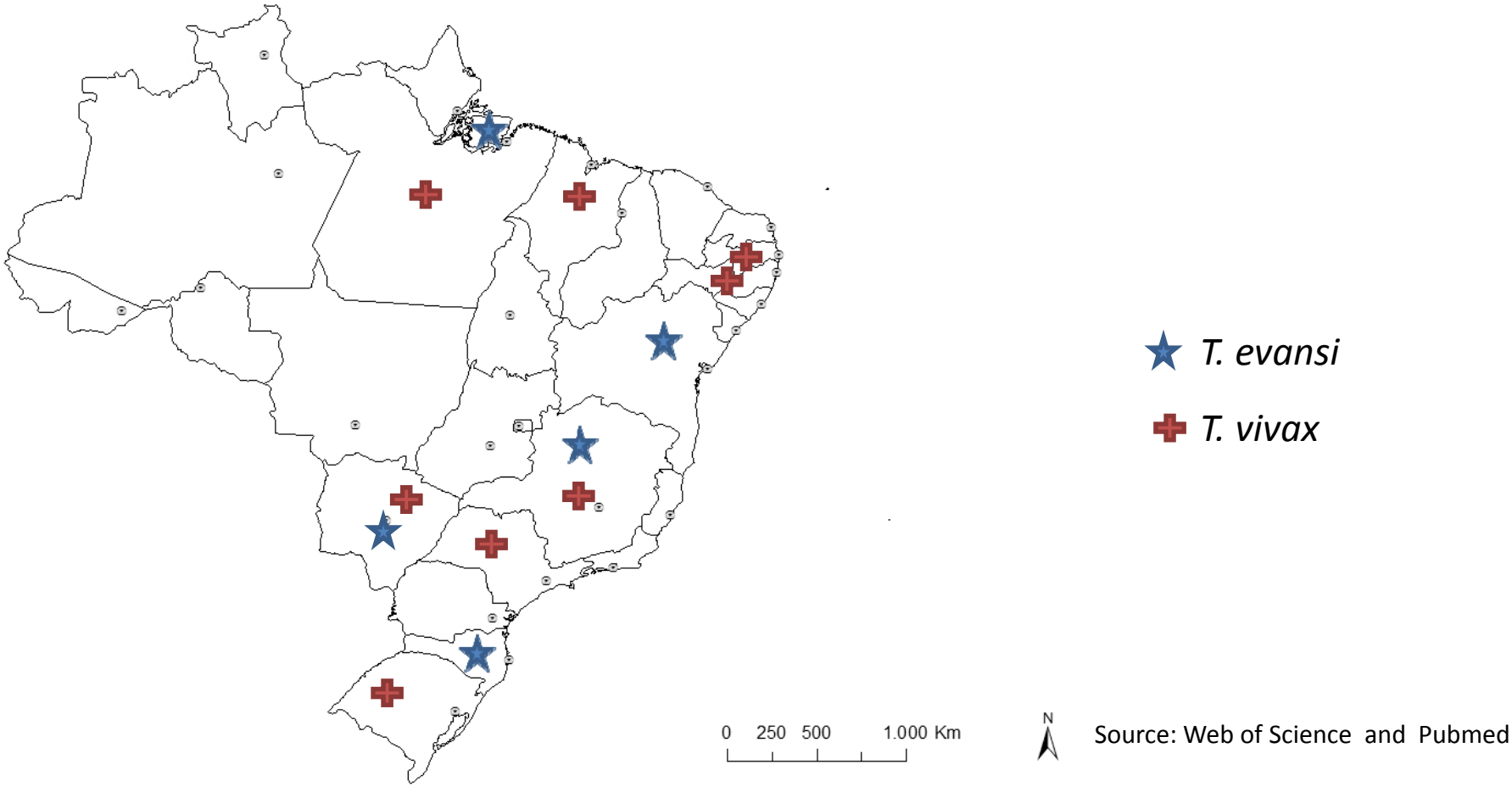
Why *T. evansi* and *T. vivax* trypanosomosis are neglected?

