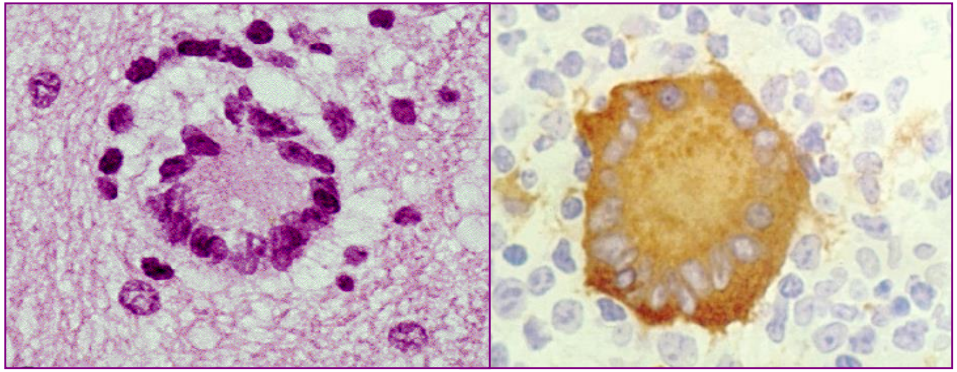
Carrefour Pathologie 2017

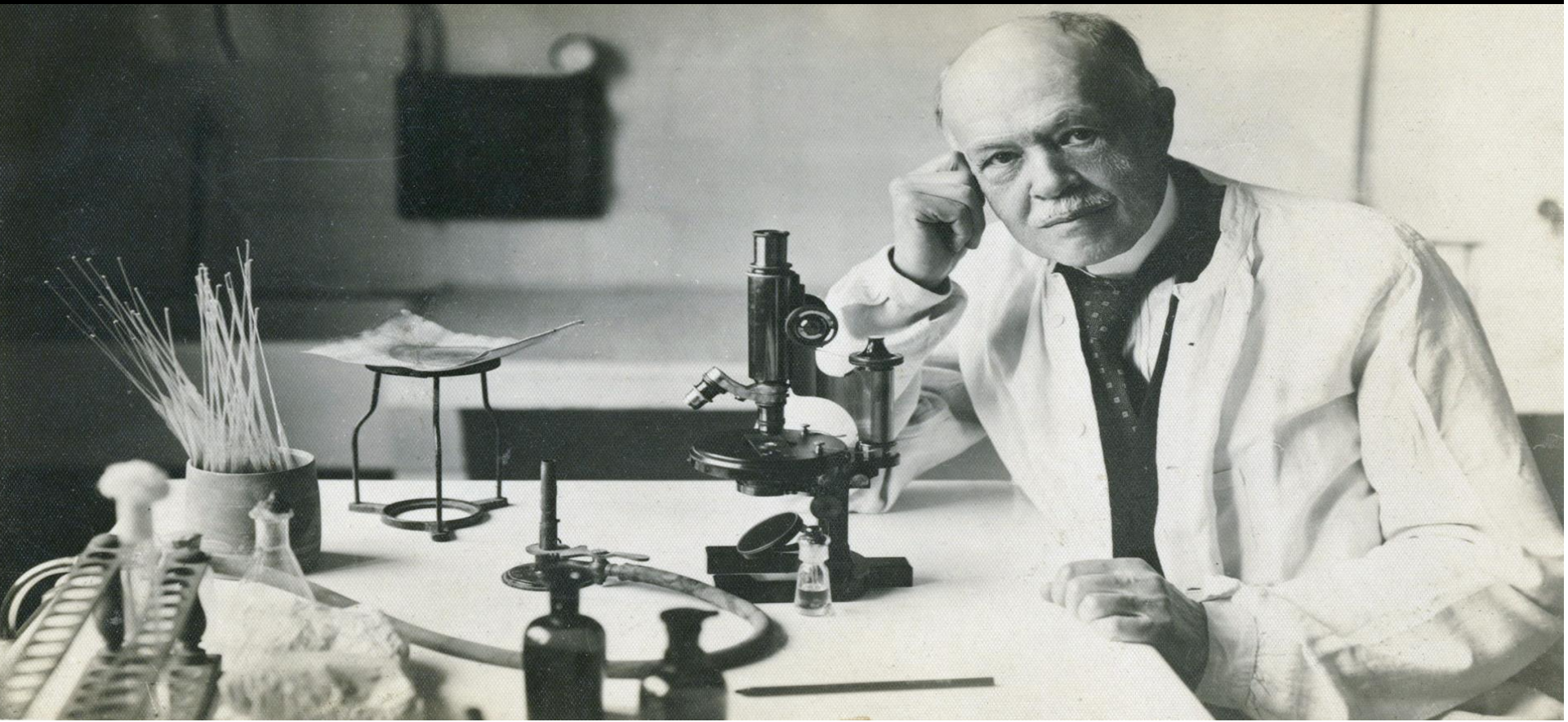
Quelle place et quel avenir pour la pathologie infectieuse en ACP?



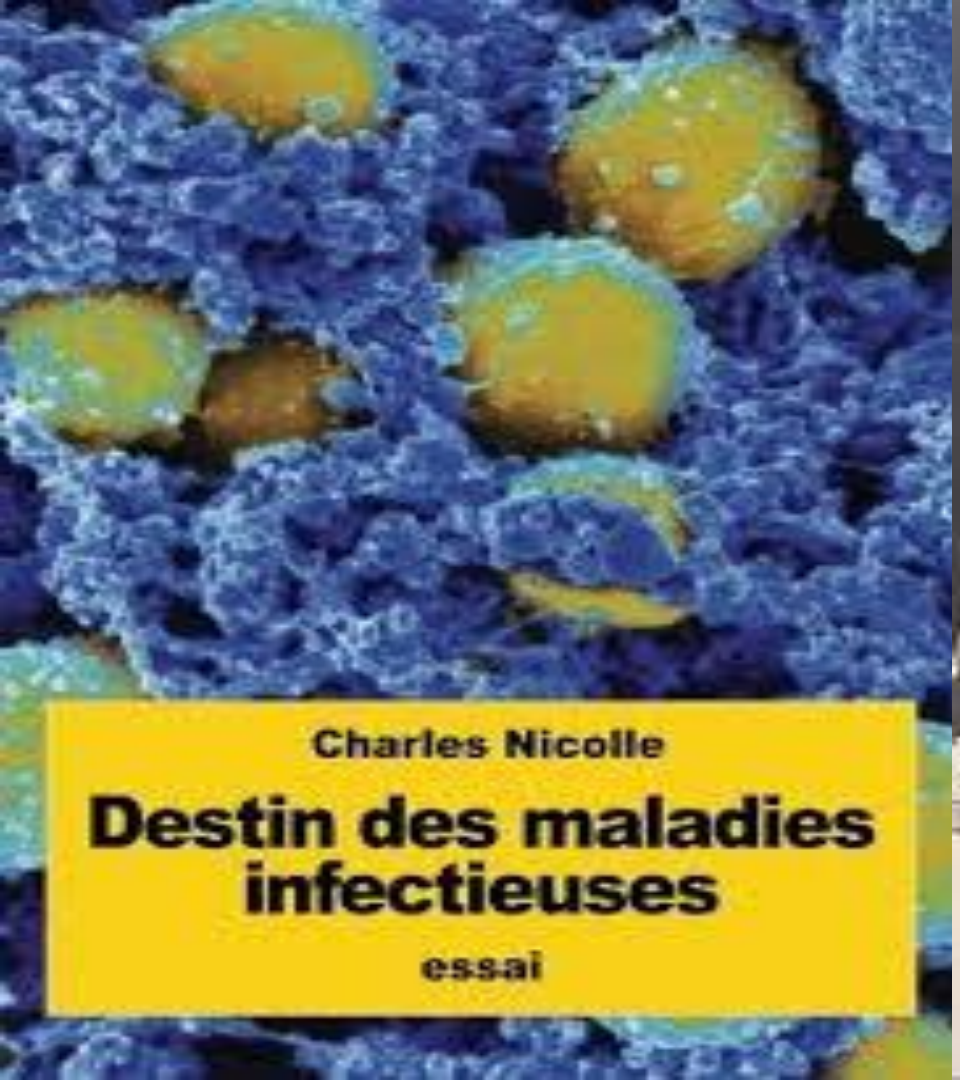
Paul Hofman

Laboratory of Clinical and Experimental Pathology, Louis Pasteur Hospital,
University Côte d'Azur, Nice

« Infectious diseases are our faithful companions throughout life »



Charles Nicolle (Nobel prize in Medicine, 1928), Pasteur Institut, Paris


Charles Nicolle
Destin des maladies infectieuses
essai

« *Infectious diseases are our faithful companions throughout life* »

Kindly from Pr N Pasaka, Kinsasha, RDC

The Nobel Prize in Physiology or Medicine 2015

Ill. N. Elmehed. © Nobel Media AB 2015.

William C. Campbell

Prize share: 1/4

Ill. N. Elmehed. © Nobel Media AB 2015.

Satoshi Ōmura

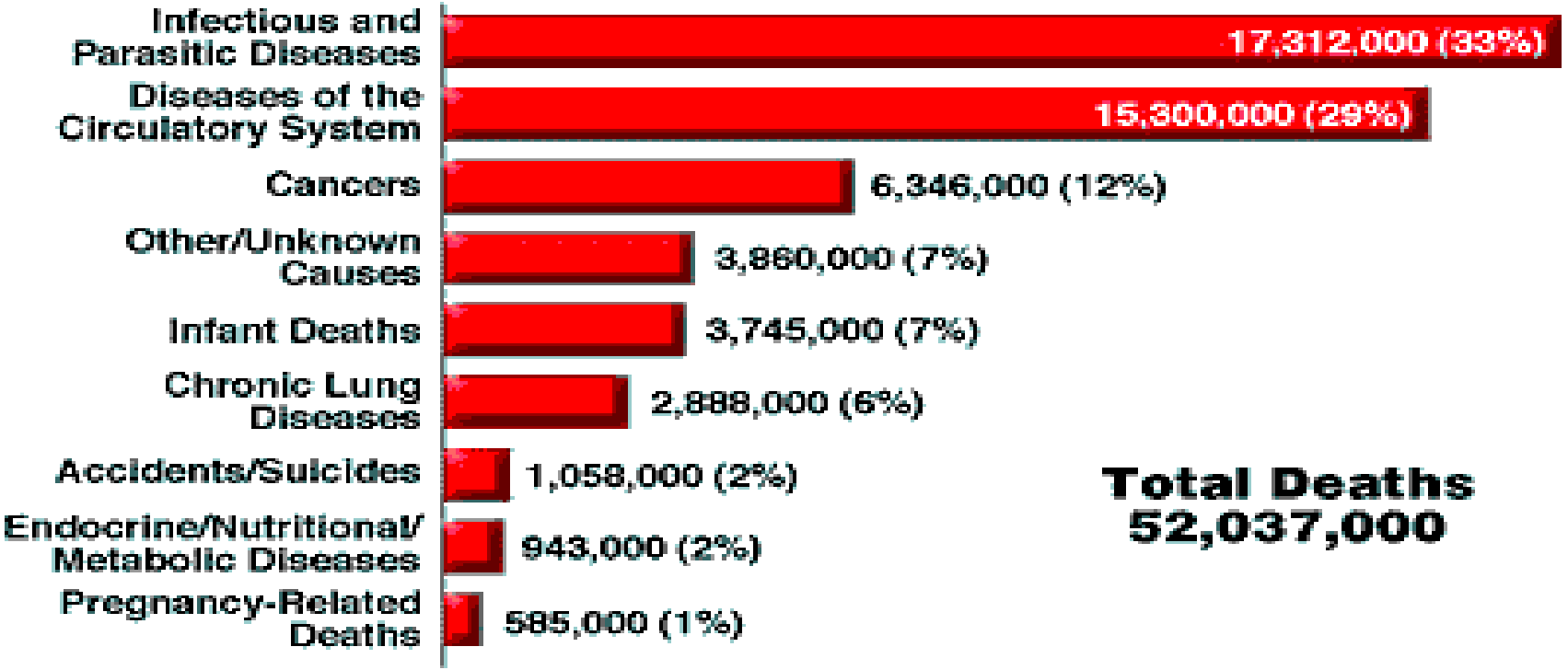
Prize share: 1/4

Ill. N. Elmehed. © Nobel Media AB 2015.

