Alianța Timișoara Universitară

Ministerul Cercetării, Inovării și Digitalizării

Ministerul Educației

Administrația Prezidențială

Academia Română

uefiscdi

Smart Diaspora 2023

Universitatea de Științe Agricole și Medicină Veterinară 1869 USAMV Cluj-Napoca

Revoluții și evoluții ale științelor omice în epoca postgenomică

10 - 13 Aprilie 2023, Timișoara

www.diaspora-stiintifica.ro

Eveniment aflat sub înaltul patronaj al Președintelui României

Universitatea de Vest din Timișoara

Universitatea de Medicină și Farmacie Victor Babeș | Timișoara

Universitatea Politehnica Timișoara

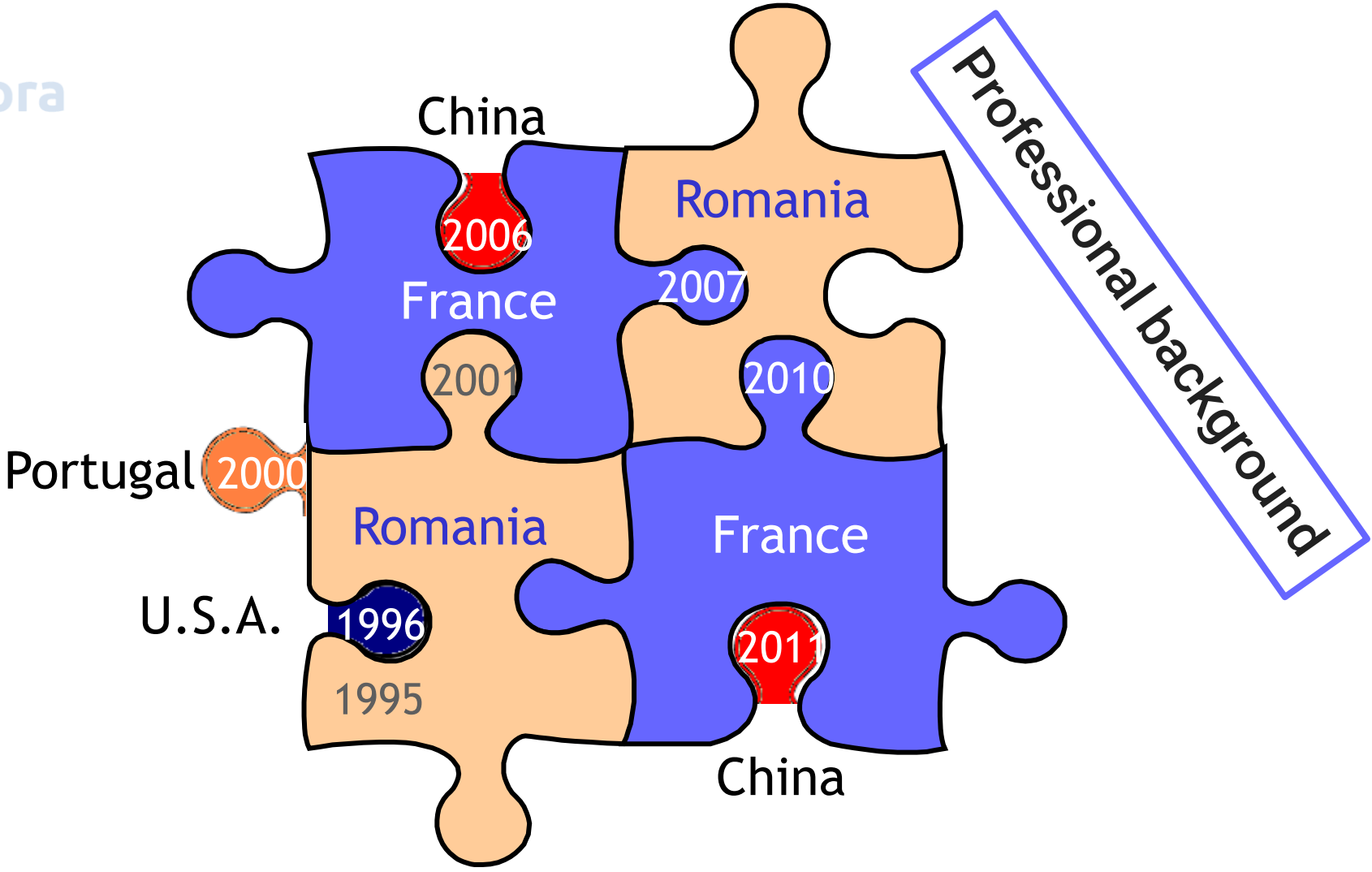
The One Health approach to food-borne zoonotic parasites: the example of *Trichinella* spp. and *Toxoplasma gondii* in Europe