Failure and non-notification

Lack of interest in the pharmaceutical industry

Failure and non-notification

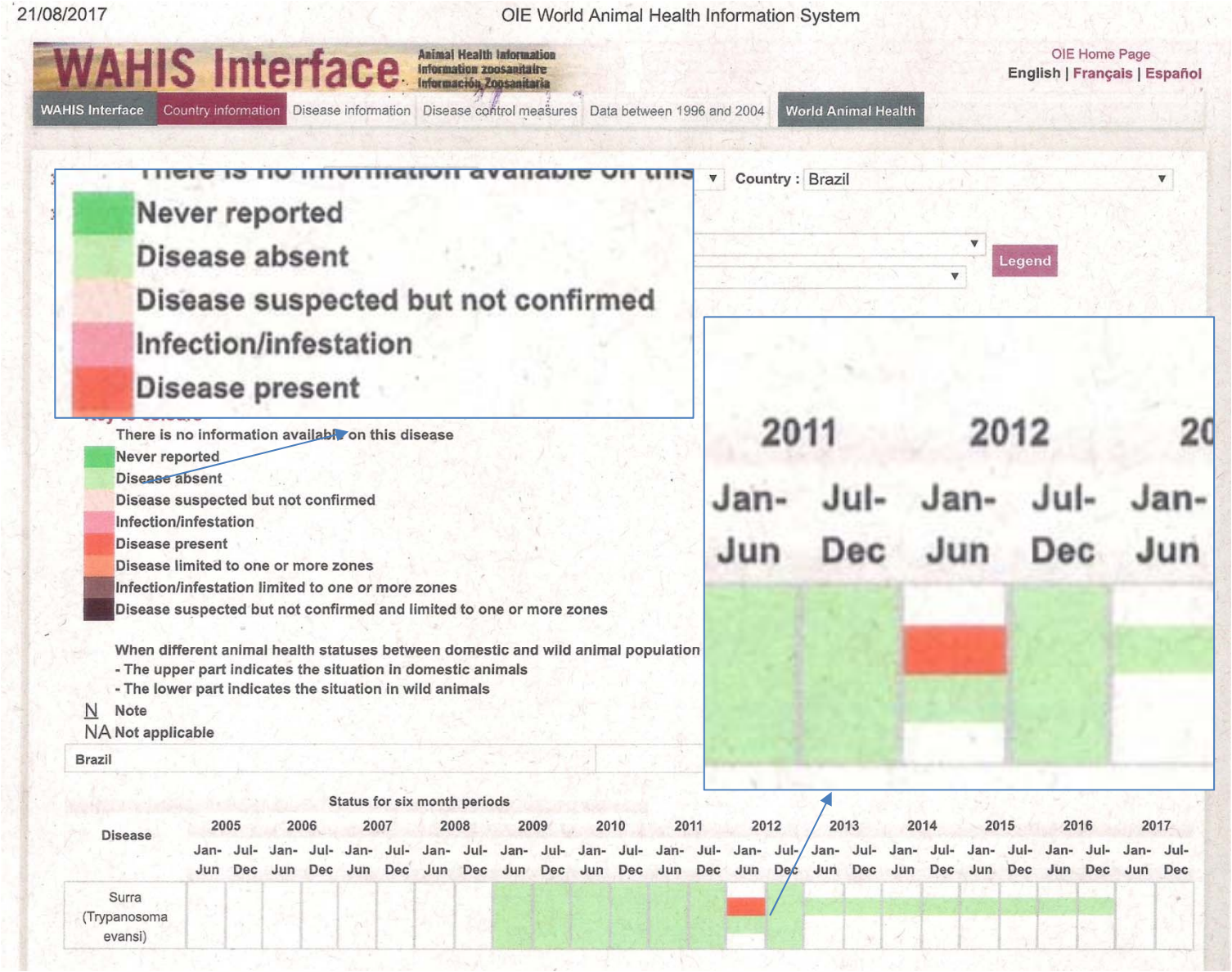
Epidemiology in Brazil
Report cases between 2001-2017



Source: Web of Science and Pubmed

Failure and non-notification

OIE- *T. evansi* Situation



Failure and non-notification

OIE- *T. vivax* Situation

21/08/2017 OIE World Animal Health Information System

WAHIS Interface — Animal Health Information / Information zoosanitaire / Información Zoosanitaria

OIE Home Page
English | Français | Español

WAHIS Interface | Country information | Disease information | Disease control measures | Data between 1996 and 2004 | World Animal Health

Info by Country/Territory — Choose by: Single country — Region : Entire World — Country :

Choose disease:

Terrestrial: Trypanosomosis (- -)

Aquatic: --- Aquatic ---

Start Year : 2005 — End Year : 2017

Disease timelines

Key to colours

There is no information available on this disease

- Never reported
- Disease absent
- Disease suspected but not confirmed
- Infection/infestation
- Disease present
- Disease limited to one or more zones
- Infection/infestation limited to one or more zones
- Disease suspected but not confirmed and limited to one or more zones

