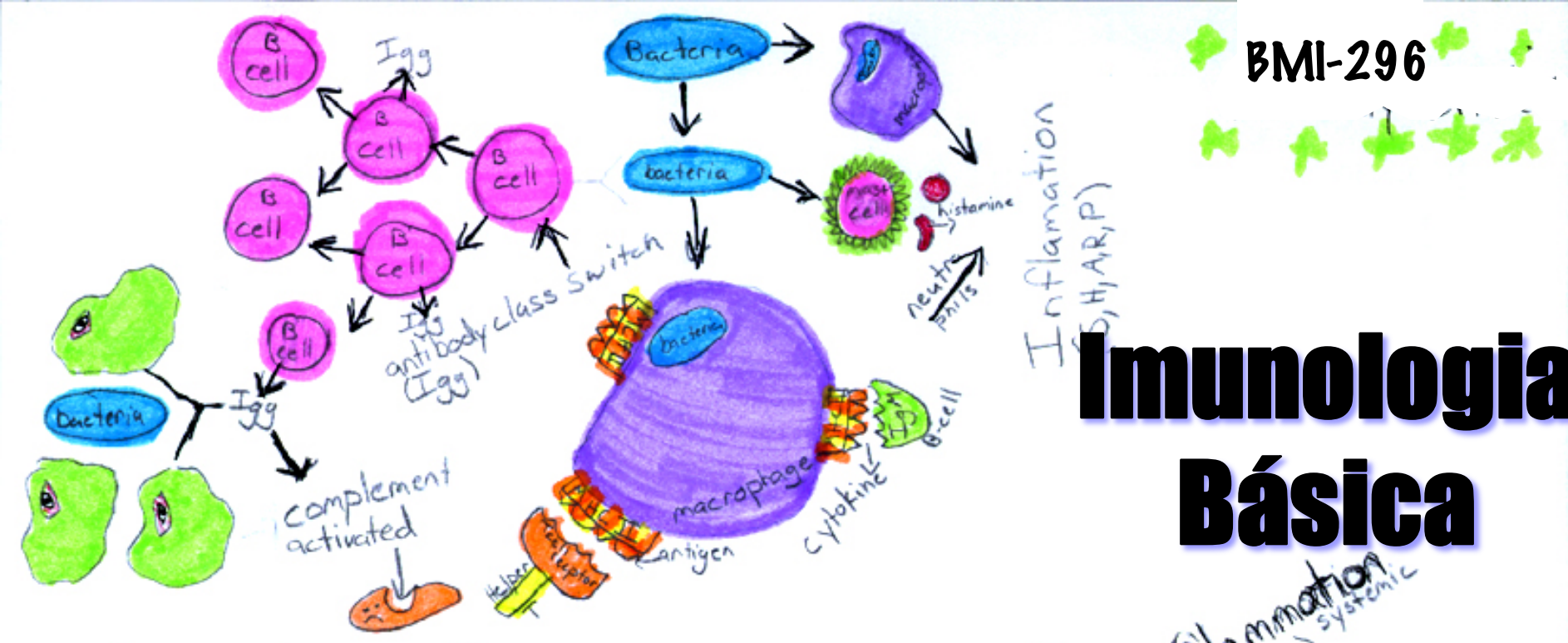
BMI-296

Imunologia Básica



Immune Response

Meaghan Bence
Leild Kessler
Mindy Talboo

BMI-296 Imunologia
Biologia Diurno
Organização das Aulas

1- início às 9hs - aula com pelo menos um intervalo

2- provas ME (pesos 1 + 2 + 4)

3- período com monitor PAE (Felipe), após as aulas, na mesma sala

4- atividade vídeo “Imunologia Animal” (peso 3)

