STAR-IDAZ
International Research
Consortium on Animal Health

The Challenges of intra-cellular pathogens

Brussels, Oct. ‘16

Alex Morrow

Intra-cellular pathogens

Viruses

Bacteria

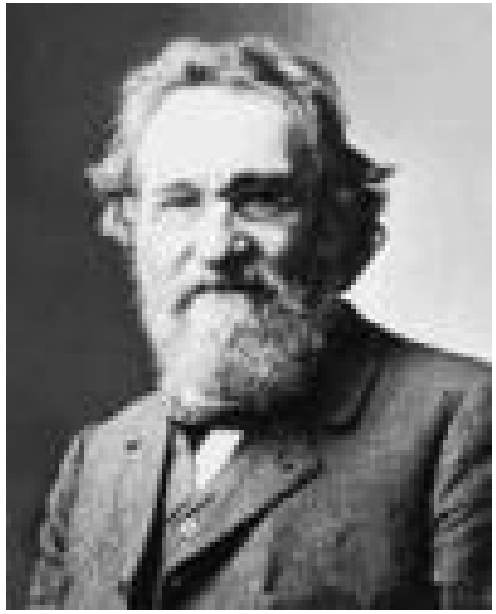
- Facultative intracellular bacteria
- Obligate intracellular bacteria

Protozoa

Fungi

Elie Metchnikoff

The first cellular immunologist



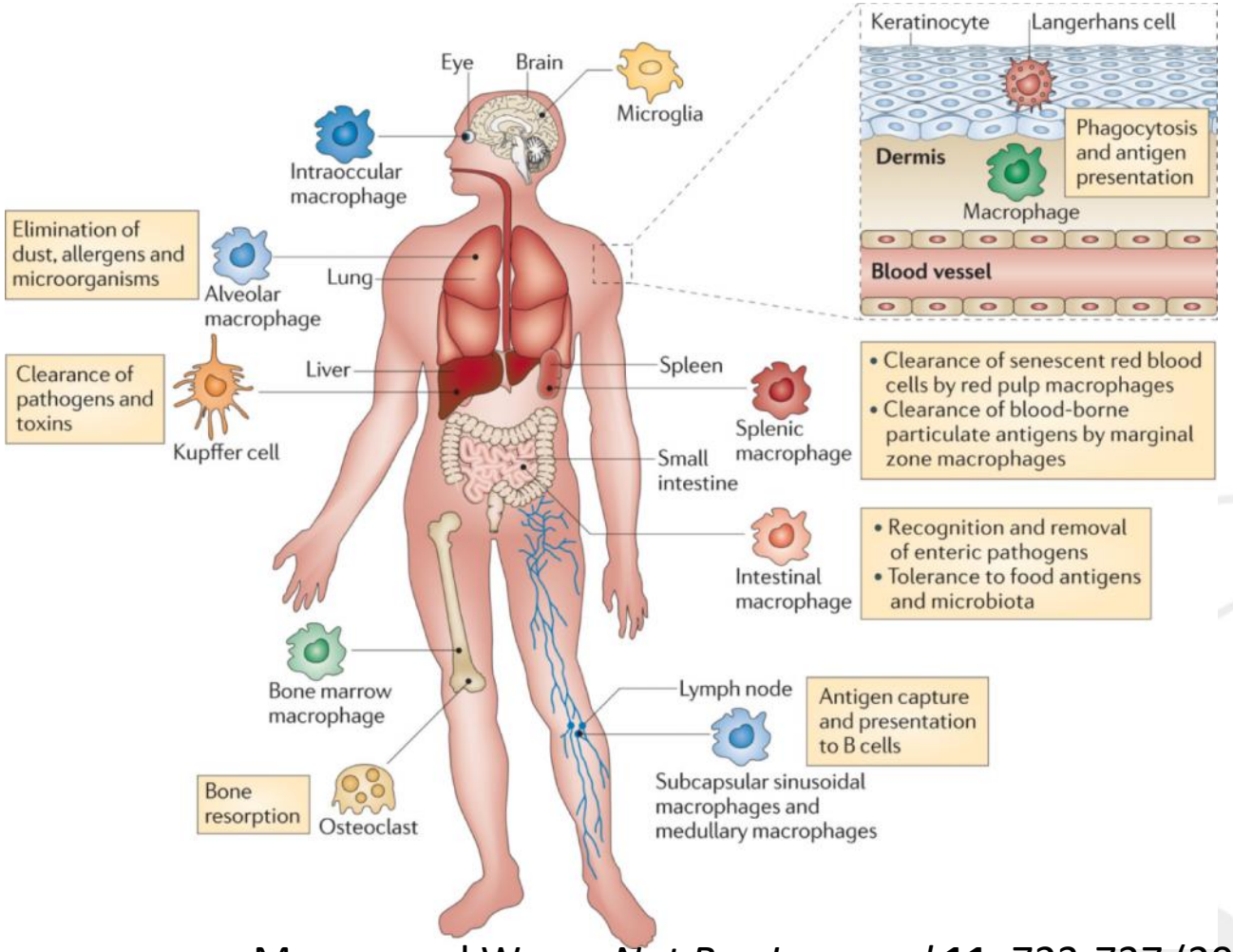
Proposed the 'phagocytic theory of immunity' stipulating that cells could destroy invading organisms