When different animal health statuses between domestic and wild animal population are provided the box is split in two:
- The upper part indicates the situation in domestic animals
- The lower part indicates the situation in wild animals

N Note

NA Not applicable

Brazil — Top

Status for six month periods

Disease	2005		2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2016		2017	
	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec
Trypanosomosis																										

Little economic importance

Financial impact- *T. evansi*

Only one study is available

Pantanal

Source : siscom.ibama.gov.b

3 million cattle, 49,000 horses

Estimated costs include risk of infection, costs of diagnosis, alternative treatments, collecting animals for treatment, and costs of animal losses

US$ 2.4 million

Source: Seidl et al 1998 Prev Vet Med. 33(1-4):219-34

Little economic importance

Financial impact- *T. vivax*

Source: Wikipédia

Only one study is available

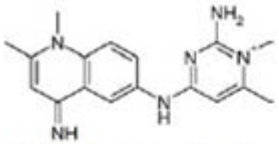
The financial impact of *T. vivax* bovine trypanosomiasis occurring in Brazilian Pantanal and Bolivian lowlands has been estimated at US$ 15 per animal (4% of the total value of each head of cattle). Without treatment, this cost would soar to as much as US$ 64 per animal, or 17% of the total value.

US$ 160 million

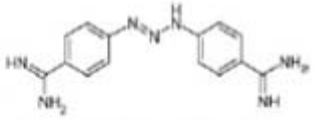
Source: Seidl et al 1999 Mem Inst Oswaldo Cruz,, Vol. 94(2): 269-272

Lack of interest in the pharmaceutical industry

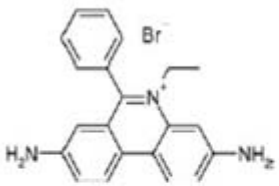
Situation of available drugs



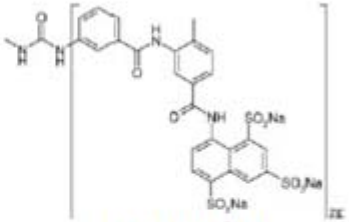
Sulfato de Quirapiramina



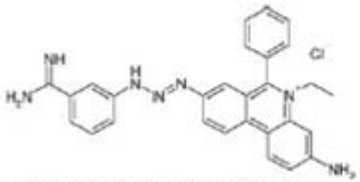
Aceturato de Diminazeno



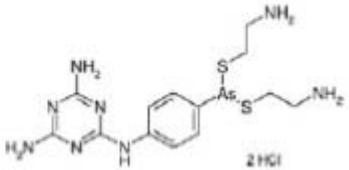
Brometo de Homídium



Suramina Sódica



Cloreto de Isometamidium



Melarsomina Dihidroclorida

Fonte: Giordani et al., (2016)

Fonte: Grace (2003)

Resistance

Toxicity

New Chemotherapeutic agents

Lack of interest in the pharmaceutical industry

Diminazene aceturate, , homidium salts and isometamidium chloride

50 years in use

“ chemical industry is not actively seeking to develop new compouds because the market is rather uncertain and not very profitable”

G. Uilenberg (1998) A field guide for THE DIAGNOSIS, TREATMENT AND PREVENTION OF AFRICAN ANIMAL TRYPANOSOMOSIS

Non zoonotic

T. evansi trypanosomosis as zoonose

2005- Joshi et al. First case report of Human trypanosomiasis caused by *Trypanosoma evansi* in India

Deficiency of apolipoprotein L1 (APOL1), a component of human serum with trypanocidal activity

2016- Chau et al. First Reported Human Infection With the Zoonotic Parasite *Trypanosoma evansi* in Southeast Asia

Normal apolipoprotein L1 (APOL1)

Few specific studies on biochemistry

Research

In a search in the PUBMED repository for the number of scientific papers that address biochemical aspects of these protozoa, only approximately 15 articles are found in the period from 2001 to 2017.

Why?

Little investment , Few groups involved and .....

What can we do?

Rational Drug Use

To better manage trypanosomosis and trypanocide resistance

Working paper

Della Grace

Working Paper 4
May, 2003

INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE

Fonte: Grace (2003)

UDESC
UNIVERSIDADE
DO ESTADO DE
SANTA CATARINA

LABHEV
UDESC
Bioquímica de Hemoparasitas e Vetores

Thank you

luiz.miletti@udesc.br