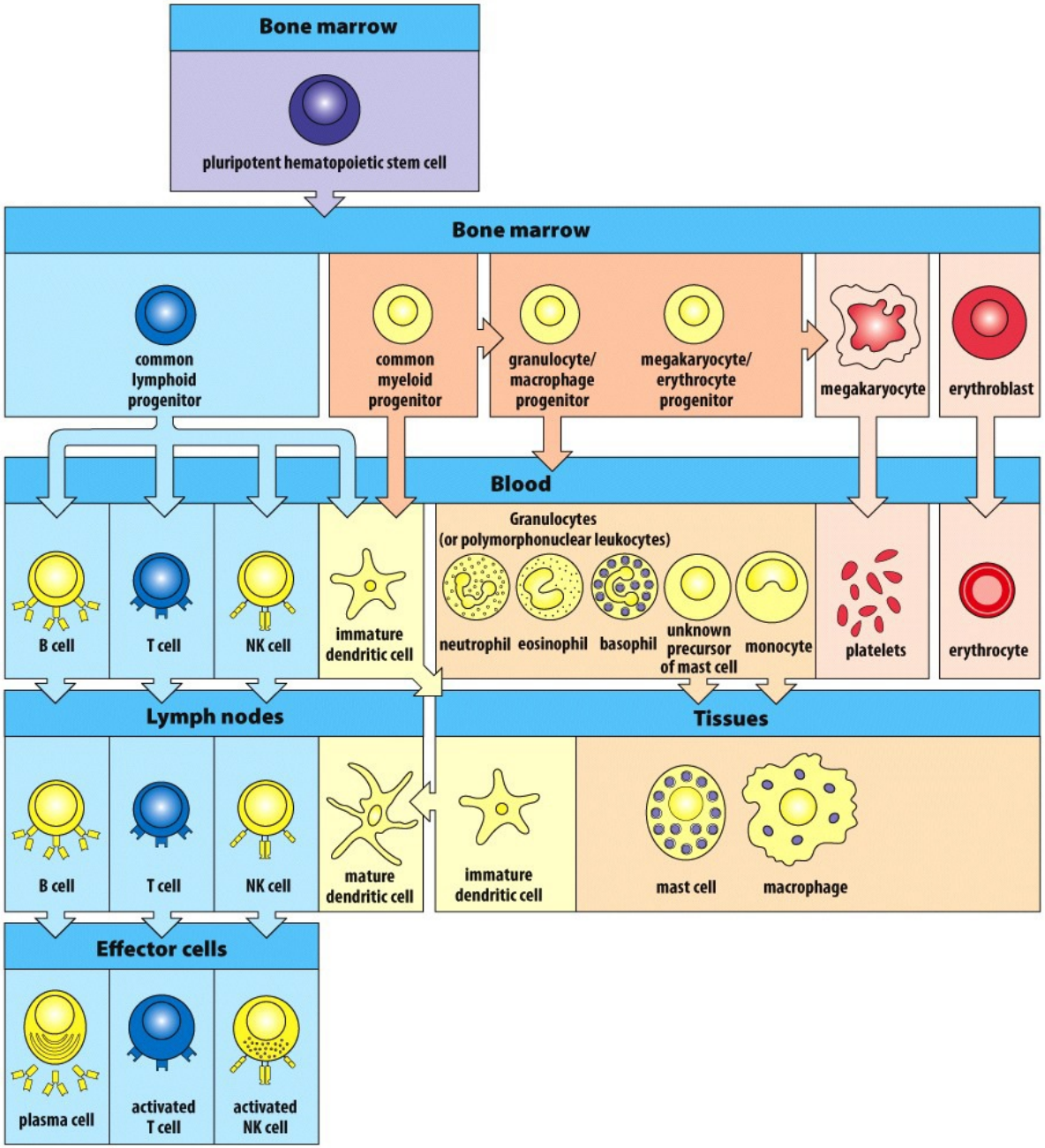
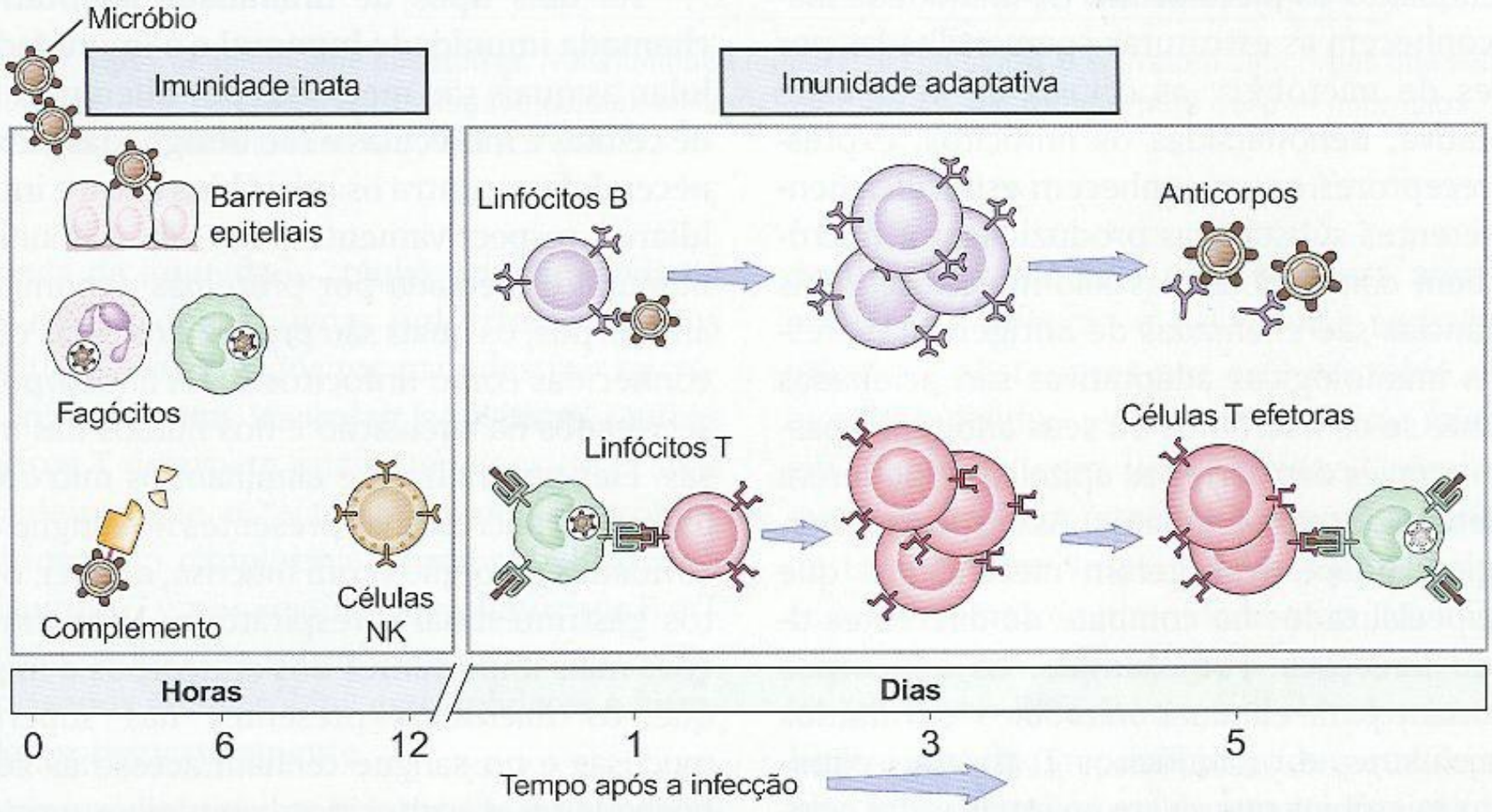
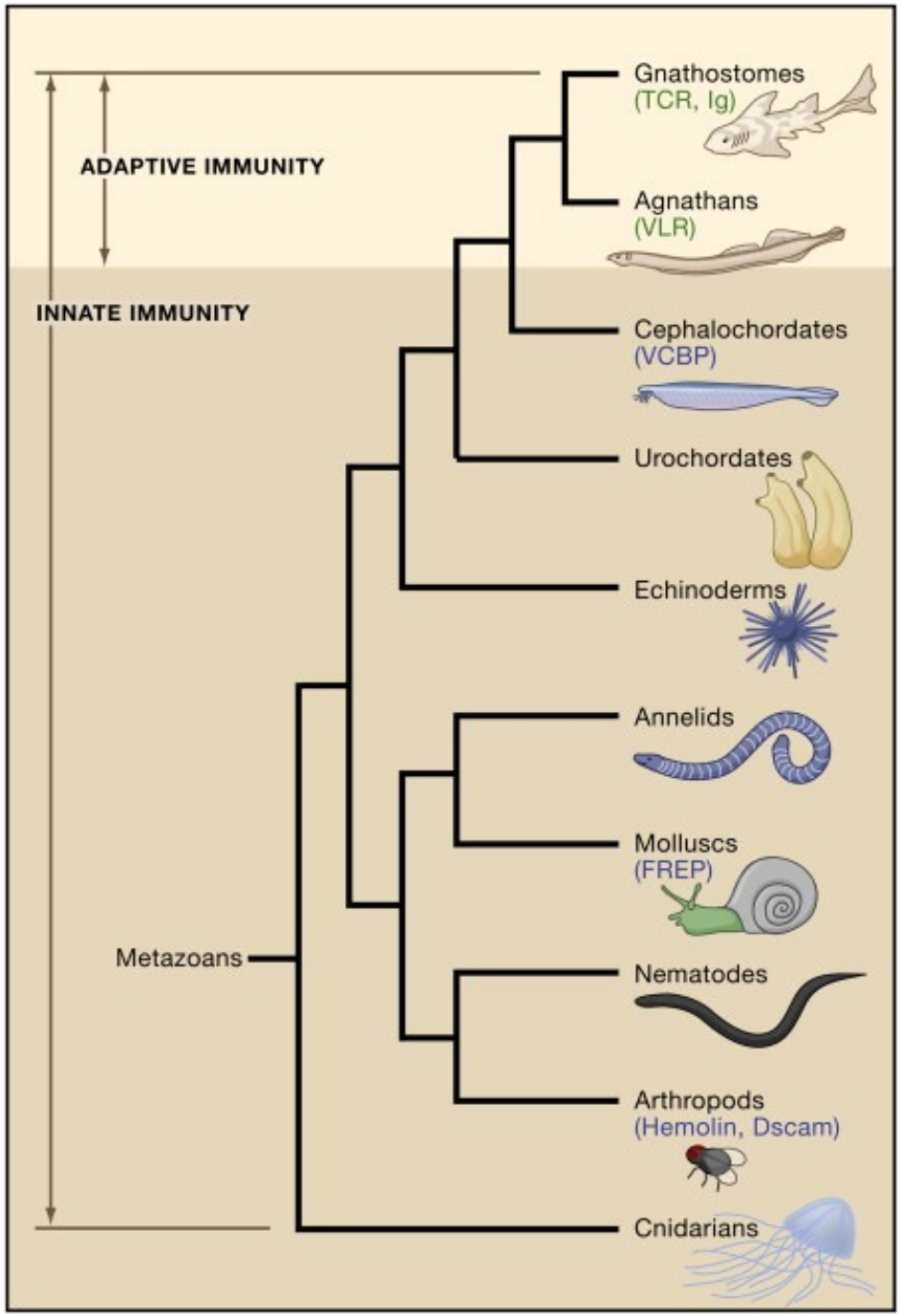


Figure 1.3 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

conceito importante!



conceito importante!