Youyou Tu

Prize share: 1/2

Worldwide Causes of Death



Source: The World Health Report (WHO)

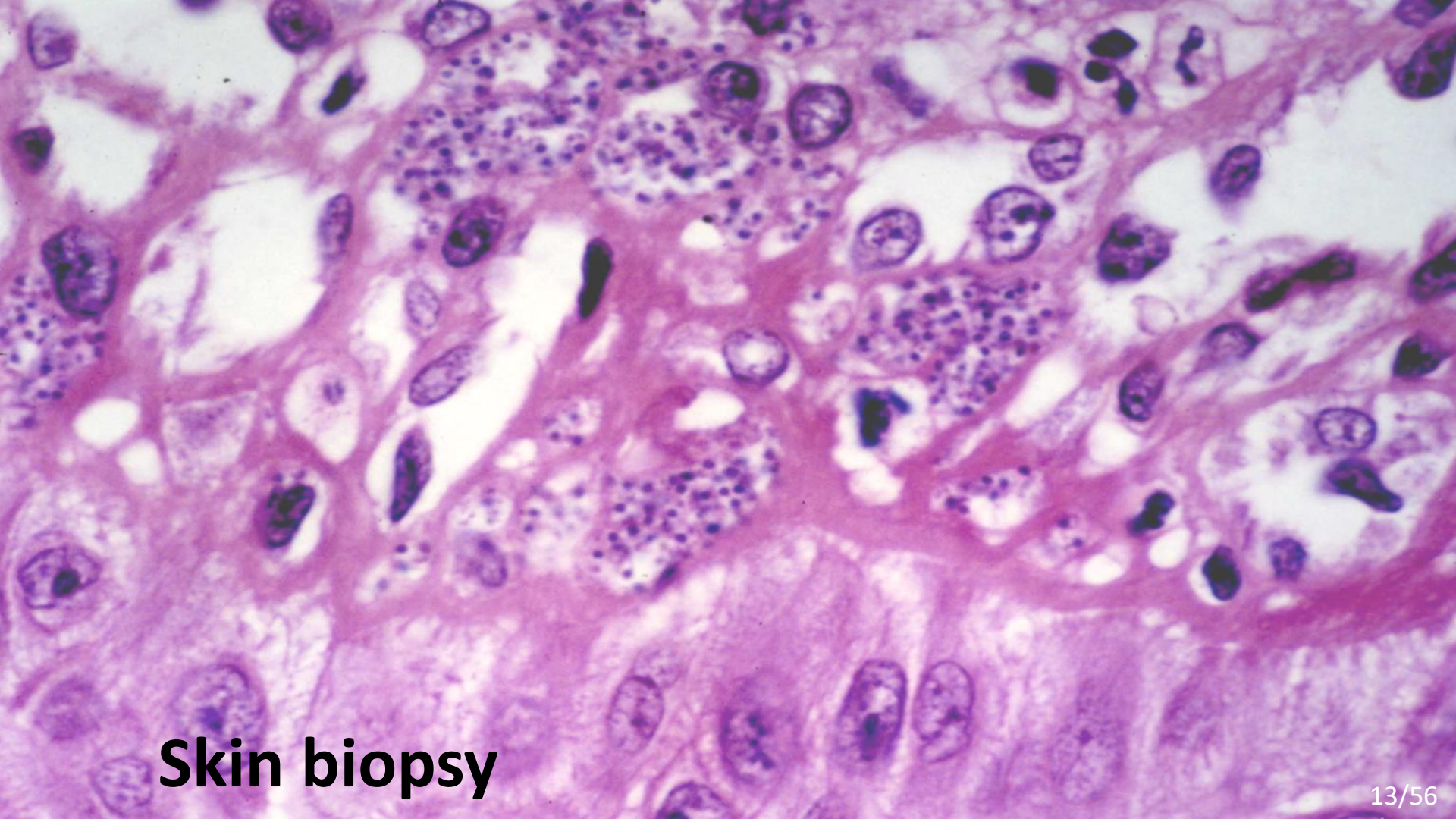
Which input of infectious diseases
in a daily practice for a pathology laboratory?

Different scenarii for **different challenges** for a surgical pathologist!

The first scenario…….

An easy diagnosis for a surgical (clinical) pathologist working in any countries…..

Ten years old girl
Living in Nice
Ulcerated skin lesion of the cheek
Three months duration



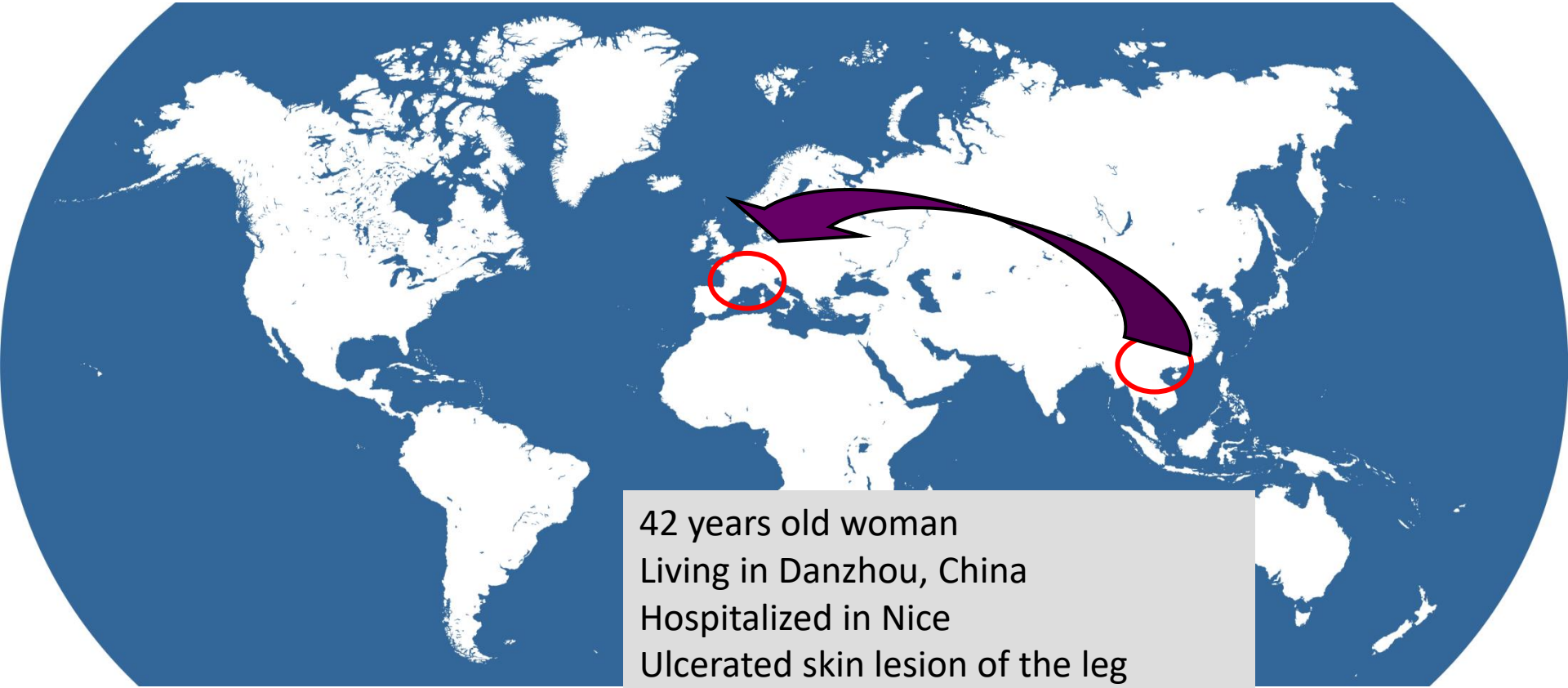
Skin biopsy

What is your diagnosis ?

Cutaneous leishmaniasis
(caused by *Leishmania infantum*)

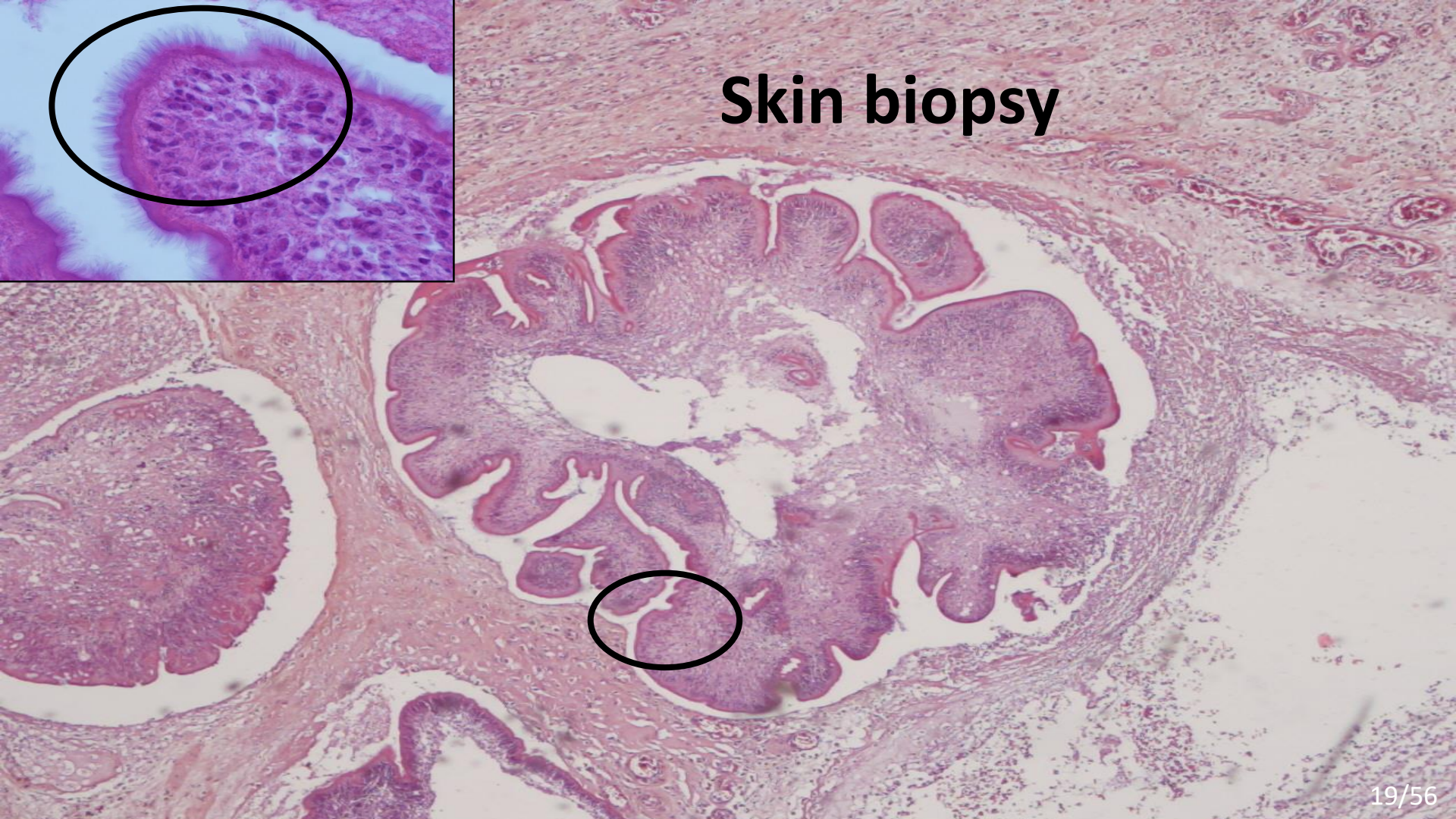
Another scenario…….