Radu BLAGA

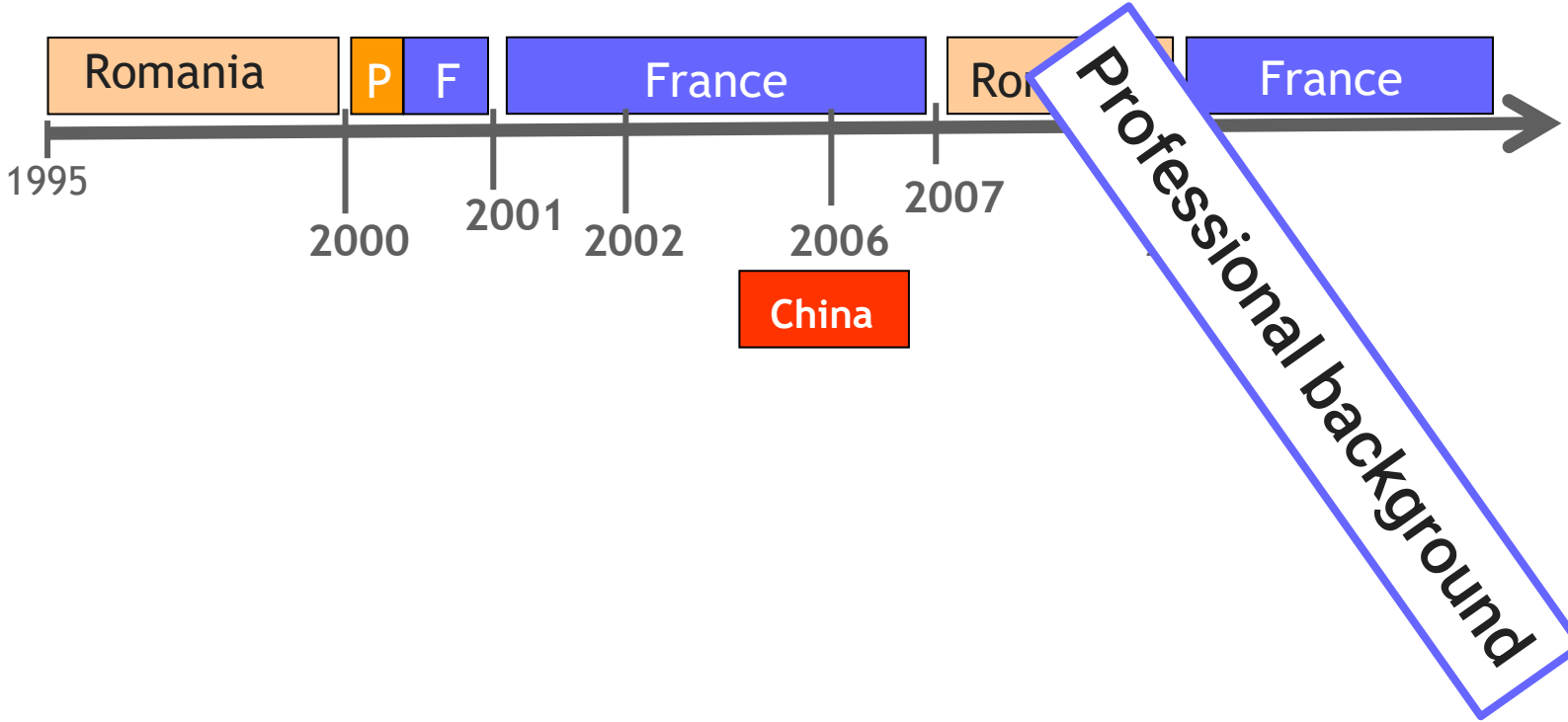
Professor of Parasitology, Mycology, Parasitic and fungal diseases, **EnvA**

UMR BIPAR Anses, EnvA, INRAe

Smart Diaspora 2023

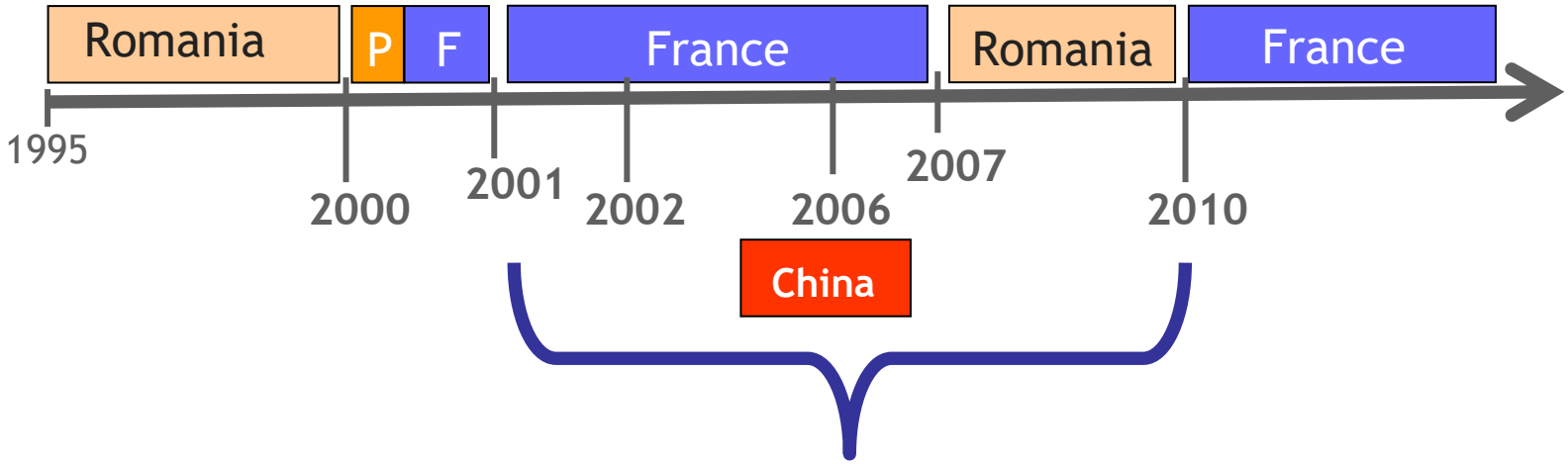


Smart Diaspora 2023



Detection of food-borne zoonotic parasites with a One Health approach (*une seule santé*)