However some organisms are capable of growing inside macrophages and avoiding destruction

How Intracellular pathogens survive in Macrophages

- Target critical signalling pathways preventing effective macrophage activation
- Escape from the phagosome, modulate phagosome maturation or liaisons with autophagosomes
- Acquire nutrients and cofactors from host cells
- Prevent or resist phagocyte oxidative burst or the formation of reactive nitrogen intermediates
- Manipulate macrophage death pathways

Macrophage distribution and function



Murray and Wynn, *Nat Rev Immunol* **11**, 723-737 (2011)

Main challenges in the EU relating to bacterial infection of macrophages

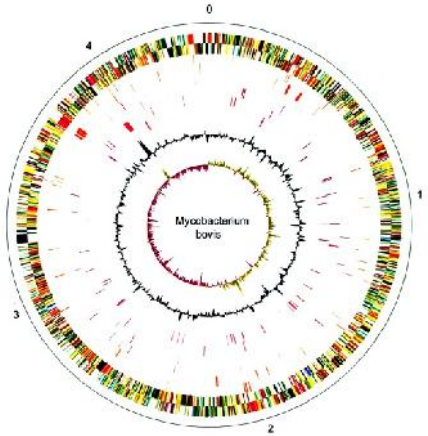
Bovine Tuberculosis

Johne's Disease

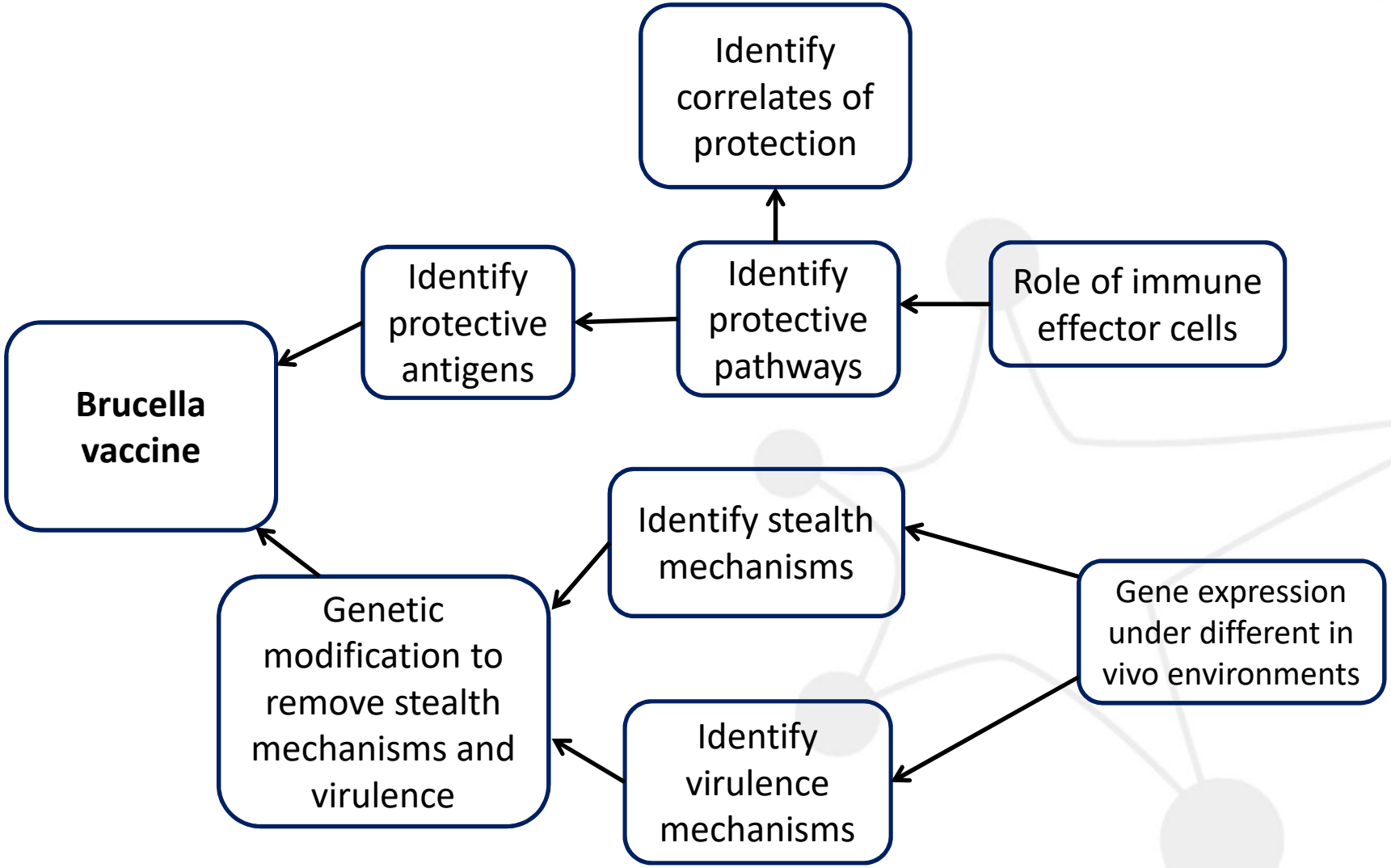