A more complex diagnosis for a surgical (clinical) pathologist working in Europe….



42 years old woman
Living in Danzhou, China
Hospitalized in Nice
Ulcerated skin lesion of the leg
12 months duration

Skin biopsy



What is your diagnosis ?

Cutaneous sparganosis
(caused by *Sparganum proliferum*)

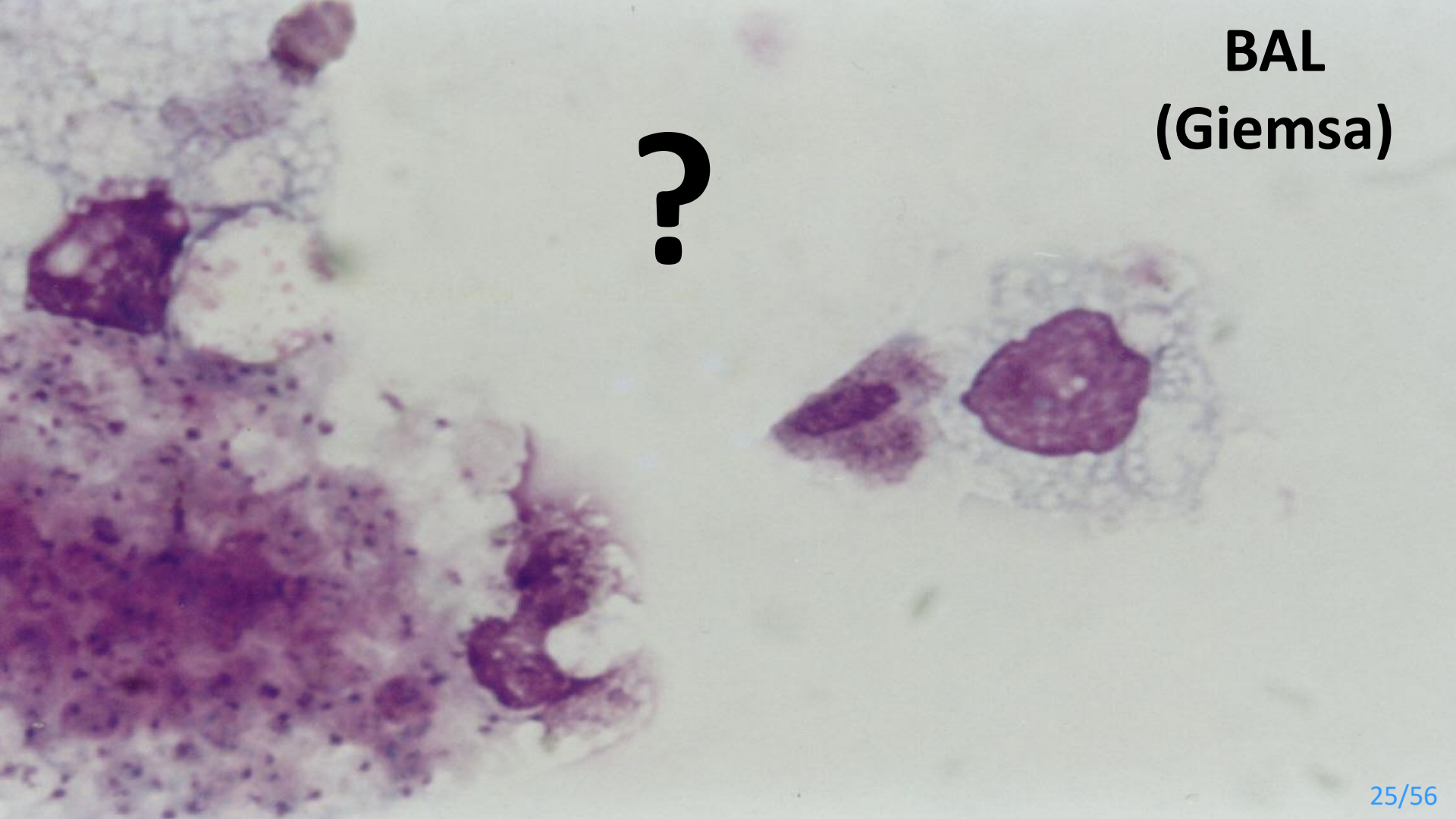

Asiatic food market
A very rare parasitic disease (cestode) of the skin

Another scenario…….

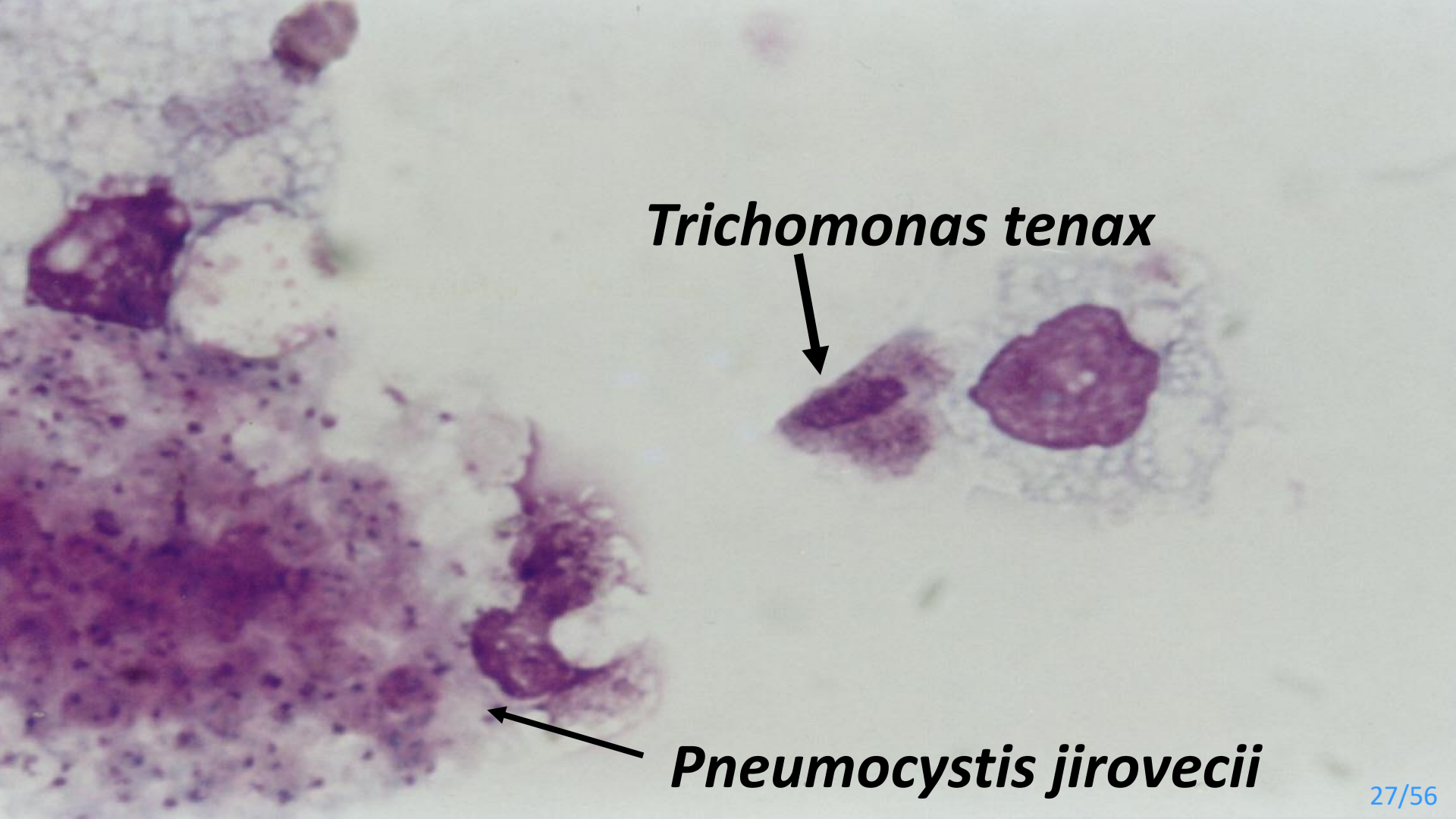
A more complex diagnosis for a surgical pathologist working in Europe….

Is it a difficult diagnosis… or ….not ?

36 years old man, HIV +
Living in Nice,
Fever, polypnea


BAL
(Giemsa)
?

What is your diagnosis ?