Smart Diaspora 2023



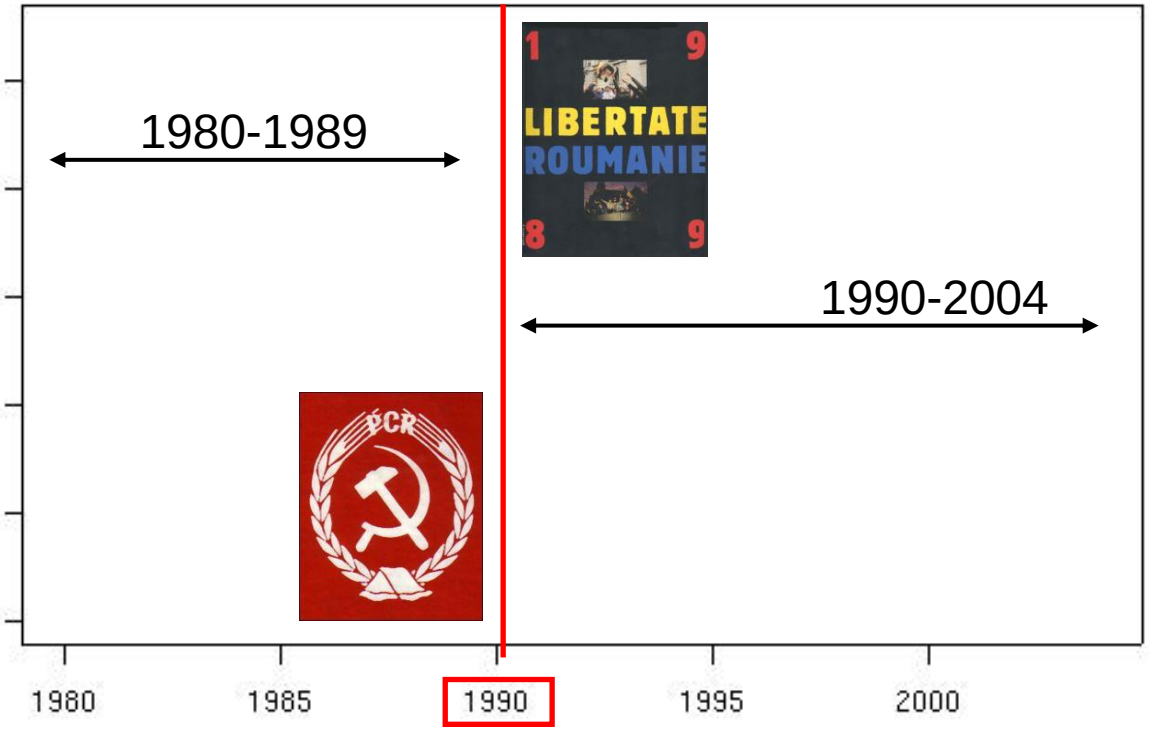
Trichinella spp.

UMR BIPAR / USAMV CN

Study of genetic and spatio-temporal variability within the genus *Trichinella* in Romania

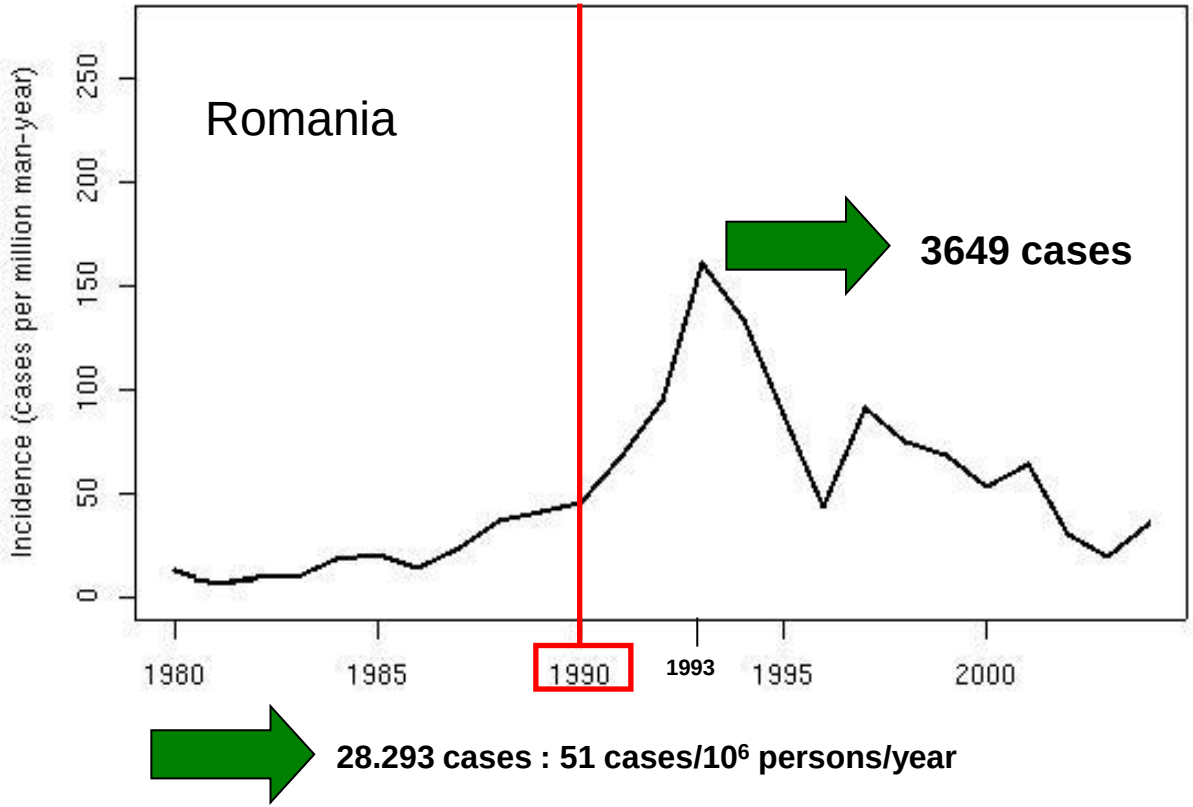
Smart Diaspora 2023

Emerging of human trichinellosis in Romania (1980-2004)