Max D. Cooper, Matthew N. Alder

The Evolution of Adaptive Immune Systems

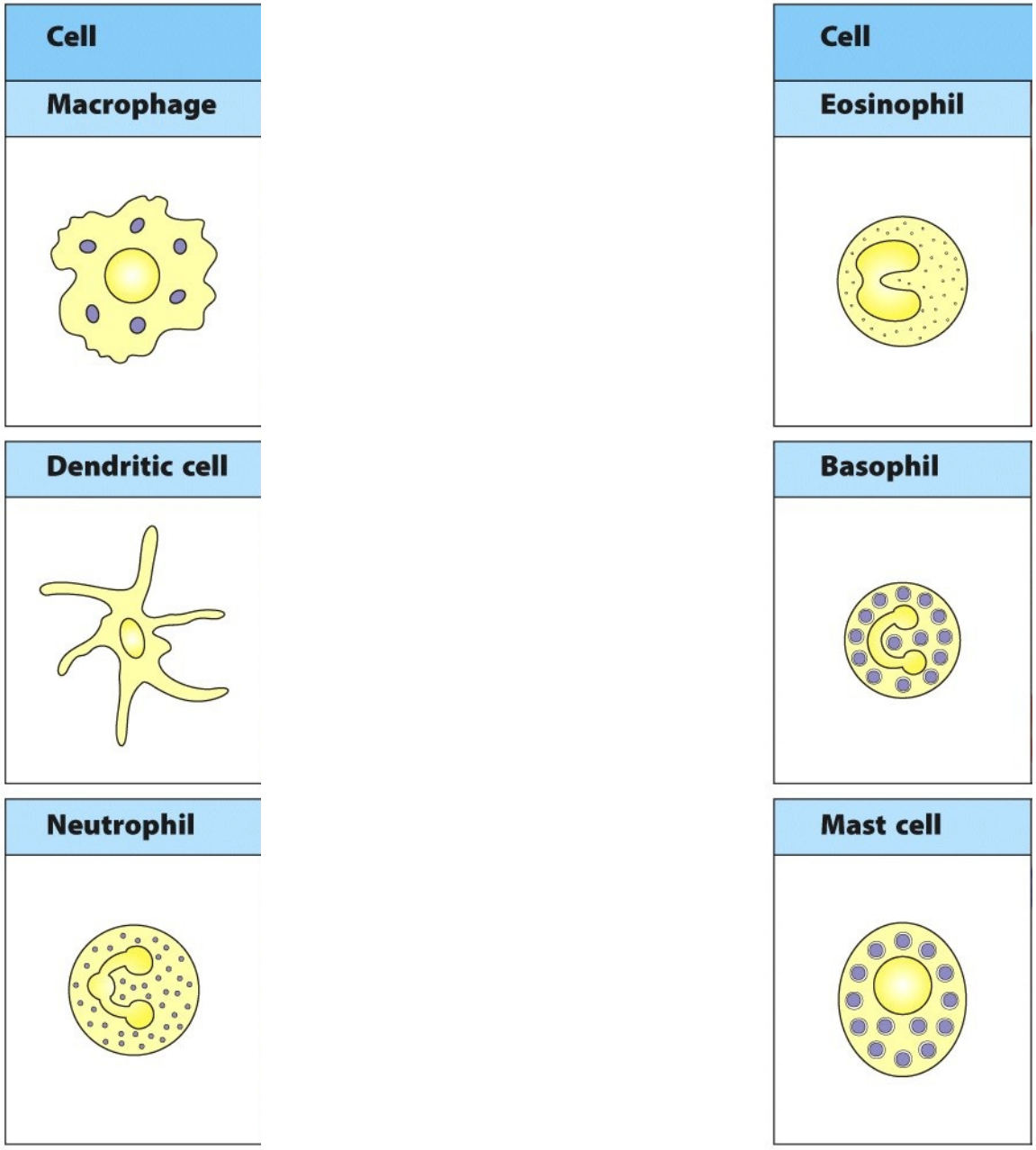
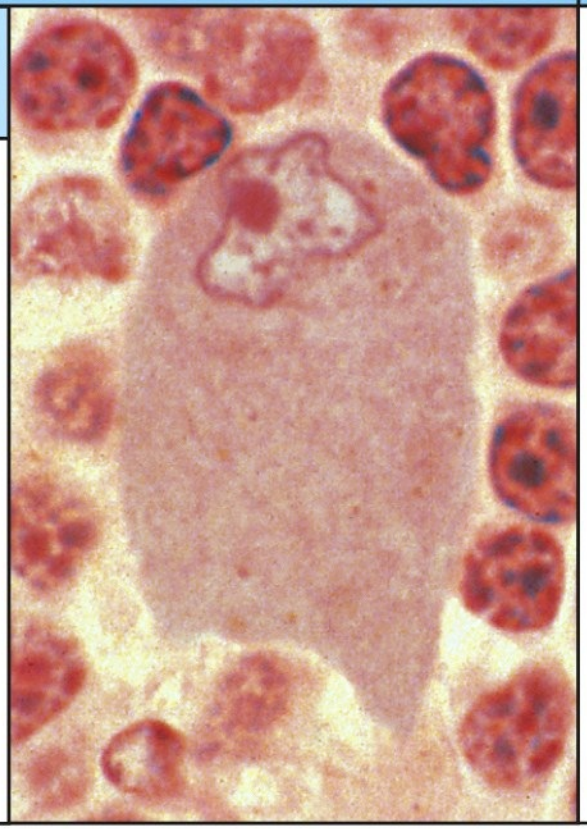


Figure 1.4 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

Cell		Activated function
Macrophage		Phagocytosis and activation of bactericidal mechanisms Antigen presentation

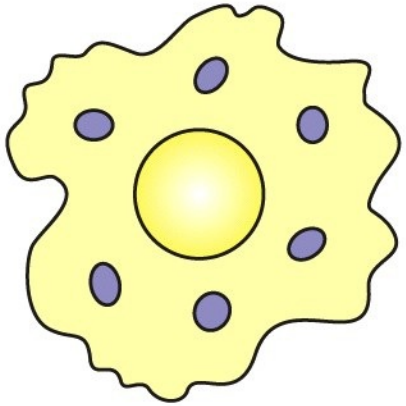


Figure 1.4 part 1 of 6 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

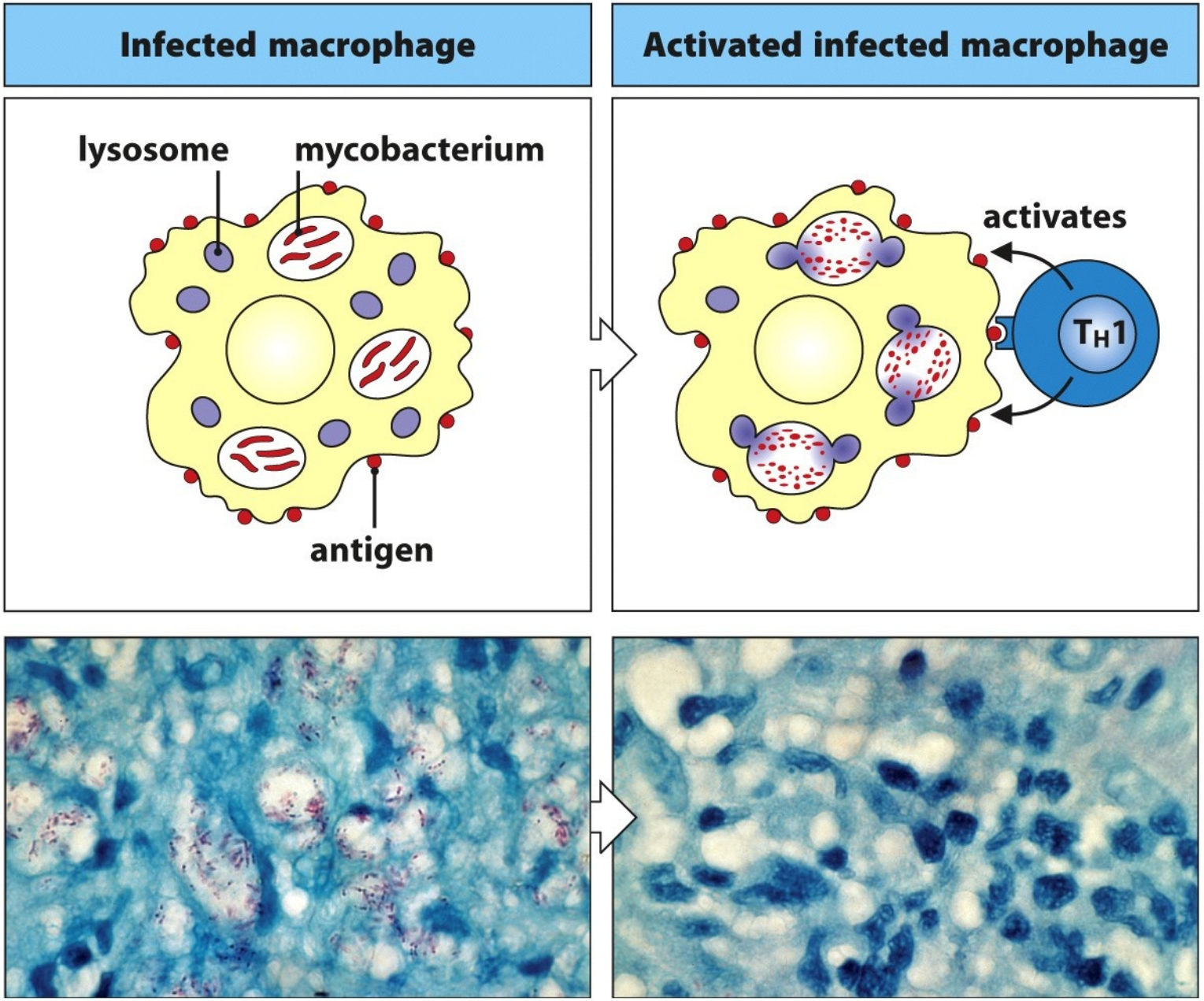


Figure 1.27 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

Cell		Activated function
Dendritic cell		Antigen uptake in peripheral sites Antigen presentation

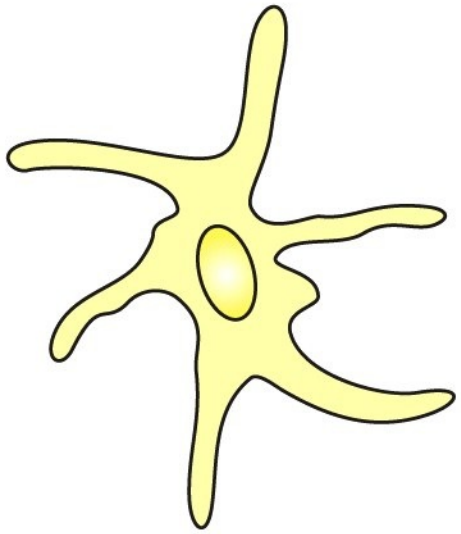


Figure 1.4 part 2 of 6 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

conceito importante!