Trichomonas tenax
Pneumocystis jirovecii

Opportunities in infectious diseases pathology practice

Increase in **opportunistic infections** following the increasing transplantation, chemotherapy and targeted therapy rates

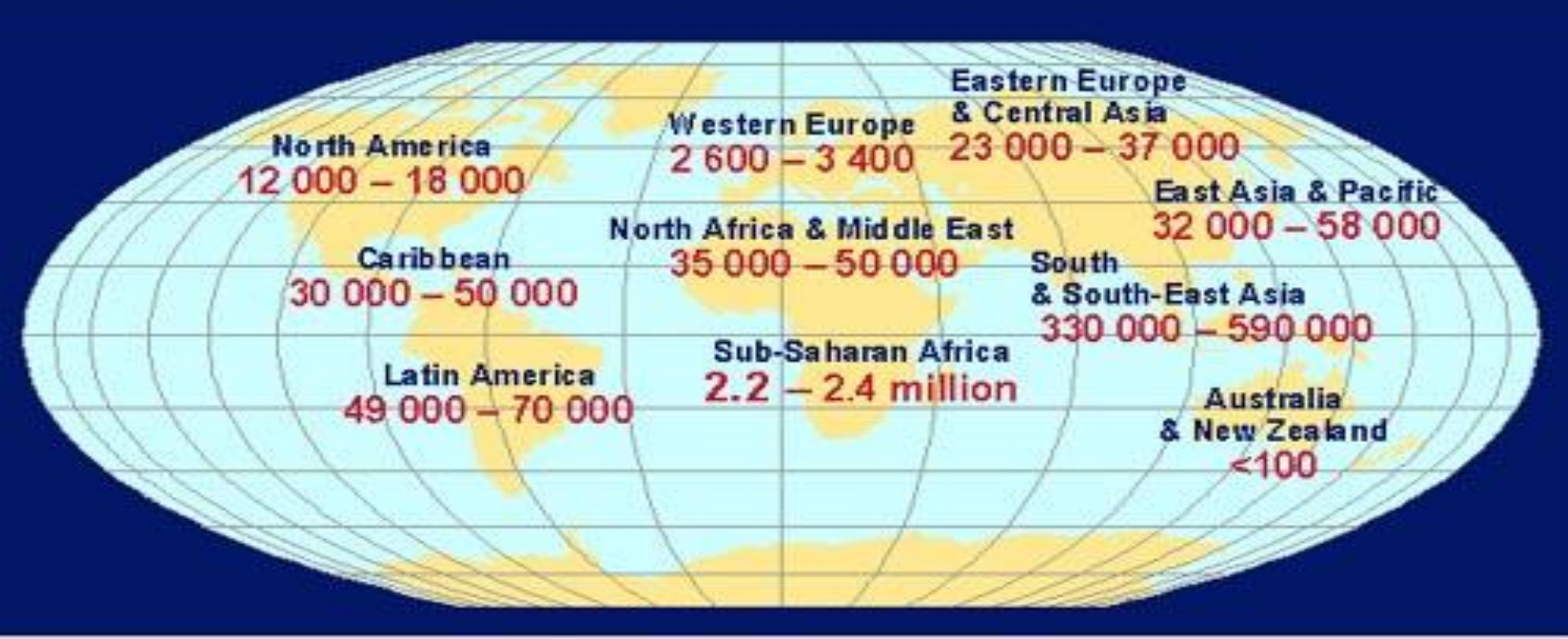
Increase in **imported parasitic and tropical diseases** in travellers and in immigrants

Emerging complications of HIV associated diseases caused by HAART

Epidemics of new and emerging or re **emerging infectious diseases**

Optimisation of **new ancillary methods** to detect pathogens in fixed samples

Opportunity to observe **tissue lesions associated with the agent** synonymous to pathogenicity and infection!



UNAIDS

Total: 2.5 – 3.5 million

World Health Organization

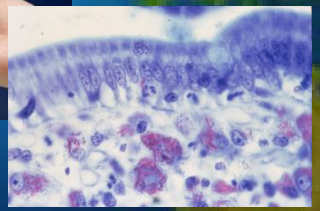
AIDS Deaths

HAART and HIV

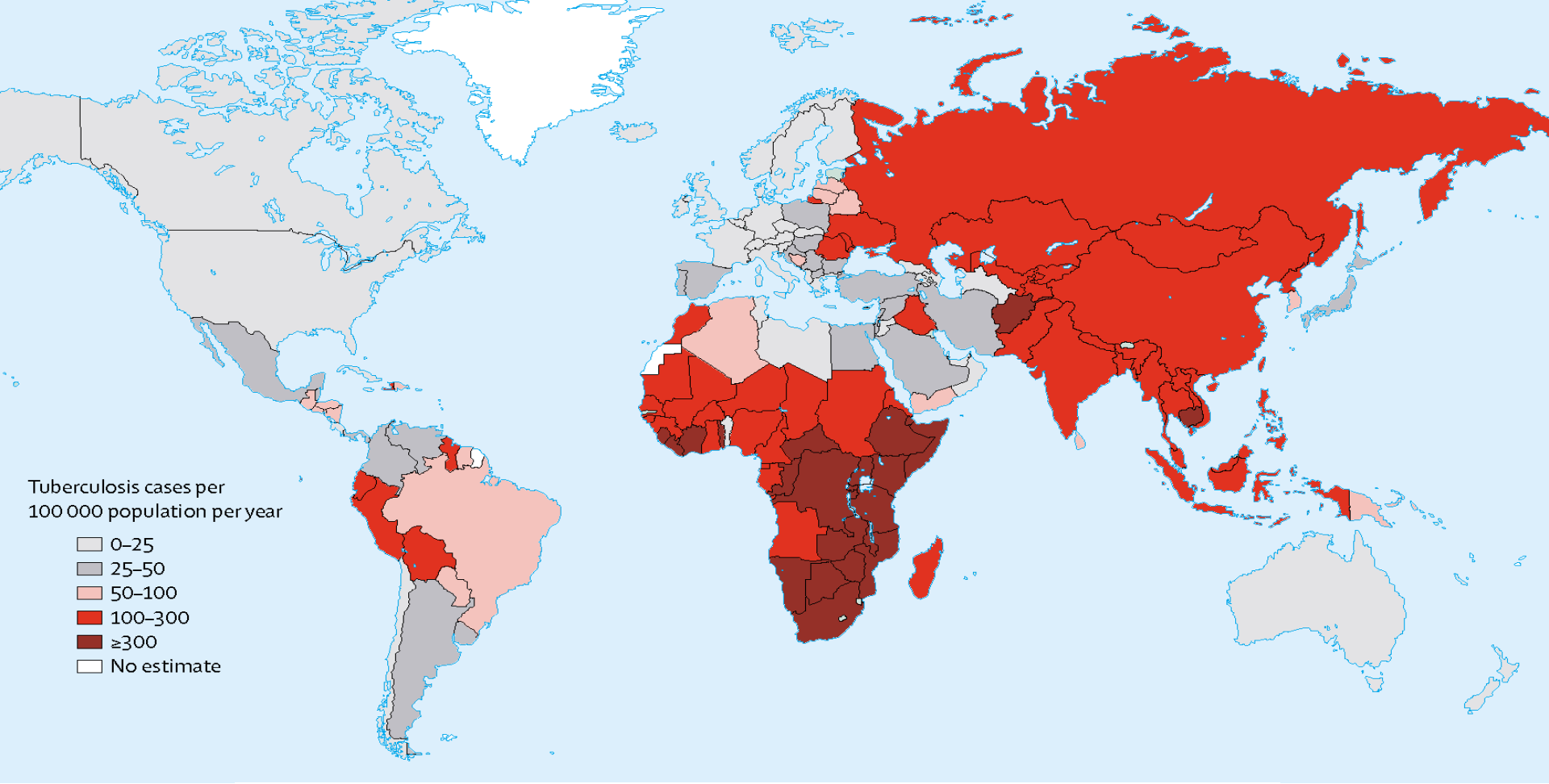
A large panel of (new) pathological induced lesions

Dystrophies

Toxicities



IRIS



Tuberculosis: 1, 500.000 deaths per year

« Infectious diseases are our faithful companions throughout life »

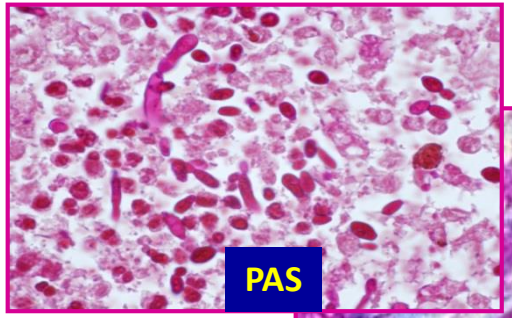
Emerging and re emerging infectious diseases

Emerging infectious diseases (1991-1993)

18 Feb 2017 – "Bioterrorists could one day kill hundreds of millions of people in an attack more deadly than nuclear war"

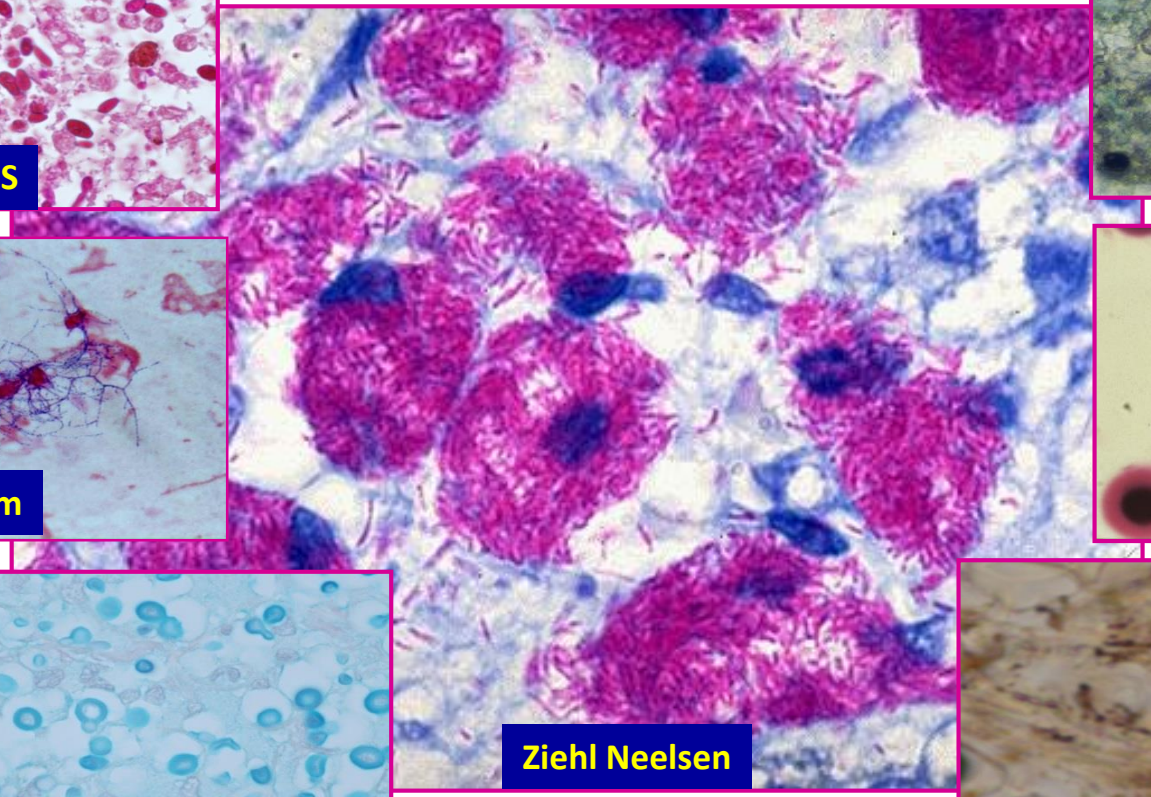
Bill Gates will warn world leaders !