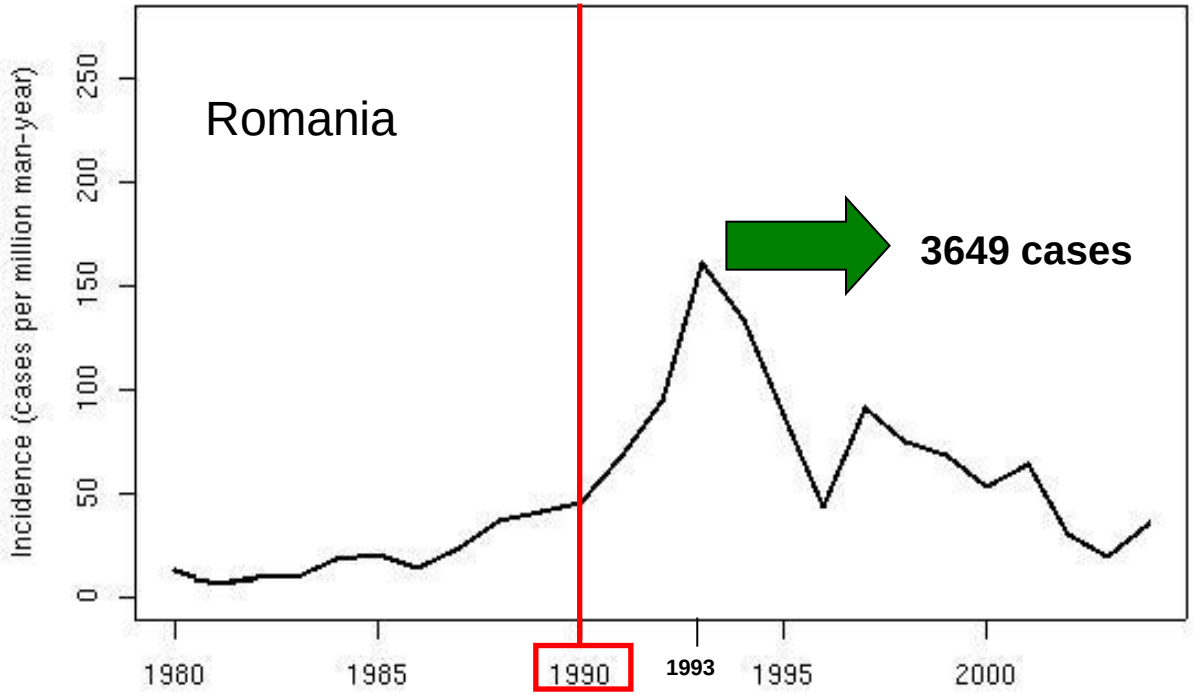
Smart Diaspora 2023

Emerging of human trichinellosis in Romania (1980-2004)



Smart Diaspora 2023

Emerging of human trichinellosis in Romania (1980-2004)



28.293 cases : 51 cases/10^6 persons/year

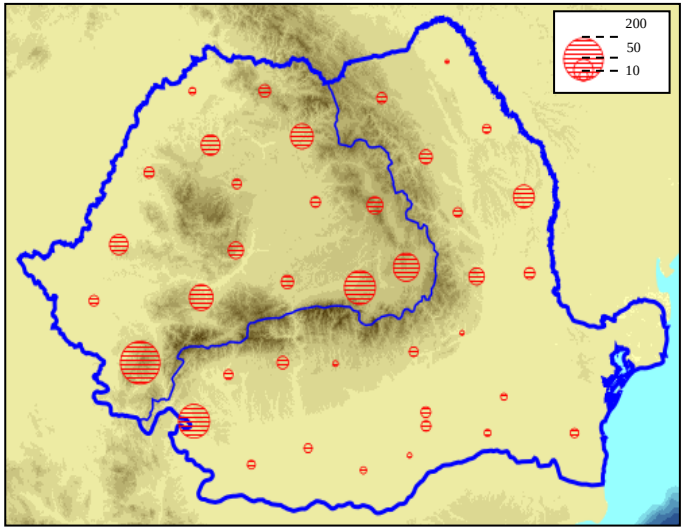
1980-1989: 19,6 cas/10^6 persons/year

1990-2004: 71,8 cas/10^6 persons/year

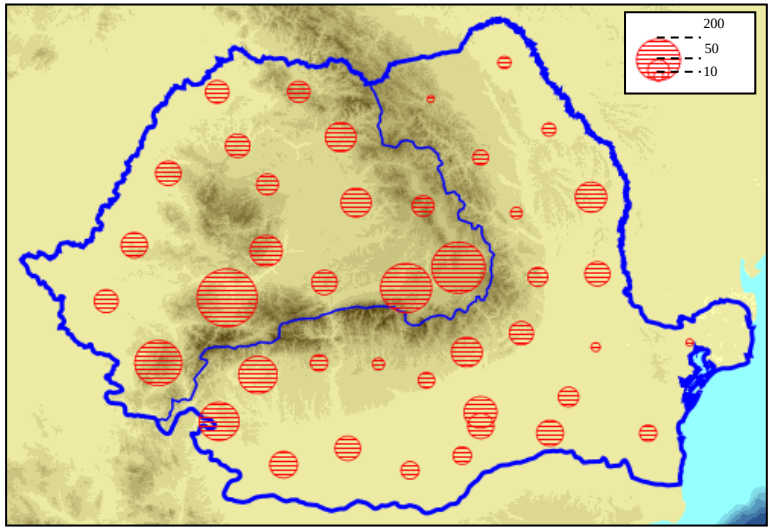
Smart Diaspora 2023

Emerging of human trichinellosis in Romania (1980-2004)