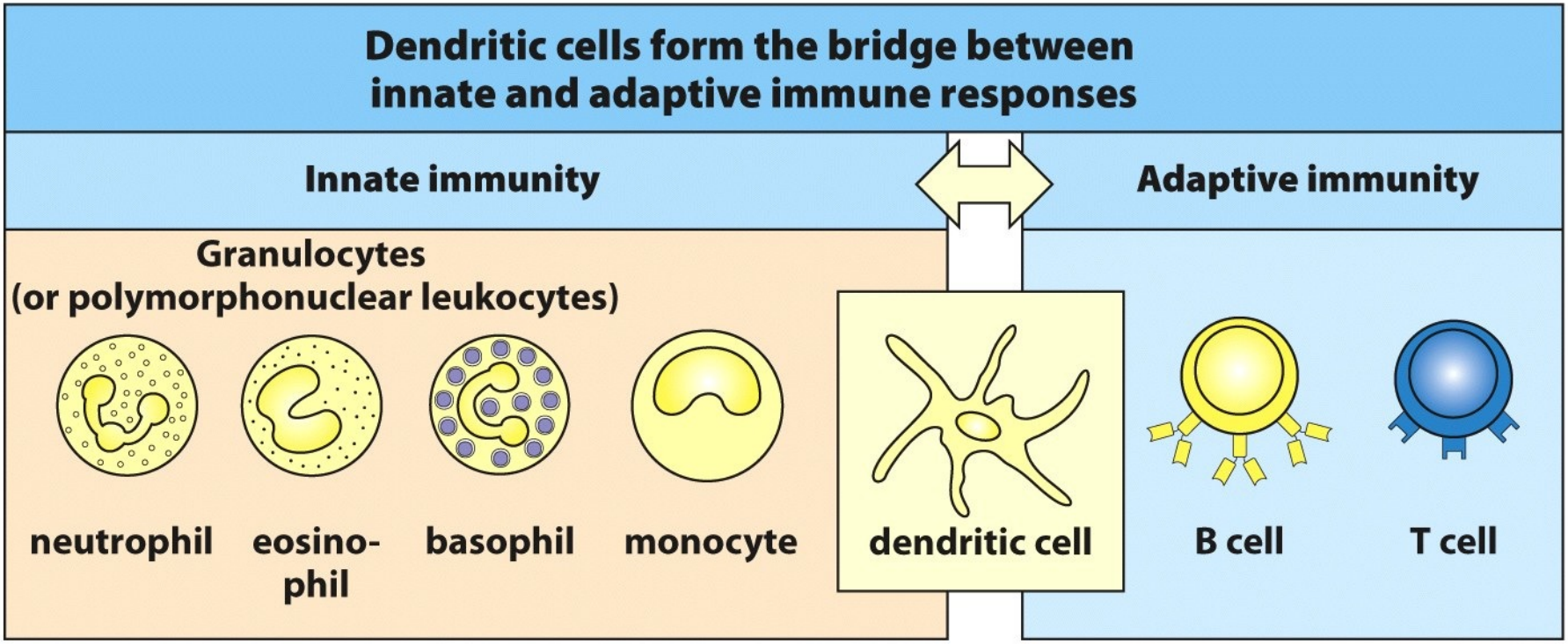


Figure 1.5 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

Cell		Activated function
Neutrophil		Phagocytosis and activation of bactericidal mechanisms

Figure 1.4 part 3 of 6 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

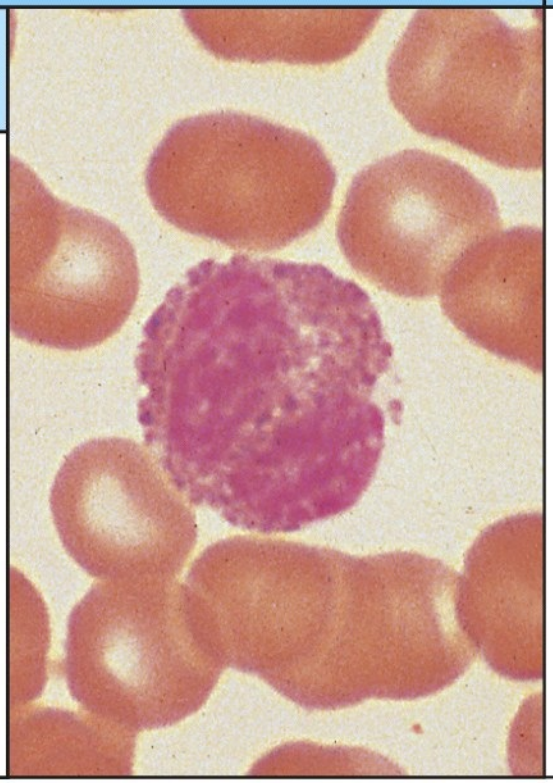
Cell		Activated function
Eosinophil		Killing of antibody-coated parasites

Figure 1.4 part 4 of 6 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

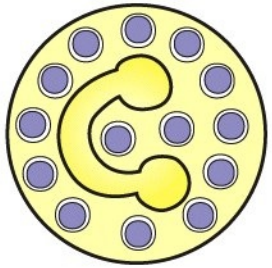
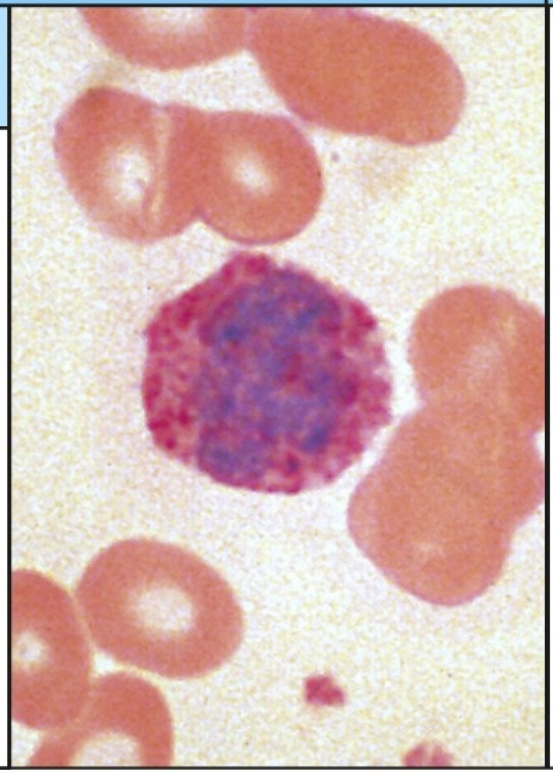
Cell		Activated function
Basophil		
		Promotion of allergic responses and augmentation of anti-parasitic immunity

Figure 1.4 part 5 of 6 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

Cell		Activated function
Mast cell		Release of granules containing histamine and active agents