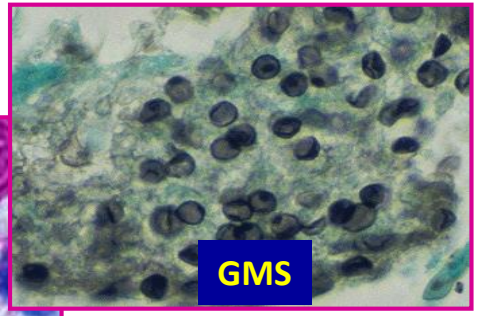
Which input for the ancillary methods (old and current) in infectious diseases pathology ?

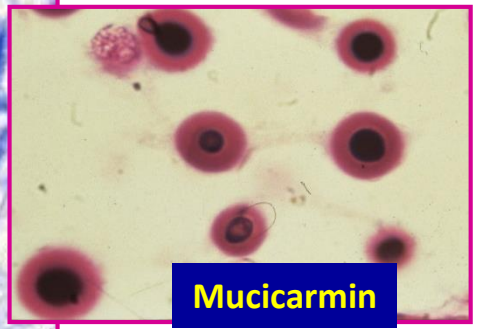

PAS


Gram

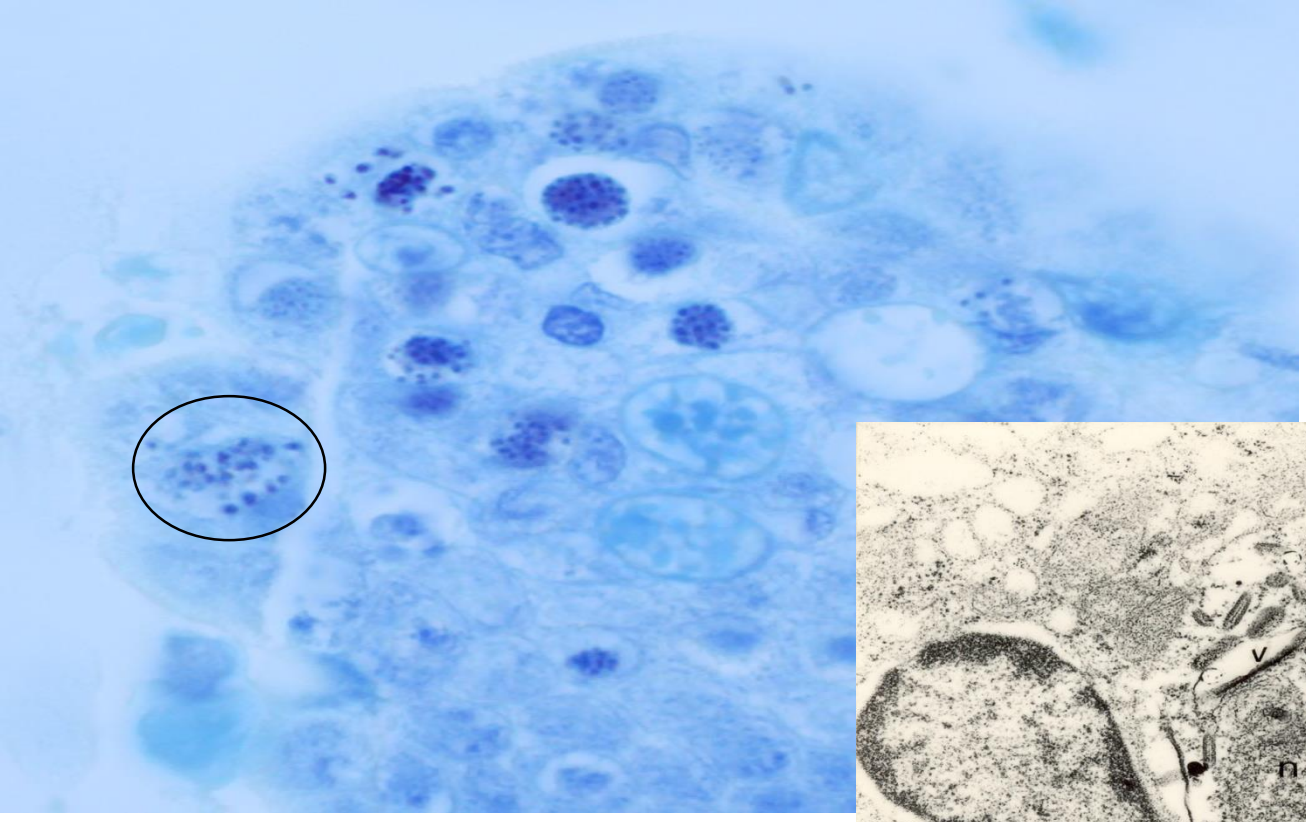

Alcian blue


Ziehl Neelsen

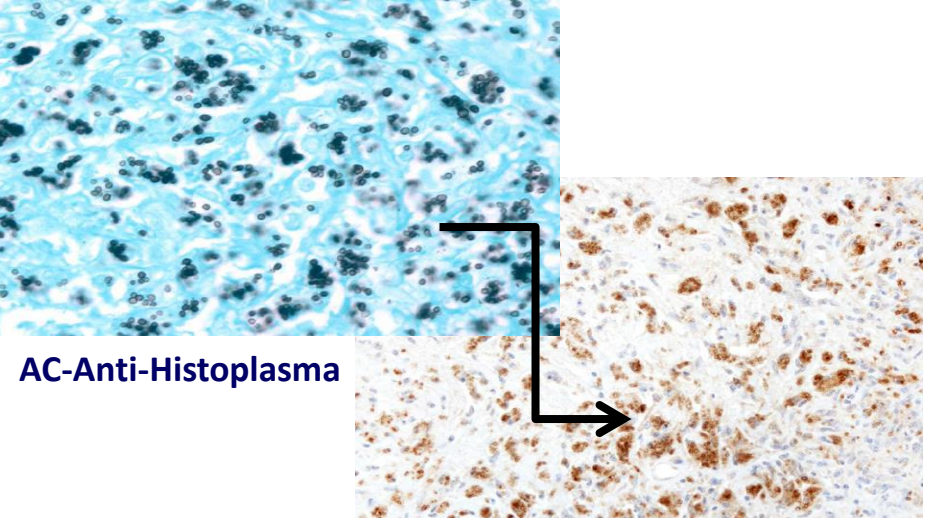

GMS


Mucicarmin

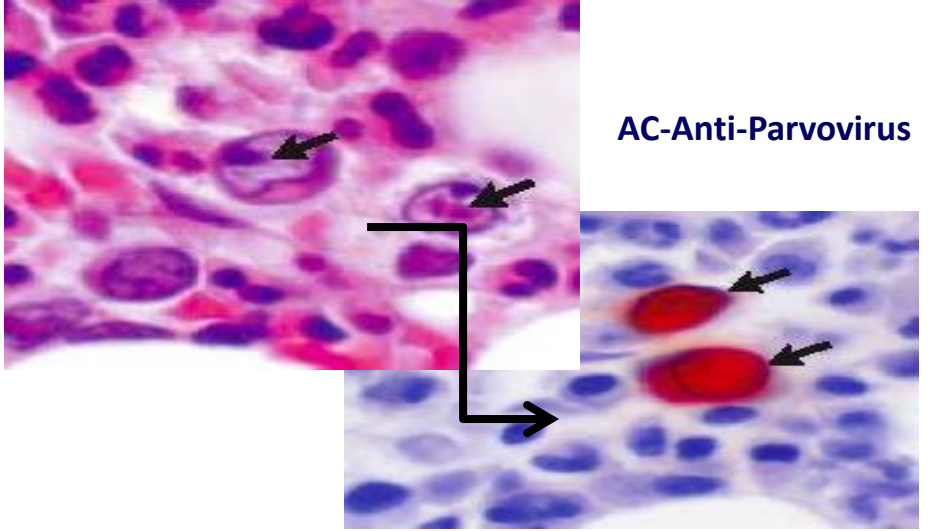

Warthin Starry



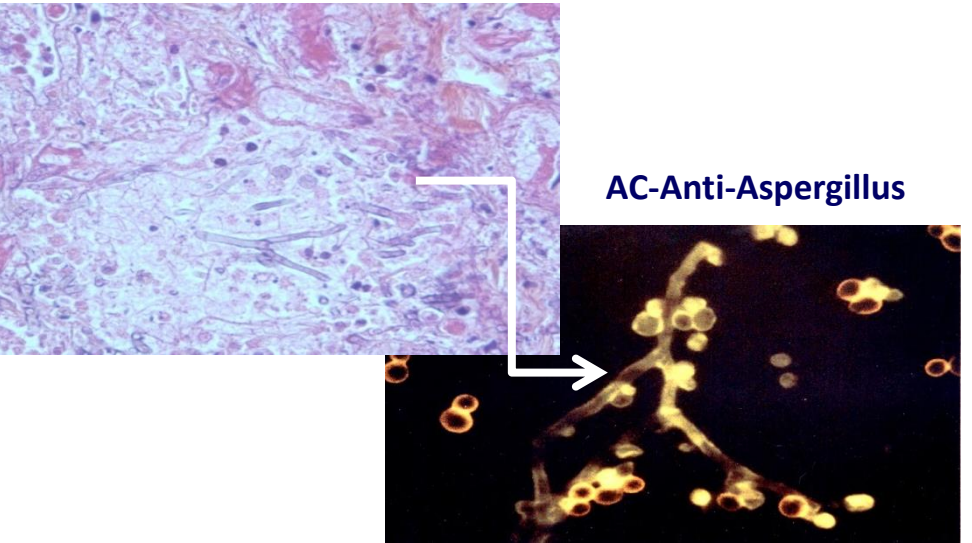
Microsporidiosis
(*Enterocytozoon bieneusii*)