Brucellosis

Q Fever

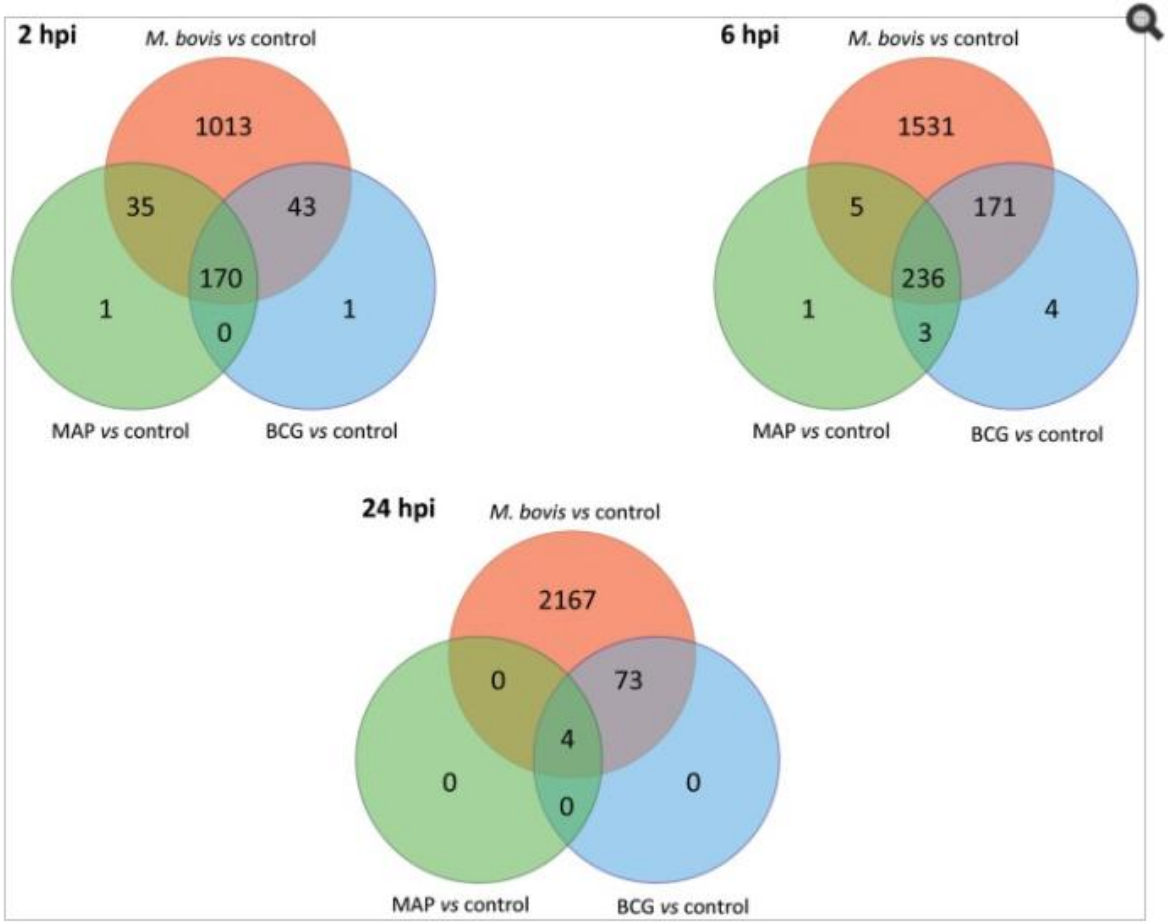
Salmonellosis



An avenue in the Brucella Research Roadmap

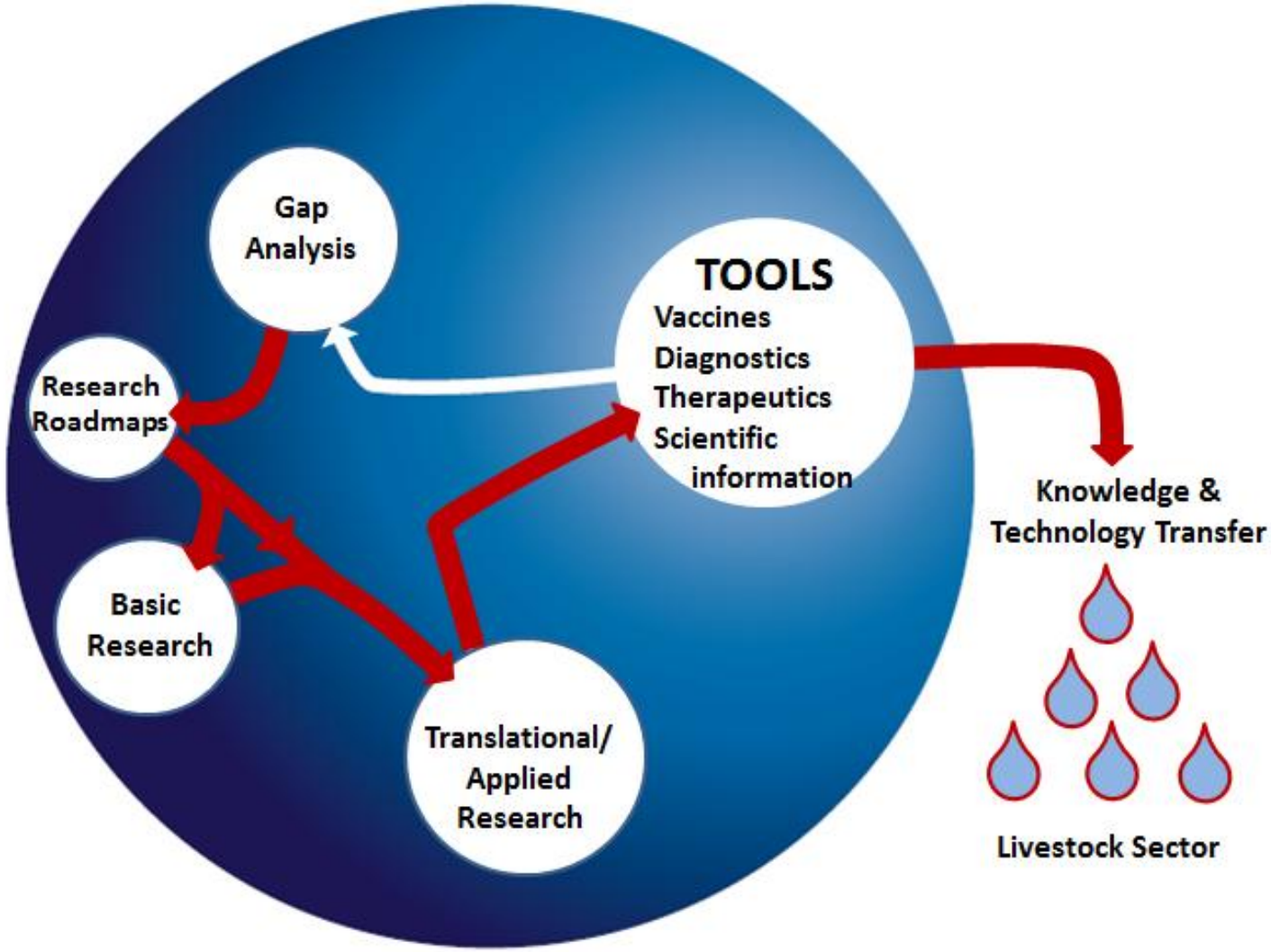


Shared and differentially expressed genes among M.bovis, MAP and BCG infected MDM



K Rue-Albrecht et al; Frontiers in Immunology, 5, 1-14(2014)

The Research Pipeline



Thank You For Your Attention

http://www.star-idaz.net/