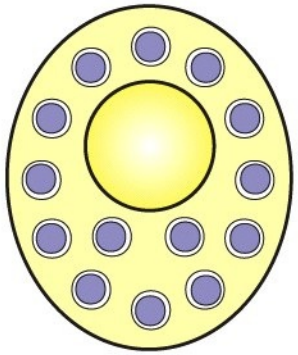


Figure 1.4 part 6 of 6 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

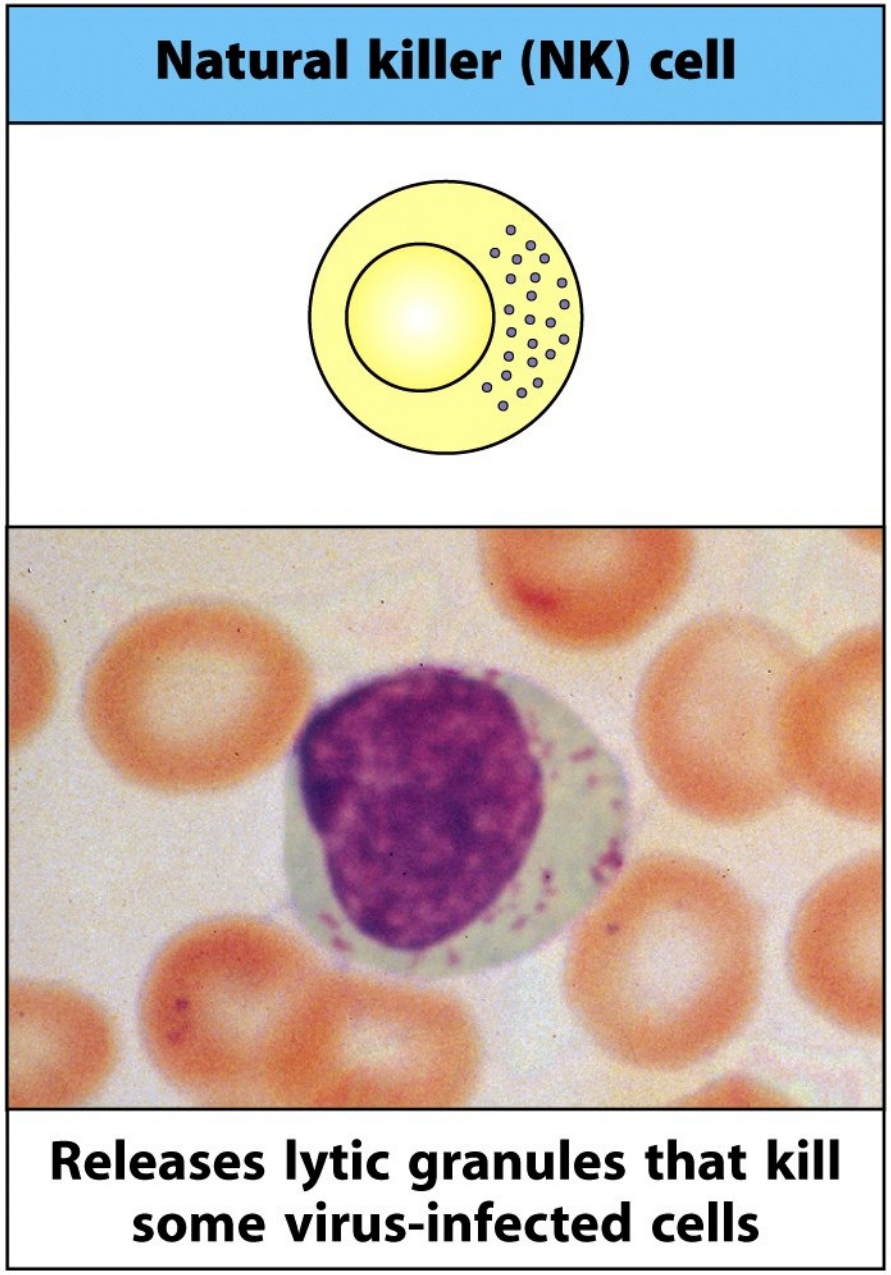


Figure 1.6 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

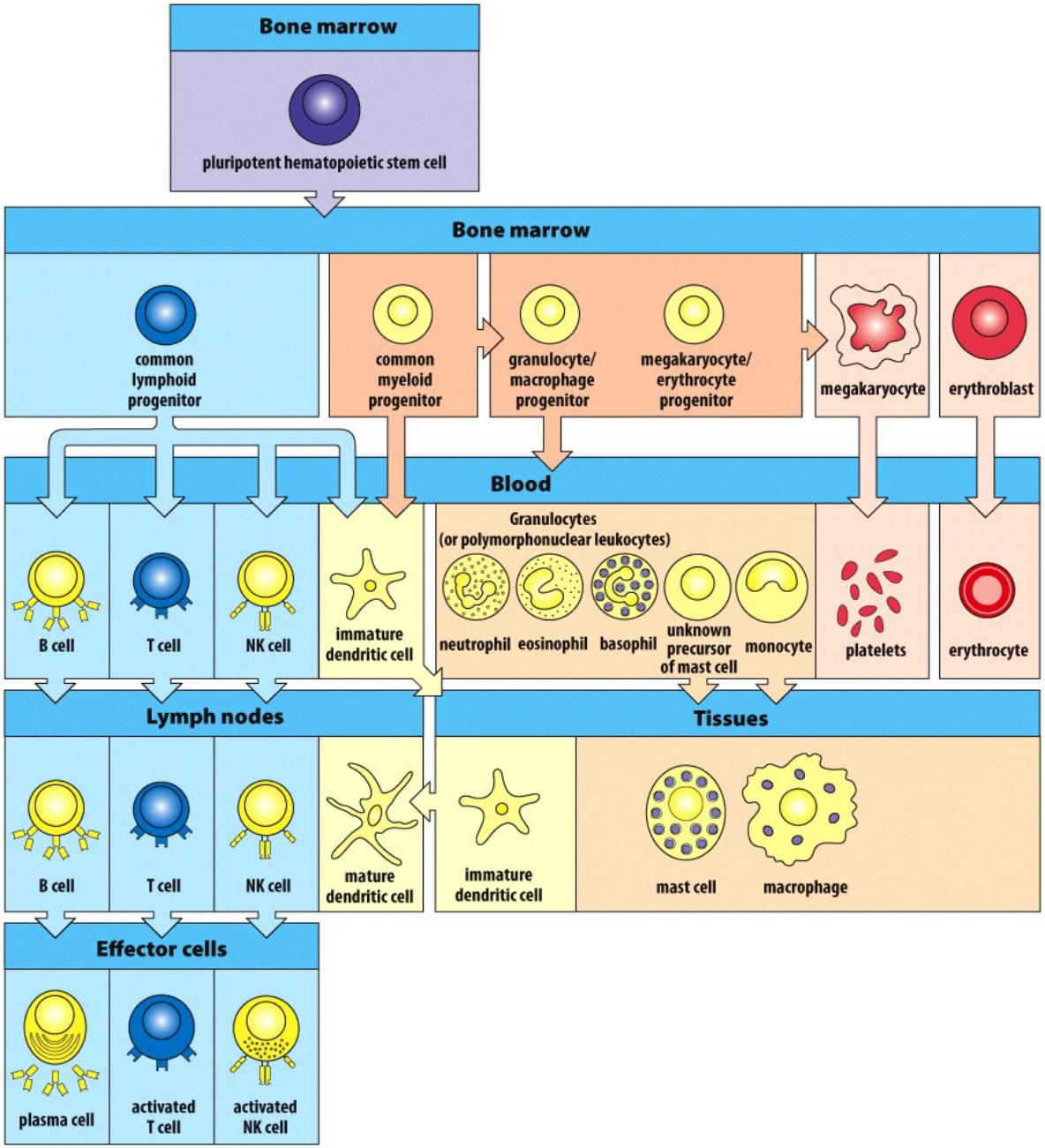


Figure 1.3 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