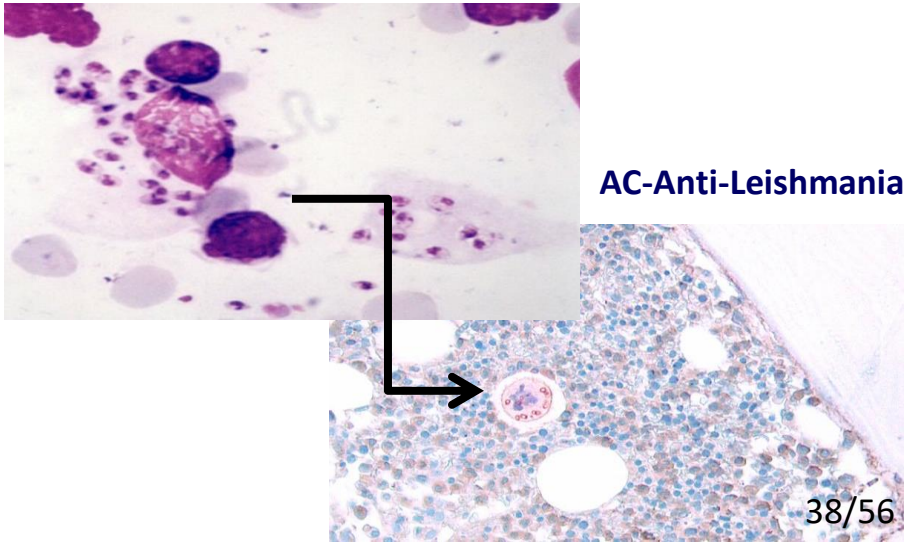
AC-Anti-Histoplasma



AC-Anti-Parvovirus

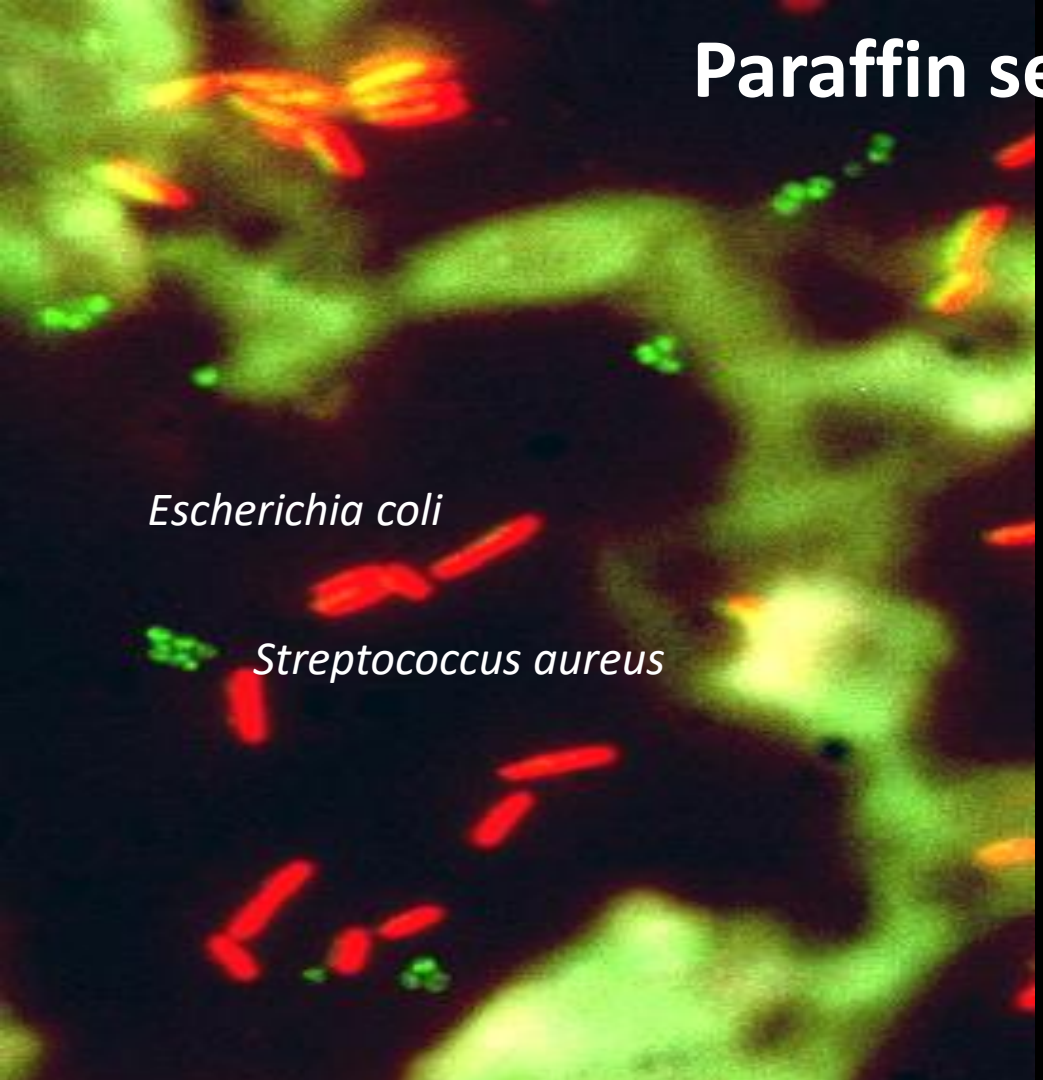


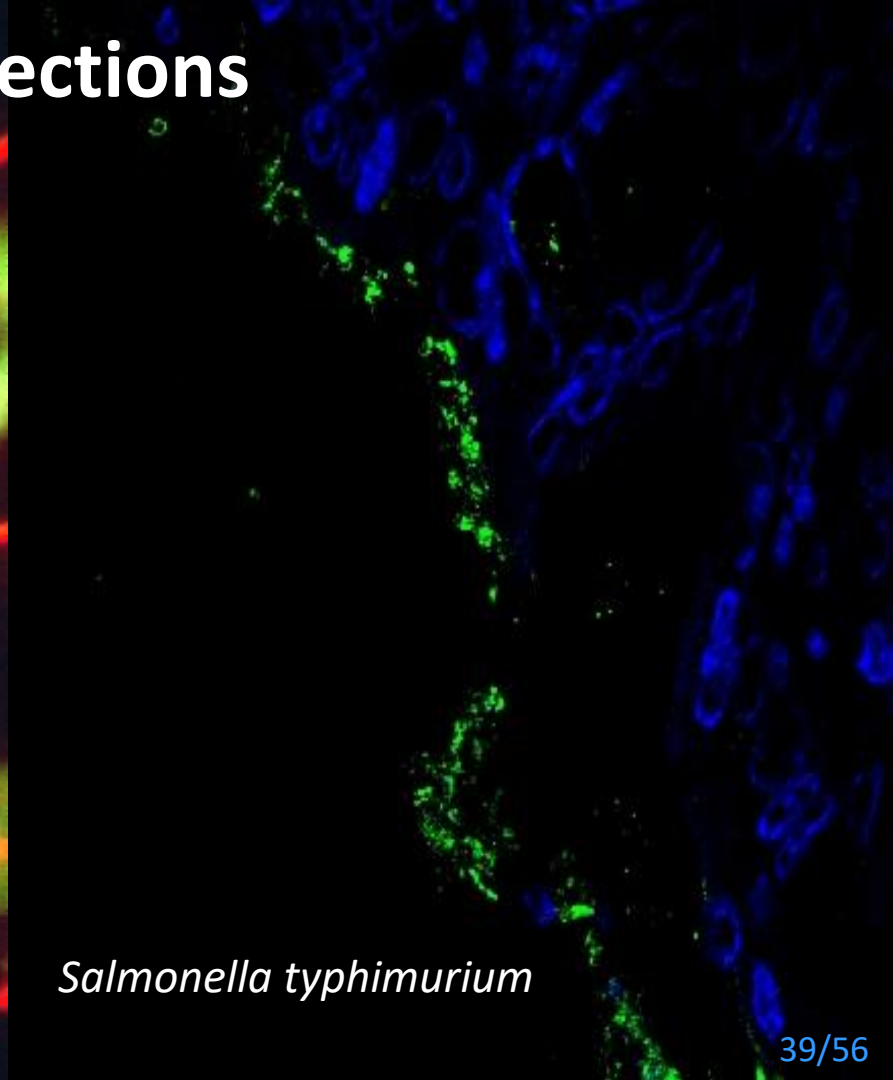
AC-Anti-Aspergillus



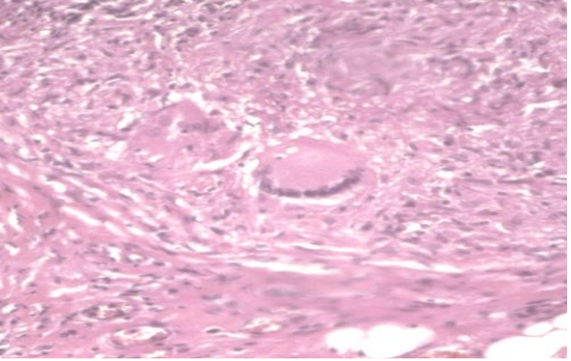
AC-Anti-Leishmania

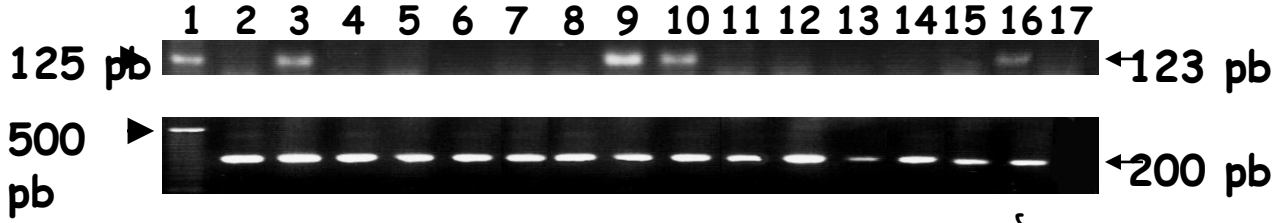
Paraffin sections



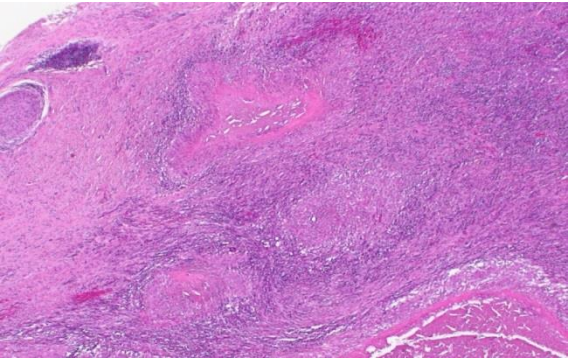


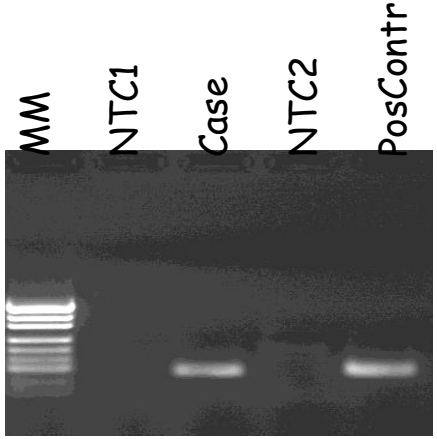
Molecular biology from tissue sections



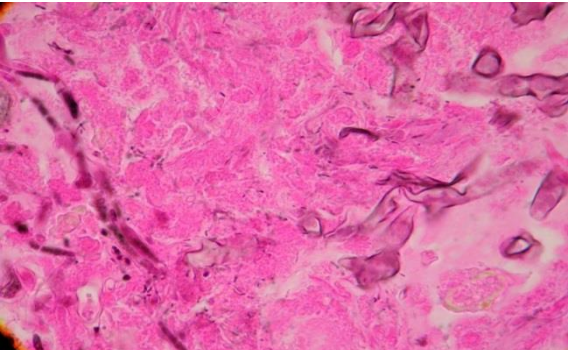


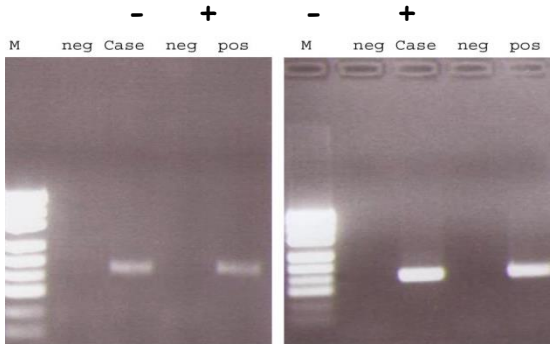
Mycobacterium tuberculosis





Brucella melitensis





Aspergillus sp. & Mucorales sp.