1980-1989



1990-2004



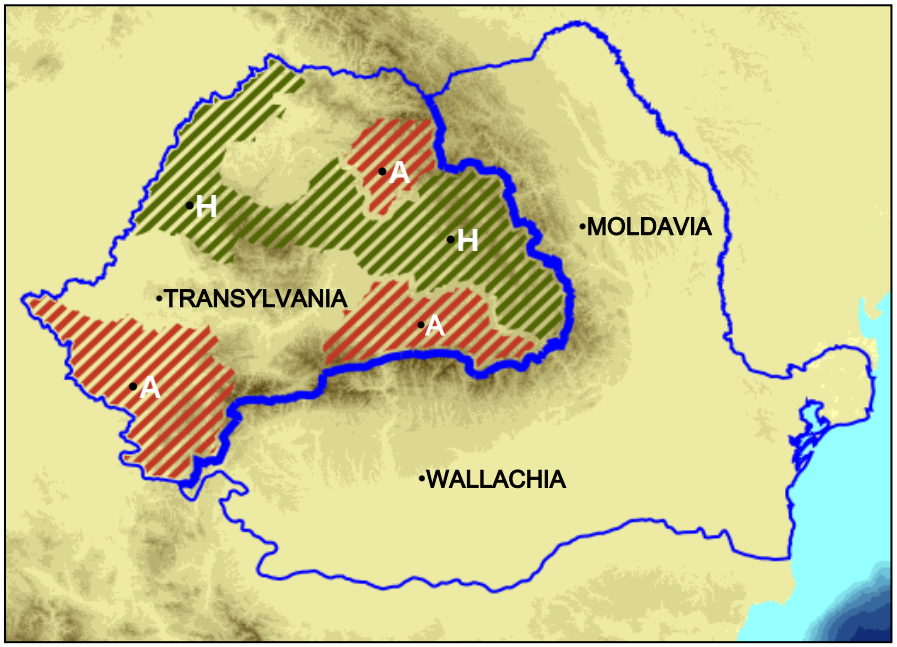
TEMPORAL VARIATION

- the circulation of the parasite in the pig population
- the level of meat consumption
- the efficiency of the veterinary sanitary controls
- the proportion of positive cases that are reported

Smart Diaspora 2023

Emerging of human trichinellosis in Romania (1980-2004)

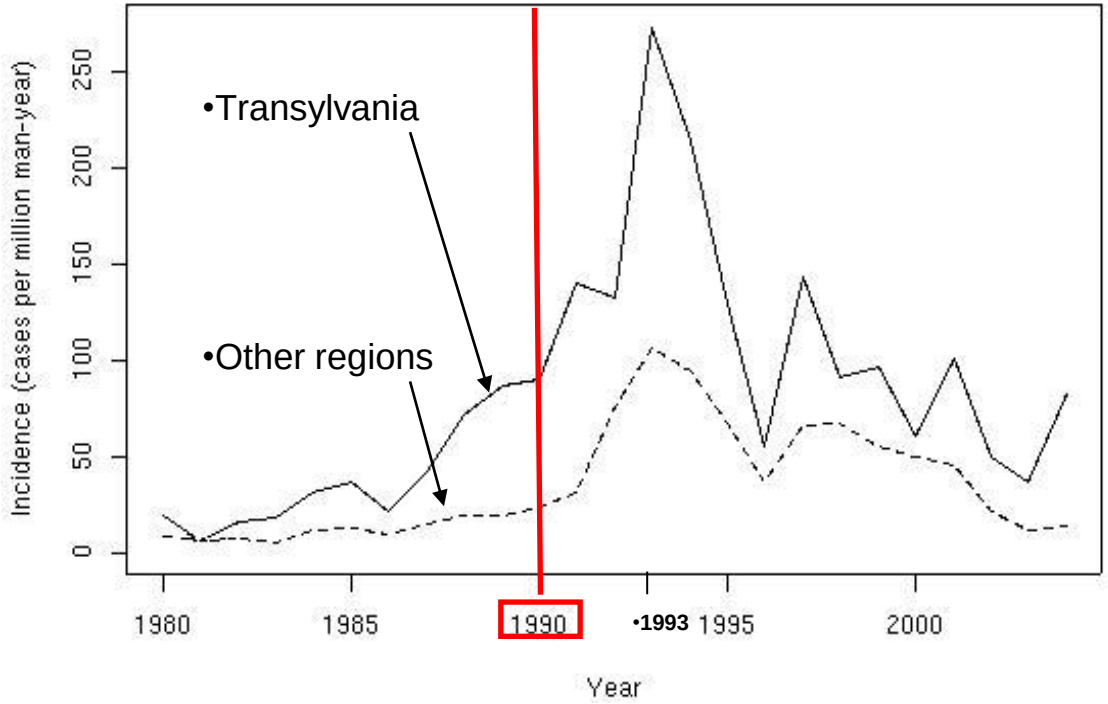
- 12th century
- 16th century
- 18th century



Transylvania *vs* **Other regions**

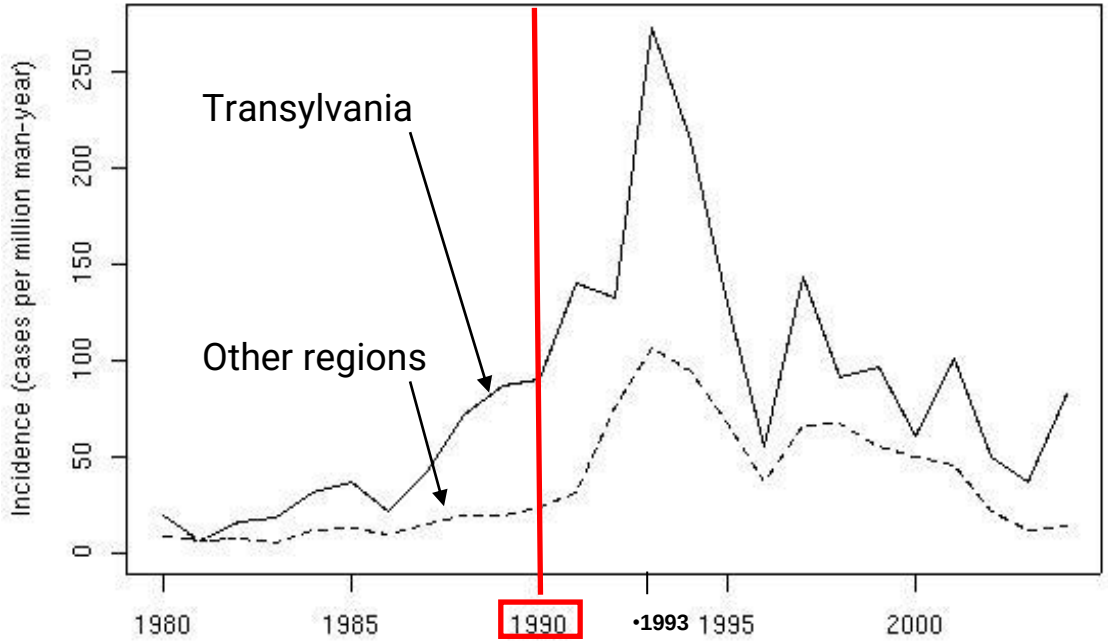
Smart Diaspora 2023

Emerging of human trichinellosis in Romania (1980-2004)