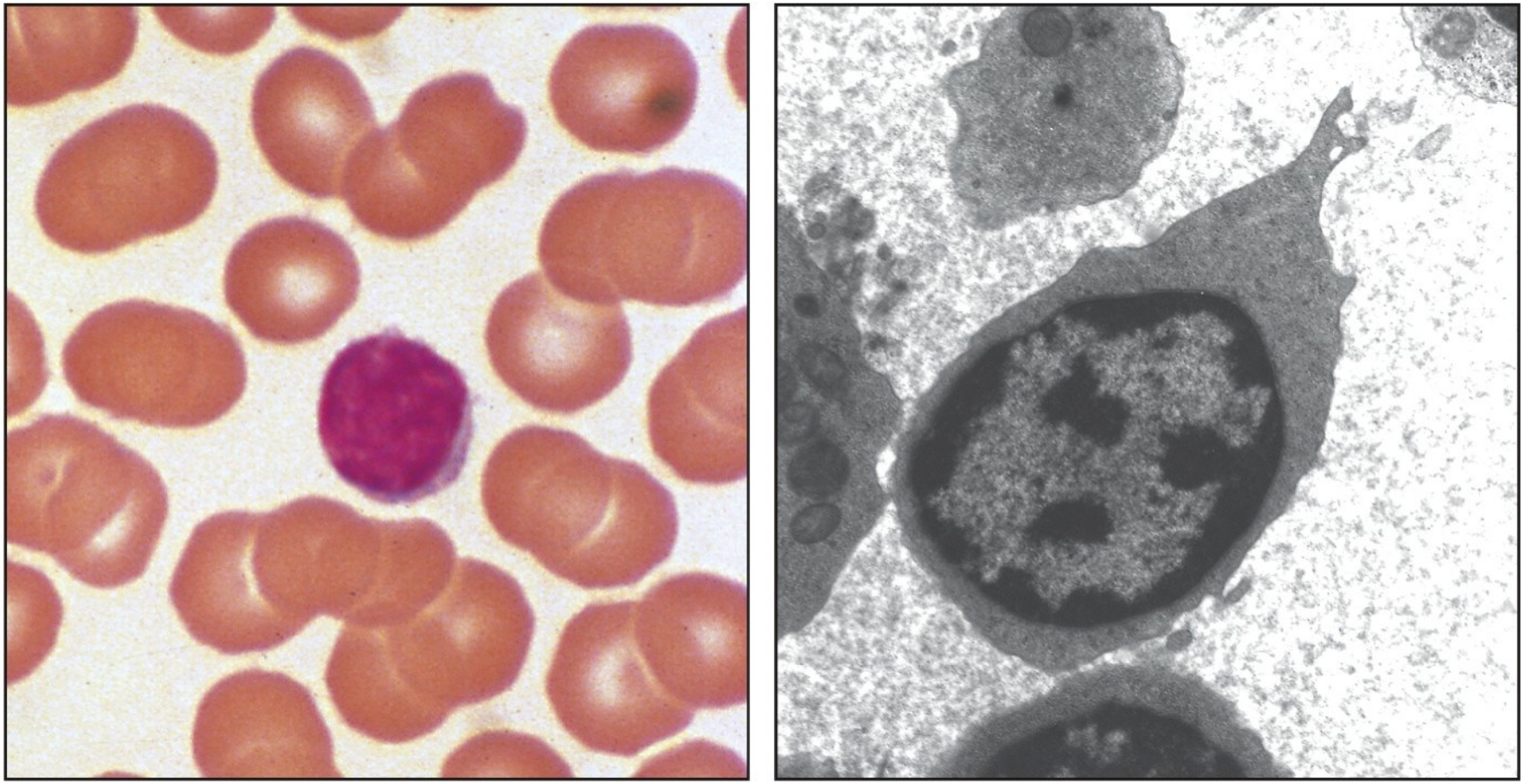


Figure 1.7 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

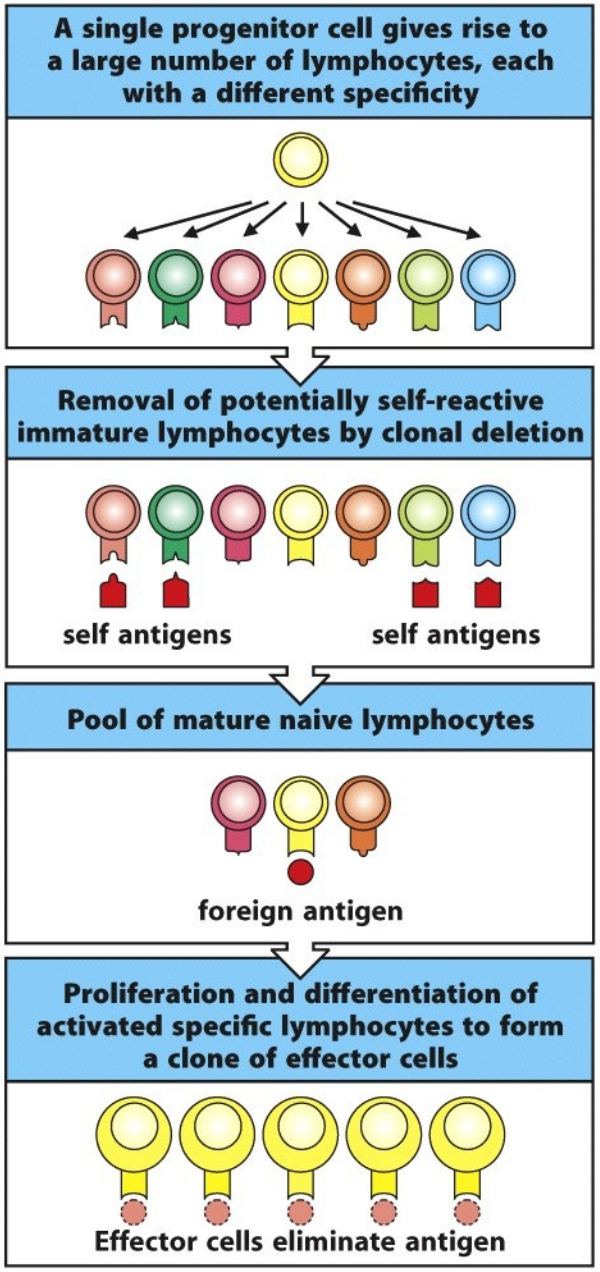


Figure 1.12 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

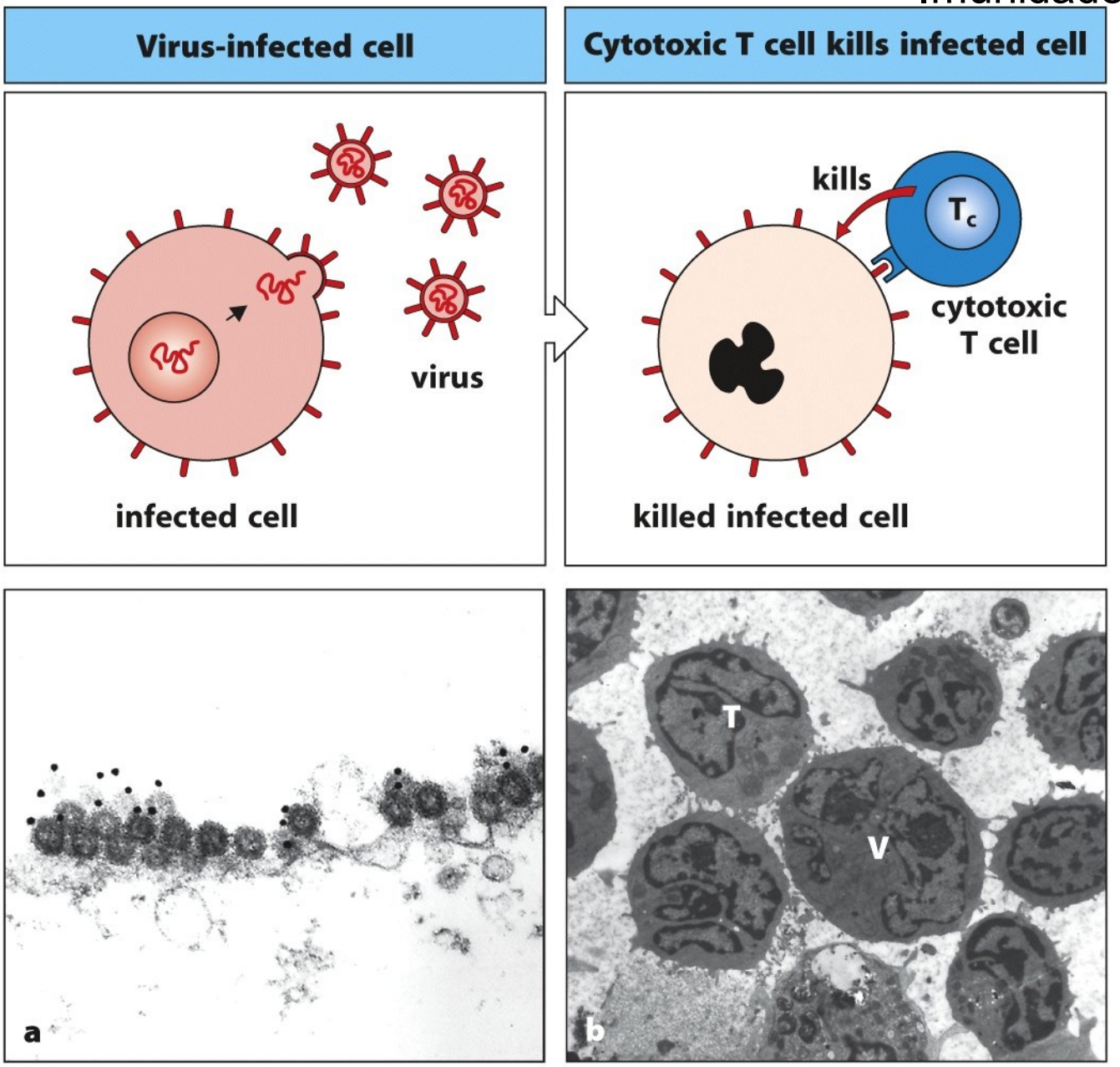
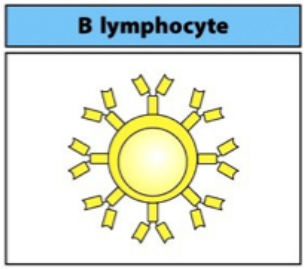


Figure 1.26 Janeway's Immunobiology, 8ed. (© Garland Science 2012)