Opportunities in infectious diseases pathology practice

Increased opportunistic infections following the increasing transplantation, chemotherapy and targeted therapy rates

Increase in imported infectious and tropical diseases in returning travellers and in immigrants

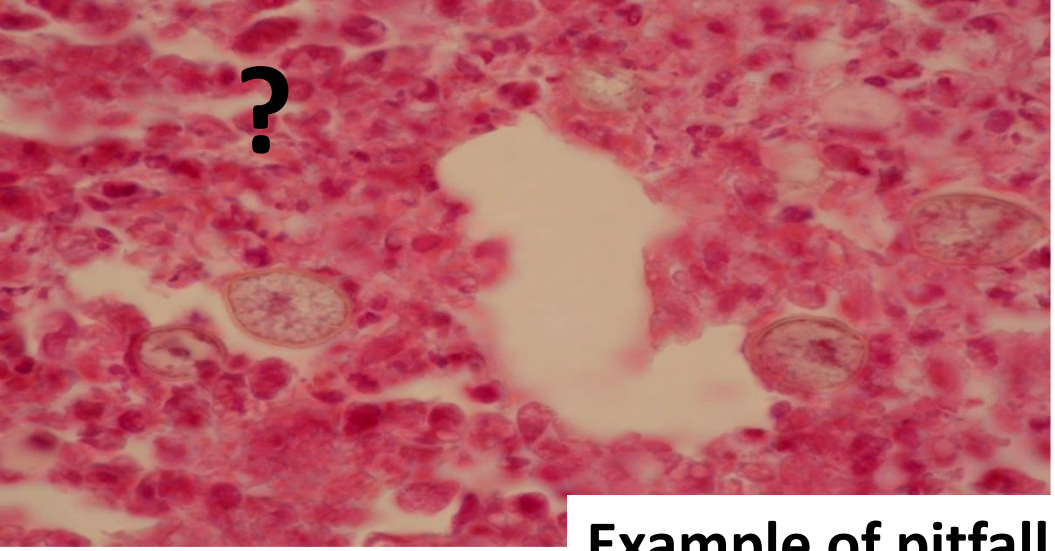
Emerging complications of HIV associated diseases caused by HAART

Epidemics of new and emerging or re emerging infectious diseases

Optimisation and development of new ancillary methods to detect pathogens in fixed samples

Opportunity to observe tissue lesions associated with the agent which is synonymous to pathogenicity and infection

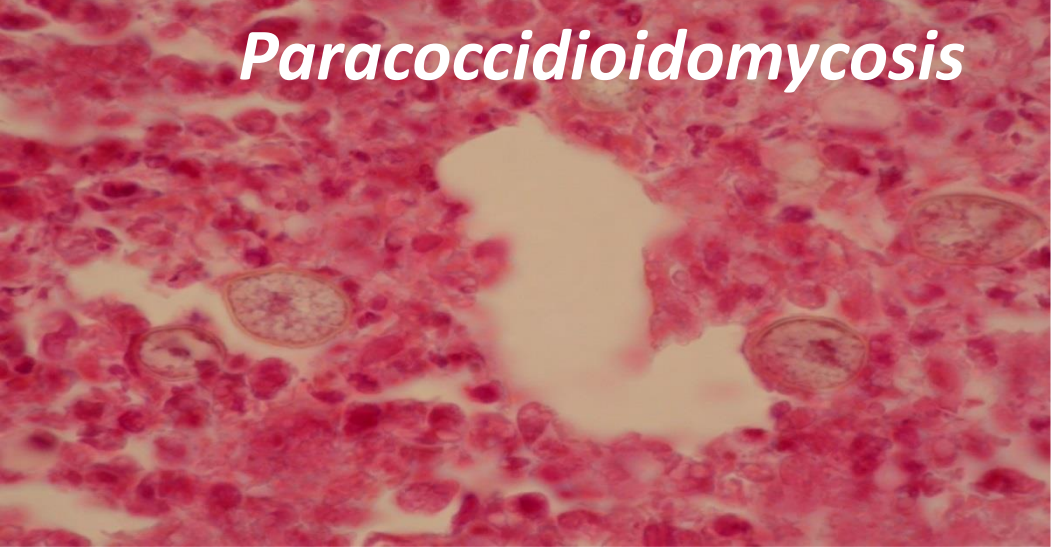
→ **Differential diagnosis: non pathogenic lesions mimicking an infection**



Nasal mucosa

Example of pitfall in ID Pathology field

Nasal mucosa



Nasal mucosa

Nasal mucosa

6 constraints in infectious diseases pathology activity

Weak ability to get a **full time job** for doing pathology infectious diseases diagnostic
Weak possibility to have **training in tropical diseases** pathology in tropical countries
Difficulty to maintain a **broad number of antibodies** targeted infectious agents
Low budget for the development of a **molecular pathology infectious** disease unit
Set up weekly **meetings with physicians** concerned by infectious diseases pathology
Sustainability of **autopsy activity** in institutions

3 potential orientation for tomorrow (?)

Increasing the number of supports and of **grants** in infectious diseases pathology (be attractive to the NGP*)

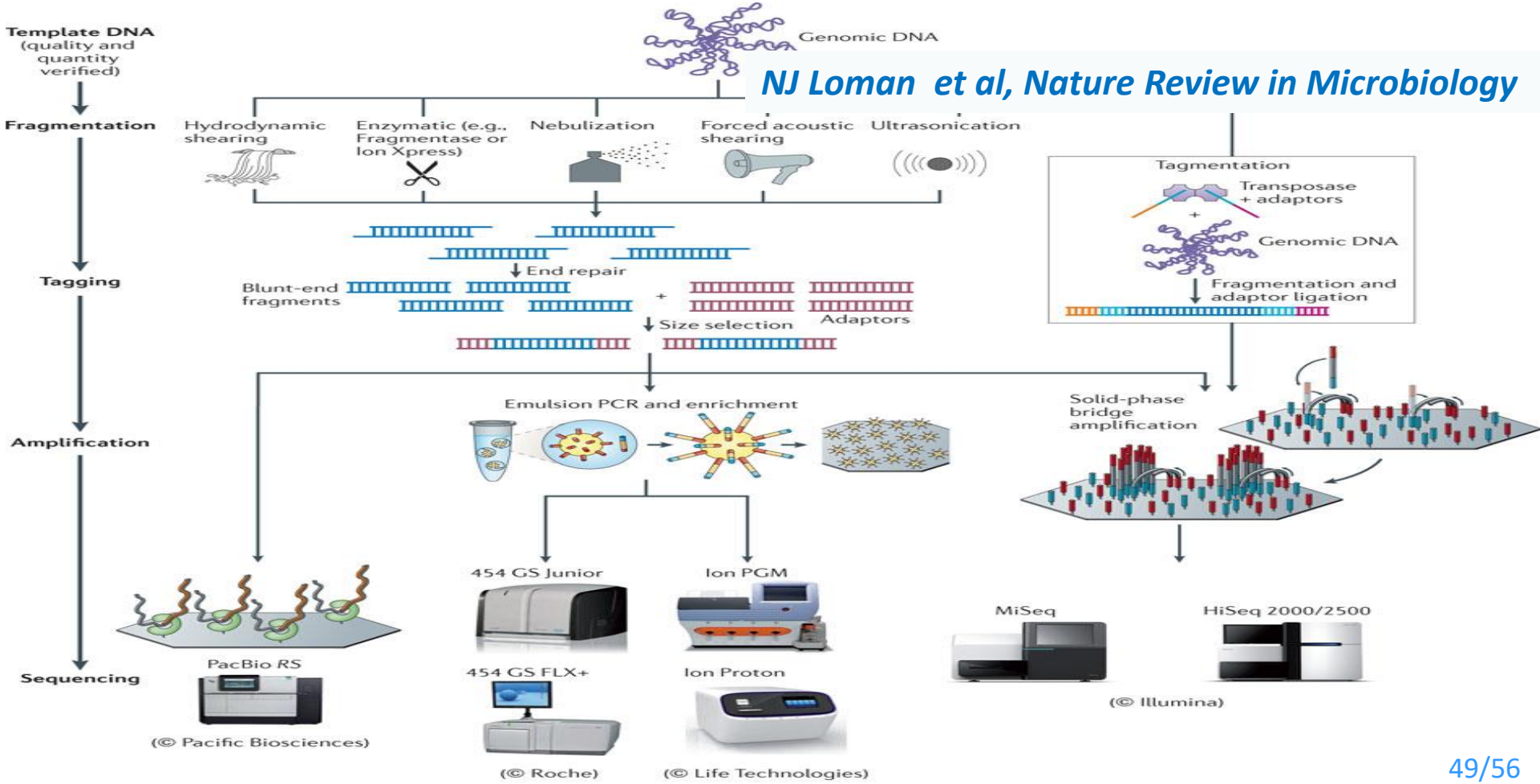
Developing **telepathology** approach for optimisation of the turn around time for **consultation diagnosis** made by experts in infectious and tropical diseases pathology

Set up or **sustaining expert centres** in infectious and tropical diseases pathology

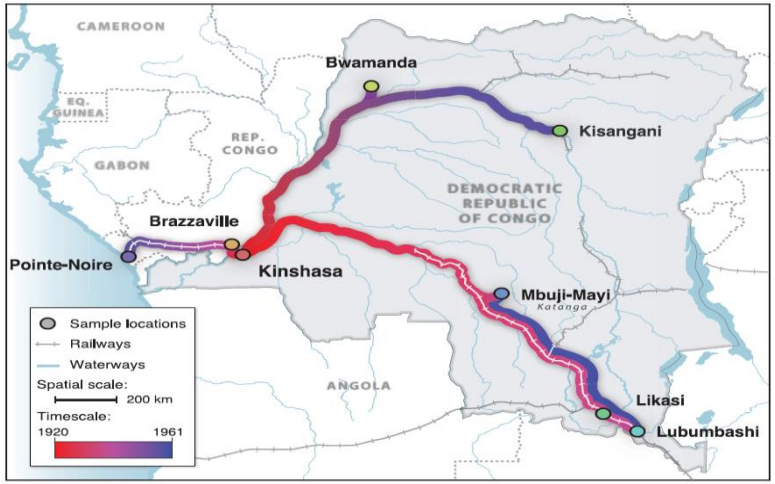
*Next Generation of Pathologists

Innovative technologies for the improvement of infectious diseases diagnostic from fixed tissue sections ?

MAIN HIGH-THROUGHPUT SEQUENCING PLATFORMS



Spatial dynamics of HIV-1 spread
From 1920 to 1960….!