Smart Diaspora 2023

Emerging of human trichinellosis in Romania (1980-2004)



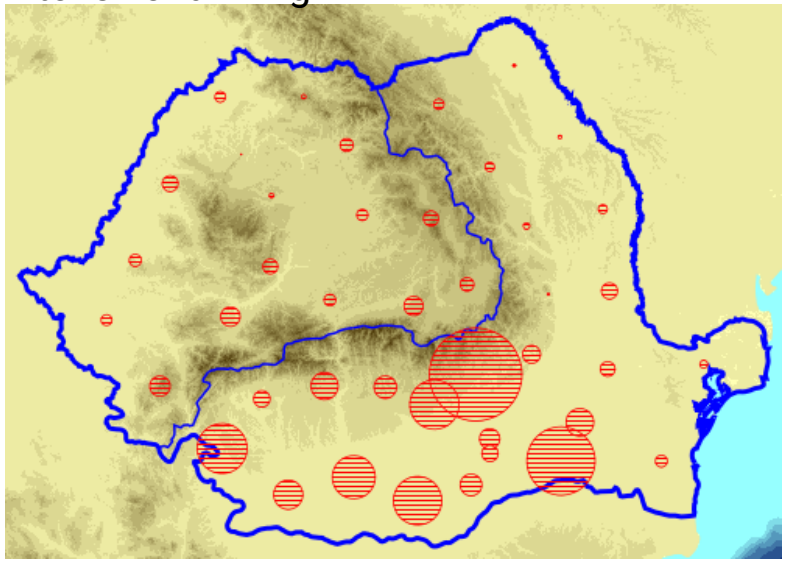
Transylvania: → **14.991 cases: 82,2 cas/10^6 persons /year**

Other regions: → **13.302 cases: 35,7 cas/10^6 persons /year**

Smart Diaspora 2023

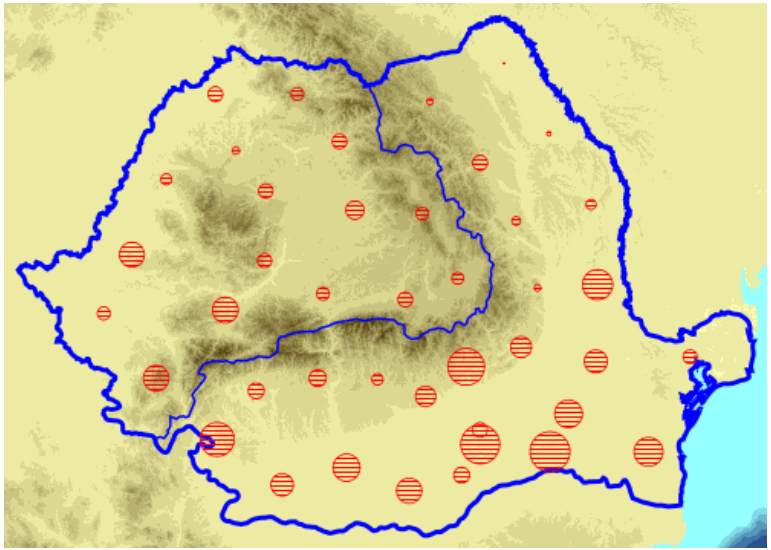
Trichinella infection in pigs in Romania (1997-2004)

Intensive farming



Romania	0,077 / 100 animals
Transylvania	0,019 / 100 animaux
Other regions	0,140 / 100 animaux

Extensive farming (GP)

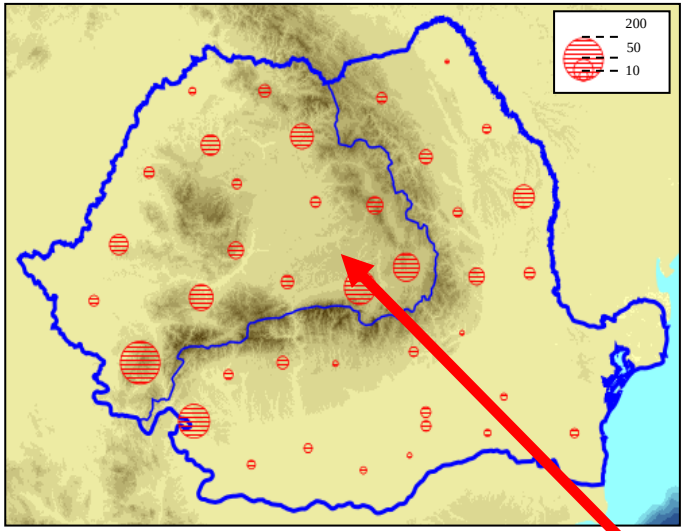


Romania	0,089 / 100 animaux
Transylvania	0,061 / 100 animaux
Other regions	0,108 / 100 animaux

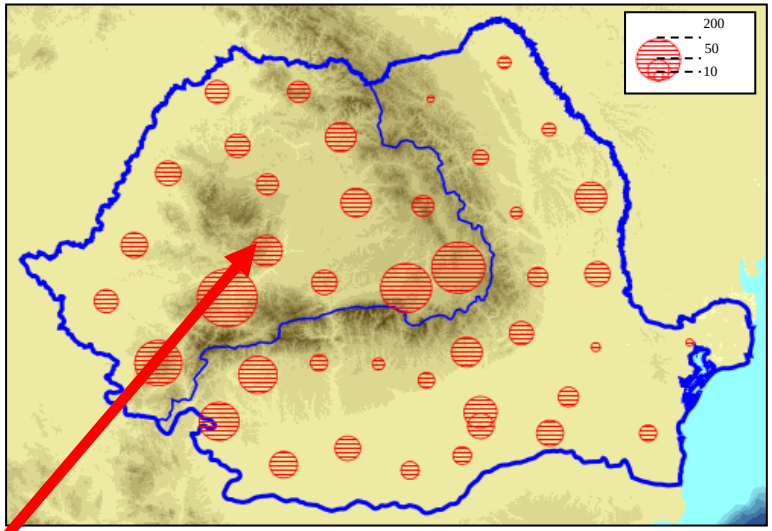
Smart Diaspora 2023

Emerging of human trichinellosis in Romania (1980-2004)