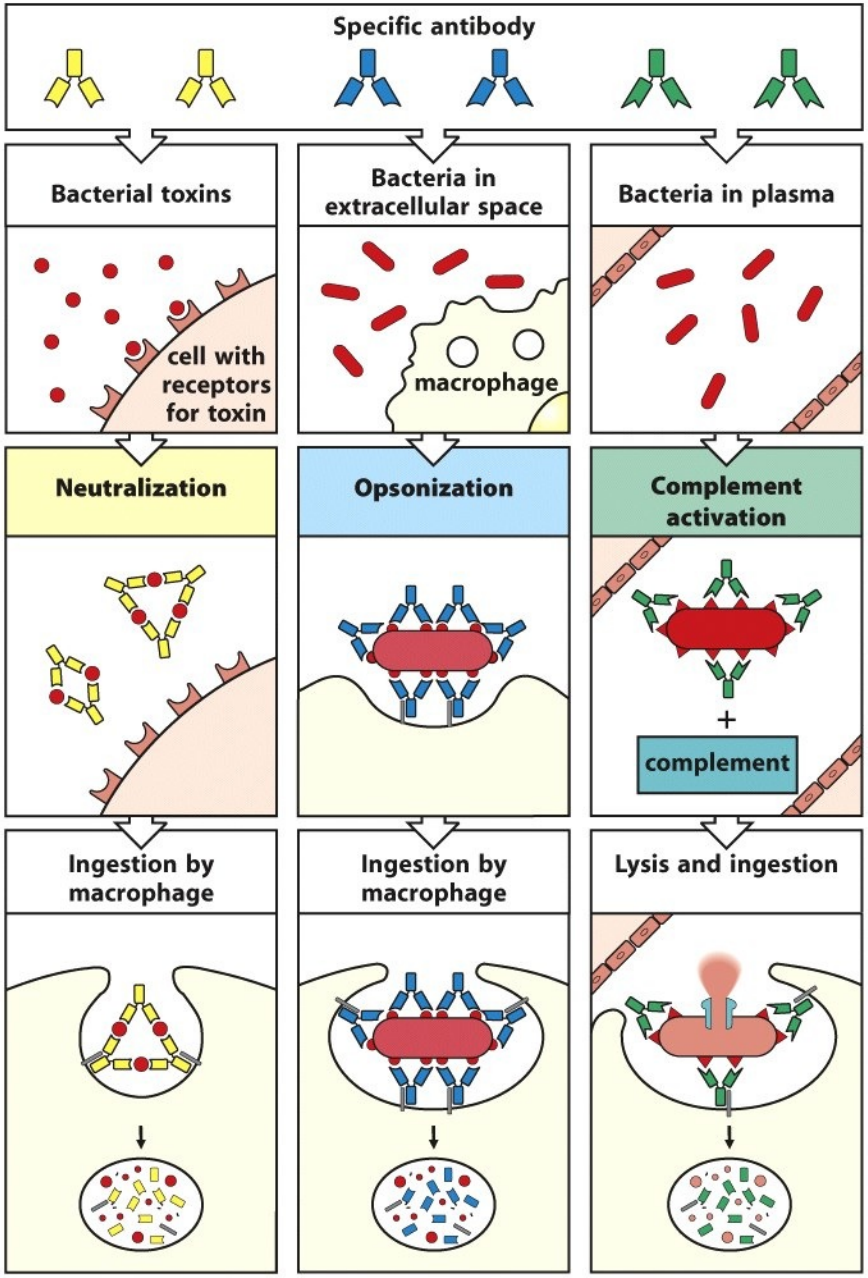


Figure 1.25 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

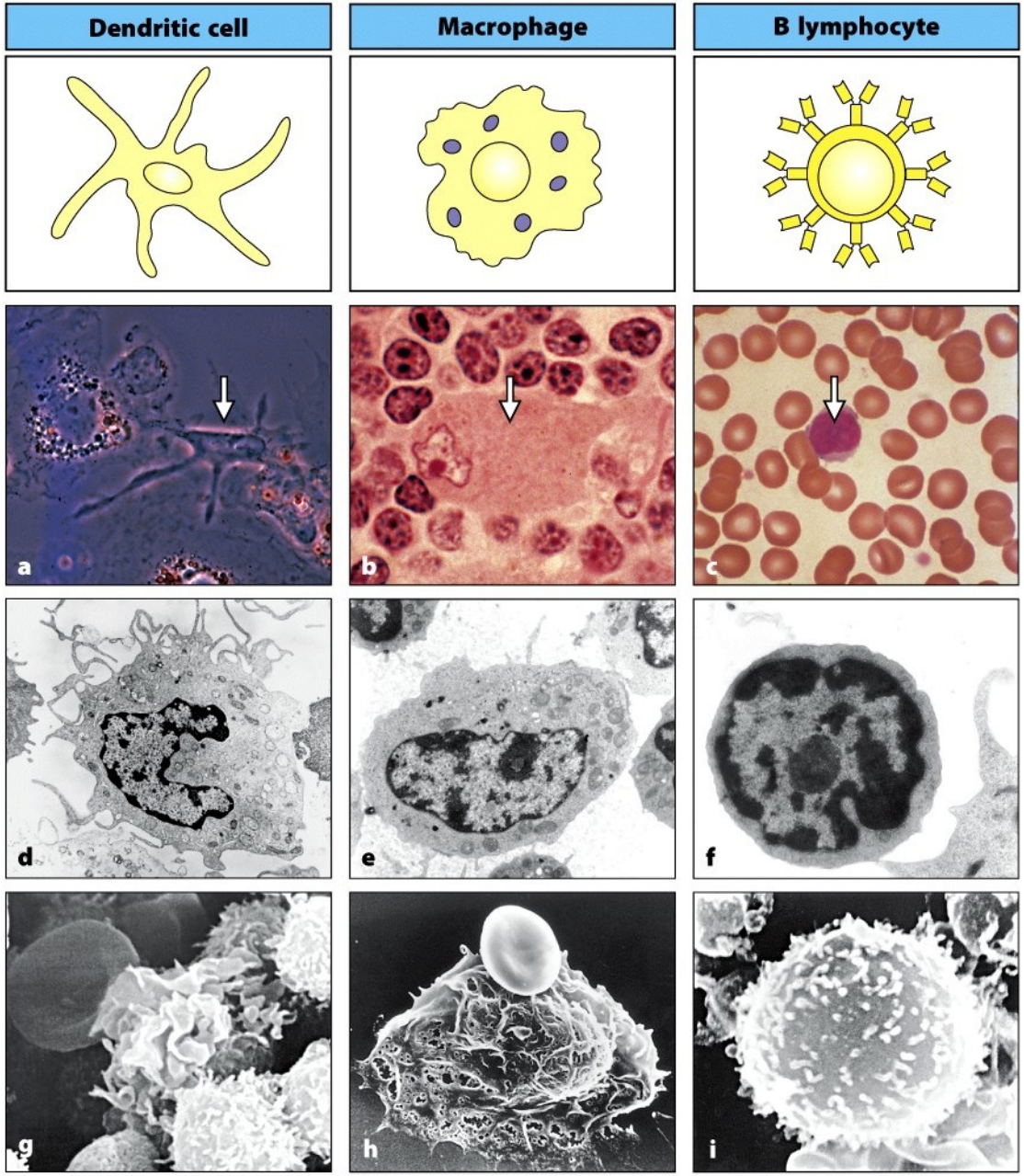


Figure 1.22 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

Antigen
Presenting
Cell

conceito importante!

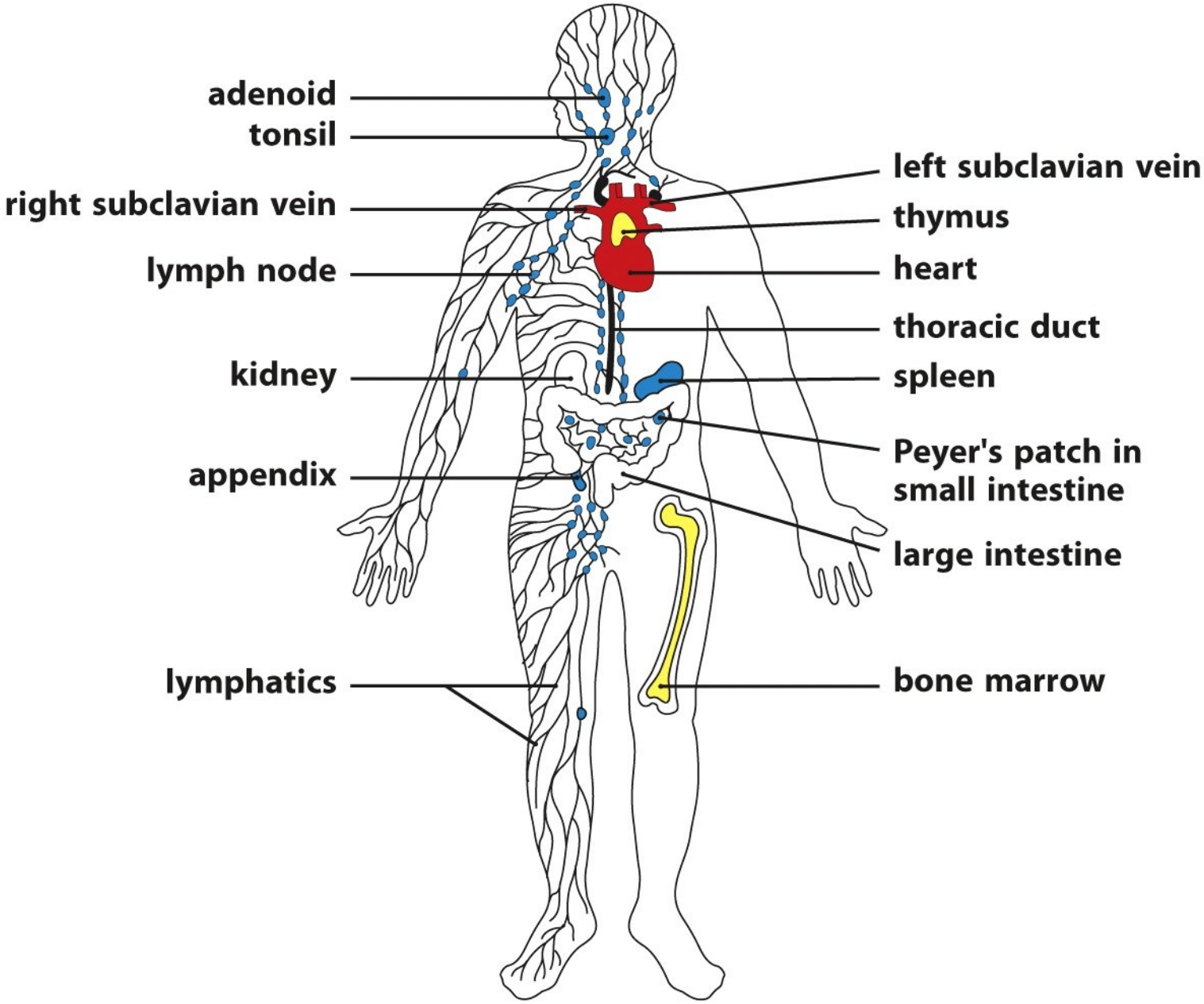


Figure 1.8 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

Orgãos linfóides primários (maioria dos mamíferos adultos)