RESEARCH ARTICLE

HIV EPIDEMIOLOGY

The early spread and epidemic ignition of HIV-1 in human populations

Nuno R. Faria,[1,2] Andrew Rambaut,[3,4,5] Marc A. Suchard,[6,7] Guy Baele,[2] Trevor Bedford,[8] Melissa J. Ward,[3] Andrew J. Tatem,[4,9] João D. Sousa,[2,10] Nimalan Arinaminpathy,[1] Jacques Pépin,[11] David Posada,[12] Martine Peeters,[13] Oliver G. Pybus,[1*†] Philippe Lemey[2*†]

Thirty years after the discovery of HIV-1, the early transmission, dissemination, and establishment of the virus in human populations remain unclear. Using statistical approaches applied to HIV-1 sequence data from central Africa, we show that from the 1920s Kinshasa (in what is now the Democratic Republic of Congo) was the focus of early transmission and the source of pre-1960 pandemic viruses elsewhere. Location and dating estimates were validated using the earliest HIV-1 archival sample, also from Kinshasa. The epidemic histories of HIV-1 group M and nonpandemic group O were similar until ~1960, after which group M underwent an epidemiological transition and outpaced regional population growth. Our results reconstruct the early dynamics of HIV-1 and emphasize the role of social changes and transport networks in the establishment of this virus in human populations.

3 OCTOBER 2014 • VOL 346 ISSUE 6205

sciencemag.org SCIENCE

A careful analysis of the morphological features is still pivotal for identifying most pathogens in tissue sections

Asking for ancillary methods **only** if necessary

However…….

42 years old man, hunter in the South of France

Mediastinal lymph nodes

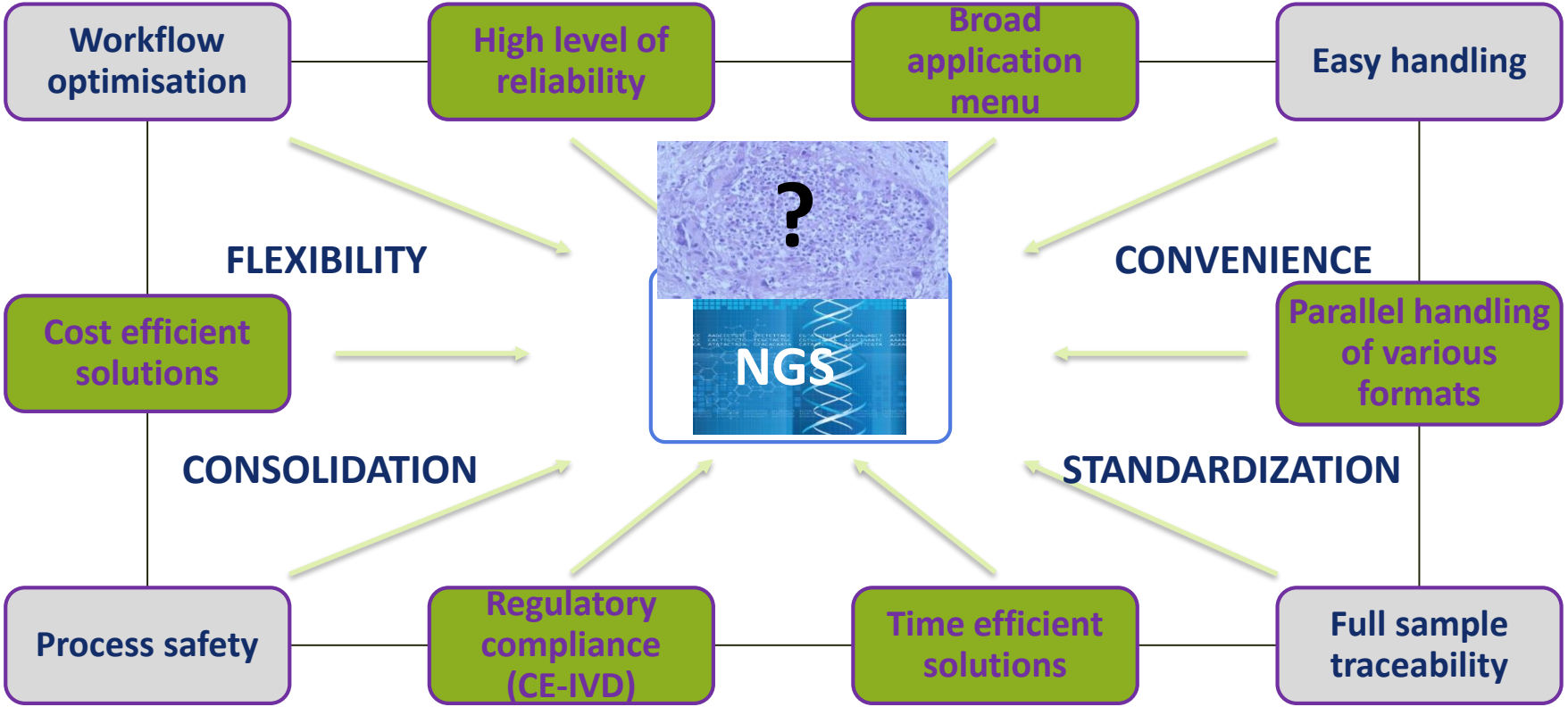
Fever

All ancillary methods negatives (including microbiology tests)

Uncertain diagnosis

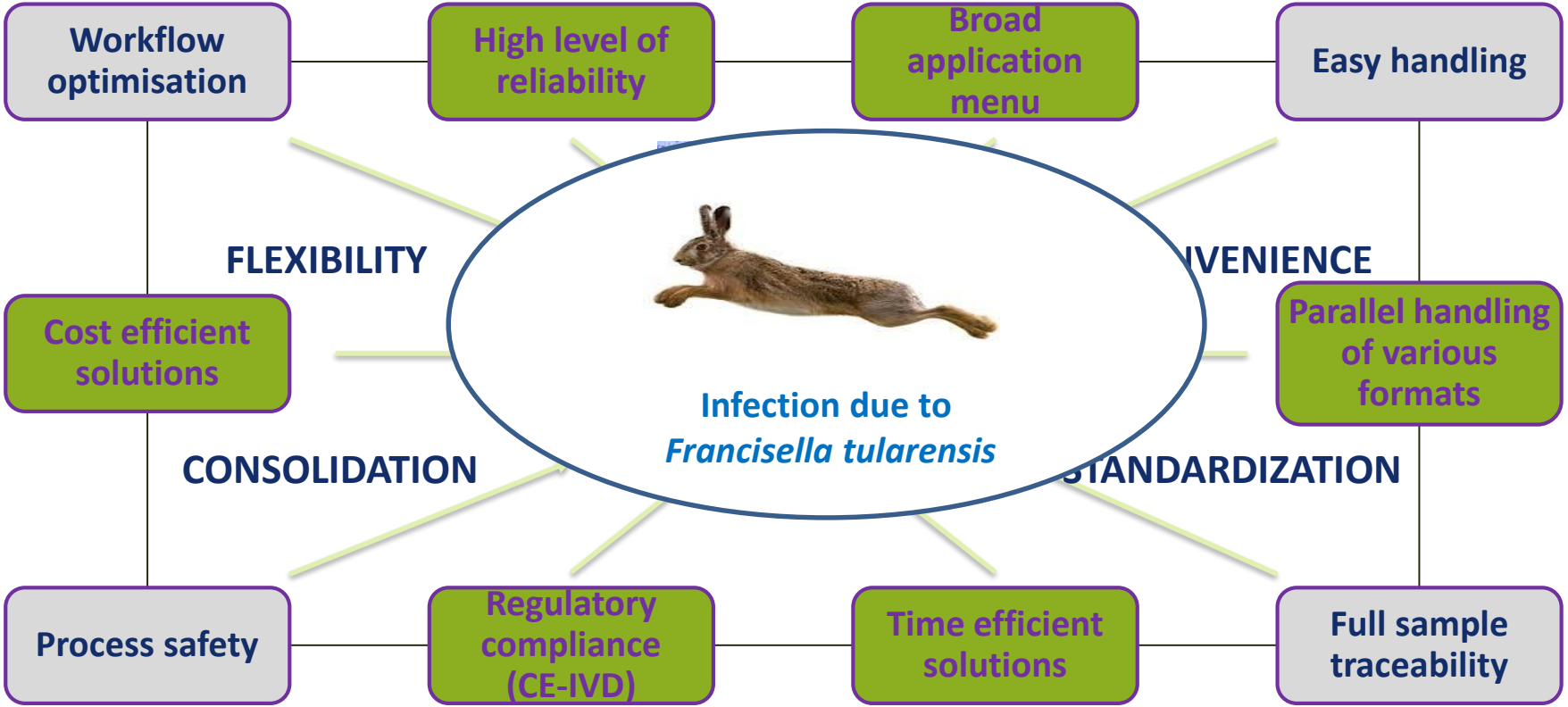
?

Needs of molecular diagnosis for routine practice in Infectious diseases from fixed samples: A new challenge for the pathologists or…… for the microbiologists ?



Collaboration with Gegor Gorkiewicz , Department of Pathology, Graz University

Needs of molecular diagnosis for routine practice in Infectious diseases from fixed samples: a new challenge for the pathologists or for the microbiologists ?



Future role for the pathologist in Infectious Diseases

- Diagnosis, prognosis and theranosis assessment of ID from tissue sections (*similarly to the role of* ***the clinical pathologist*** *in oncology*)

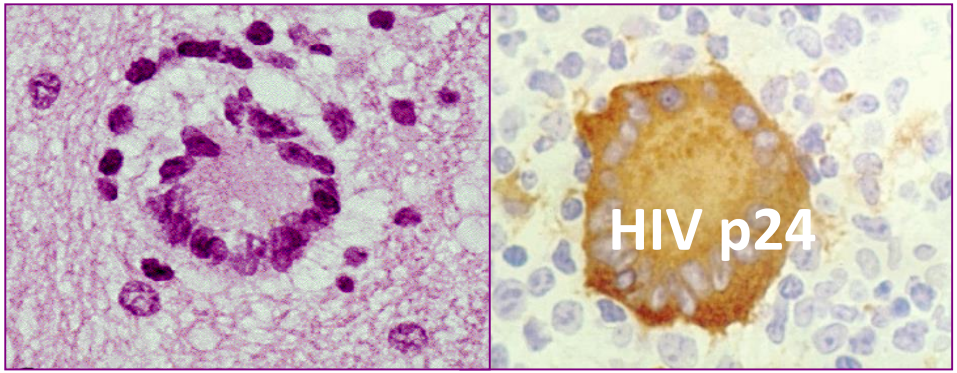
- Optimisation of the molecular pathology approach of ID from tissue sections (*similarly to the role of the* ***molecular pathologist*** *in oncology*)

- Does the molecular pathology in microbiology can be set up in a department of pathology in Europe ?

- Does challenging the microbiologist in molecular pathology still necessary ?

Carrefour Pathologie 2017

Quelle place et quel avenir de la pathologie infectieuse en ACP?



Paul Hofman

Laboratory of Clinical and Experimental Pathology, Louis Pasteur Hospital,
University Côte d'Azur, Nice