1980-1989



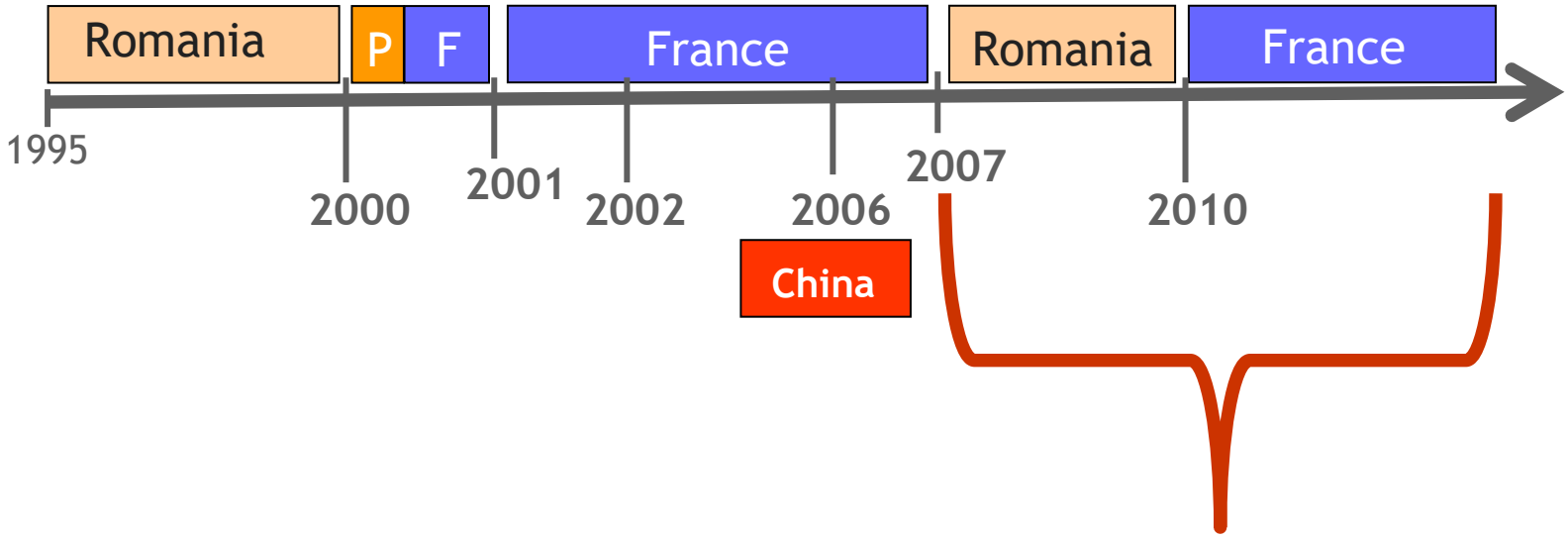
1990-2004



SPATIAL VARIATION

- Food-habits of populations of German origin: consumption of raw/smoked sausages

Smart Diaspora 2023



Toxoplasma gondii

USAMV CN / UMR BIPAR

Detection of *Toxoplasma gondii* infection in meat intended for human consumption

Meat consumption in France

Meat consumption in France *(Agreste)*

Kg/hab./year

34,7

26,2

24,6

3,9

0,4

Meat consumption in France and *Toxoplasma*

Meat consumption in France *(Agreste)*
Kg/hab./year

34,7

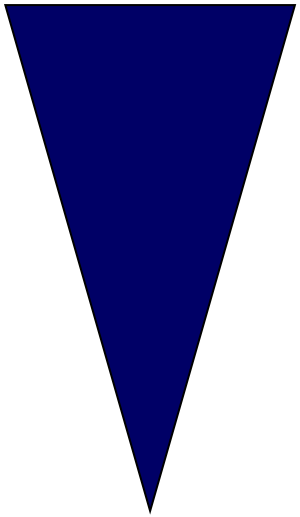
26,2

20% of adults are eating at least occasionallly **raw beef**

24,6

3,9

0,4



sheep, pigs, goats

free-ranging poultry, game animals, rabbits

horses, commercially raised poultry

buffaloes, cattle

Frequency of tissue cysts in meat ***(Tenter et al., 2000)***

Meat consumption in France and *Toxoplasma*

Meat consumption in France *(Agreste)*
Kg/hab./year

34,7

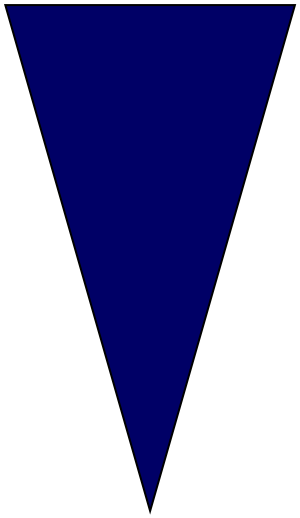
26,2

20% of adults are eating at least occasionallly **raw beef**

24,6

3,9

0,4



sheep, pigs, goats

free-ranging poultry, game animals, rabbits

horses, commercially raised poultry

buffaloes, cattle

Frequency of tissue cysts in meat ***(Tenter et al., 2000)***

National surveillance plans of *T.gondii* contamination

Smart Diaspora 2023

National surveillance plan of *T.gondii* contamination in ovine

- **Samples (muscles) : + 800 samples (French and imports)**

► **Overall seroprevalence : 24% (Fr.) and 24,7% (imp.)**

Adults (>12 mois) : 69,5% (Fr.) and 50% (imp.)
Lambs (<12 mois) : 13,1% (Fr.) et 15,9% (imp.)

Significantly influence of the age

► **Live parasites 48 /397 french carcasses (1/3 lambs)**

► **Génotype II (majority)**

Smart Diaspora 2023

National surveillance plan of *T.gondii* contamination in bovine

- **Samples (muscles) : + 2900 samples (French and imports)**

► **Overall seroprevalence : 11% (Fr.) and 22% (imp.)**

Adults (>12 mois) : 15% (Fr.) and 34% (imp.)
Veal (<12 mois) : 2,5% (Fr.) et 6% (imp.)

Significantly influence of the age

► **Live parasites 2 /207 french carcasses**

► **Génotype II**

National surveillance plan of *T.gondii* contamination in pigs

- **Samples (muscles) : + 1500 samples (indoor and outdoor)**

► **Overall seroprevalence : 4,8%**

Indoor (pig-market) : 2,8%
Outdoor (pig-market): 6,3%

Significantly influence of type of farming

► **Live parasites 41 /148 (incl. 1 -/-)**

► **Génotype II**

Strains/ bio-essai	Cardiac fluid	Sera
27/36	+	+
4/17	+	-
4/43	-	+
1/29	-	-
5/16	+	abs.

Smart Diaspora 2023

CONCLUJIONS

- Romania remains one of the country with the highest ***Trichinella*** infestation in the world (55.1 cases/106 people/year; 8 cases /10,000 pigs tested, 10 cases / 1,000 wild boars tested and 10 cases / 100 bears tested)
- Influence of contrasting dietary habits of the local populations

- For ***T.gondii*** infection: 2.46% for pig-offspring to 69.5% for adult sheep depending of the age of the animal, type of farming
- Live parasites were detected in two adult cattle carcasses, suggesting possible transmission to humans through the consumption of beef

Smart Diaspora 2023

Merci à tous

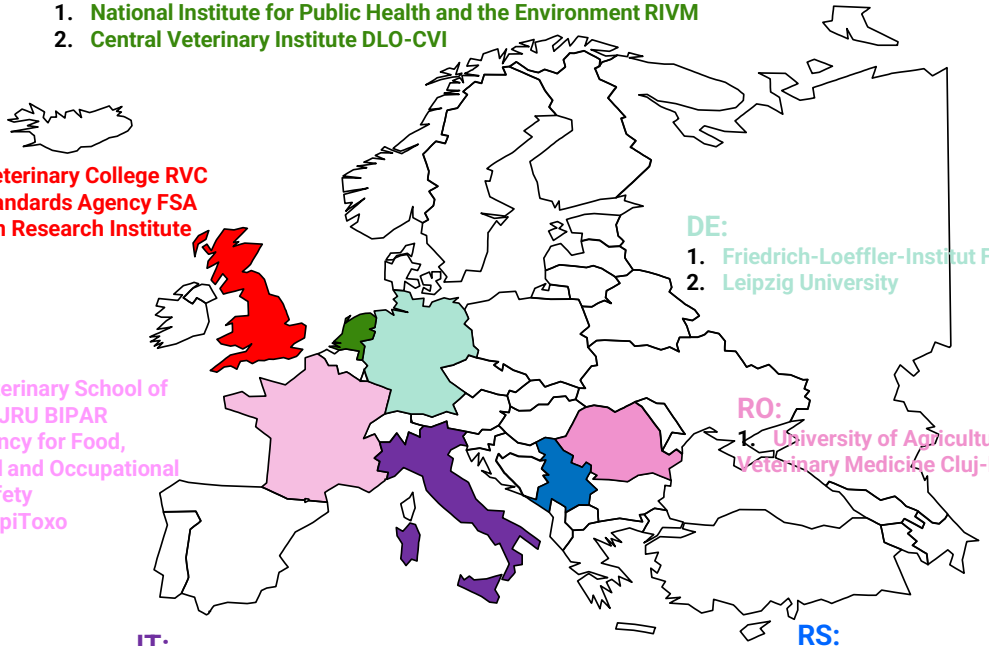
Smart Diaspora 2023

Relationship between seroprevalence in the main livestock species and presence of *Toxoplasma gondii* in meat

efsa
European Food Safety Authority

NL:
1. National Institute for Public Health and the Environment RIVM
2. Central Veterinary Institute DLO-CVI

UK:
1. Royal Veterinary College RVC
2. Food Standards Agency FSA
3. Moredun Research Institute



DE:
1. Friedrich-Loeffler-Institut FLI
2. Leipzig University

FR:
1. National Veterinary School of Alfort ENVA –JRU BIPAR
2. French Agency for Food, Environmental and Occupational health and Safety ANSES-USC EpiToxo

RO:
1. University of Agricultural Science and Veterinary Medicine Cluj-Napoca UASVM CN

IT:
1. Instituto Superiore di Sanità ISS

RS:
1. University of Belgrade Institute for Medical Research IMR

Smart Diaspora 2023

Relationship between seroprevalence in the main livestock species and presence of *Toxoplasma gondii* in meat

efsa European Food Safety Authority

	MBio	PCR digest	MC-PCR	Any DD
MAT CF <1:6	5/83 (6.0%)	21/88 (23.9%)	9/88 (10.2%)	29/83 (34.9%)
MAT CF ≥1:6	32/46 (69.6%)	37/52 (71.2%)	16/52 (30.8%)	37/46 (80.4%)
kappa	0.66	0.46	0.23	0.41
	strong	moderate	weak	moderate
95% CI	0.52-0.80	0.31-0.61	0.05-0.42	0.26-0.58

	MBio	PCR digest	MC-PCR	Any DD
MAT <1:6	4/178 (2.2%)	-	12/182 (6.7%)	16/184 (8.7%)
MAT ≥1:6	8/98 (8.2%)	-	8/100 (8.0%)	16/98 (16.3%)
kappa	0.08	-	0.02	0.09
	very weak		very weak	very weak
95%CI	-0.07-0.23	-	-0.13-0.17	-0.05-0.23

Smart Diaspora 2023

La Roumanie