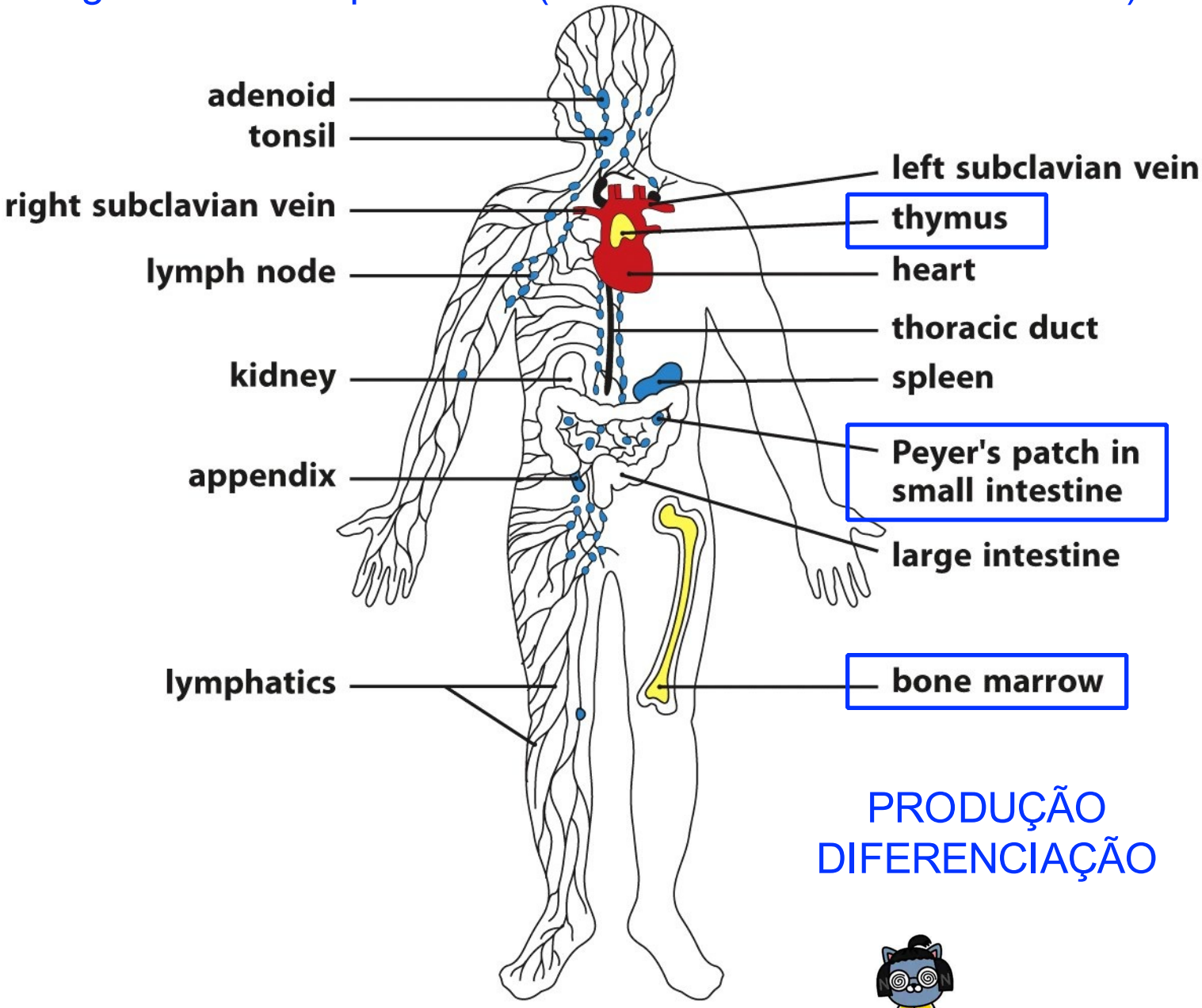
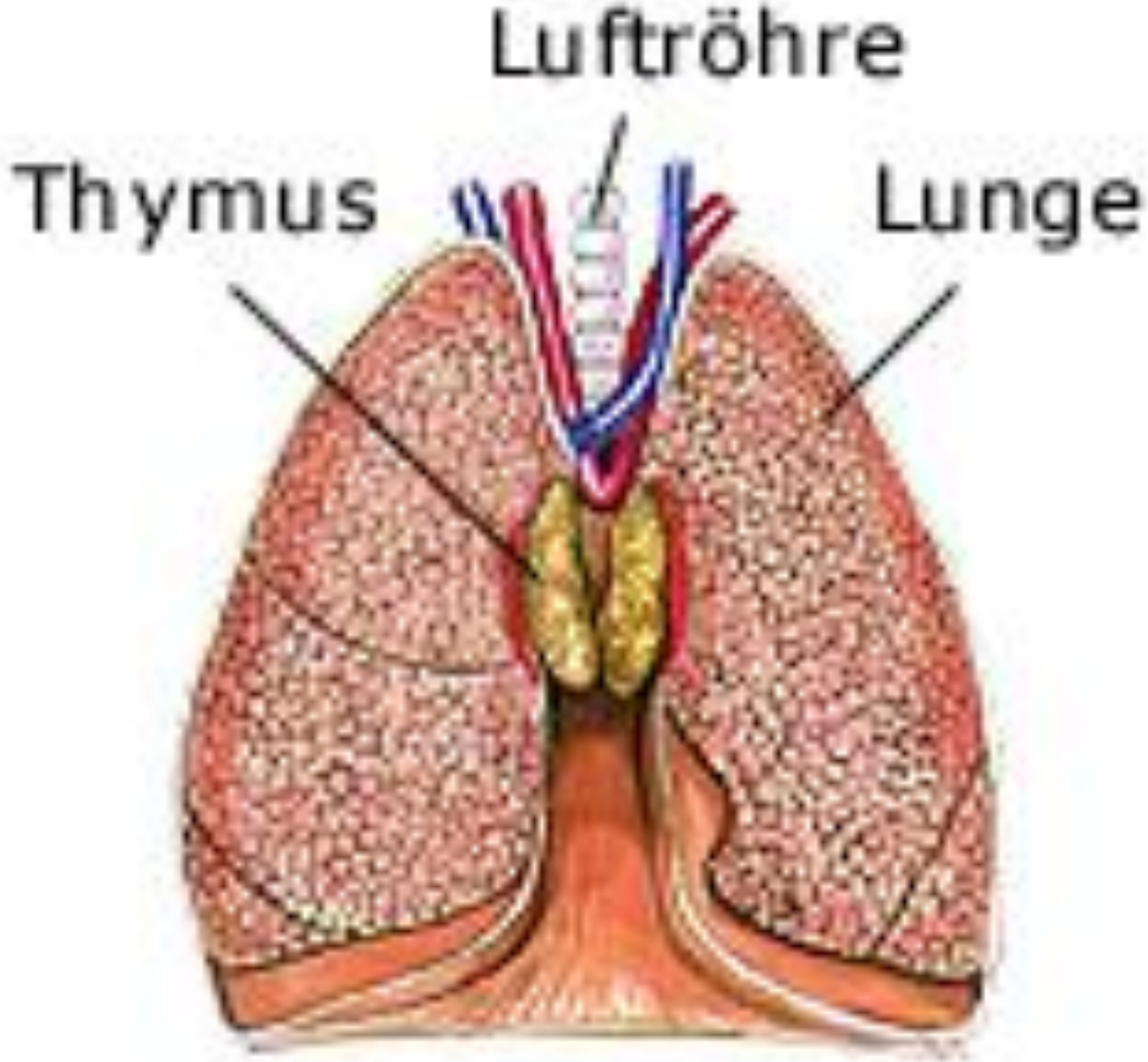
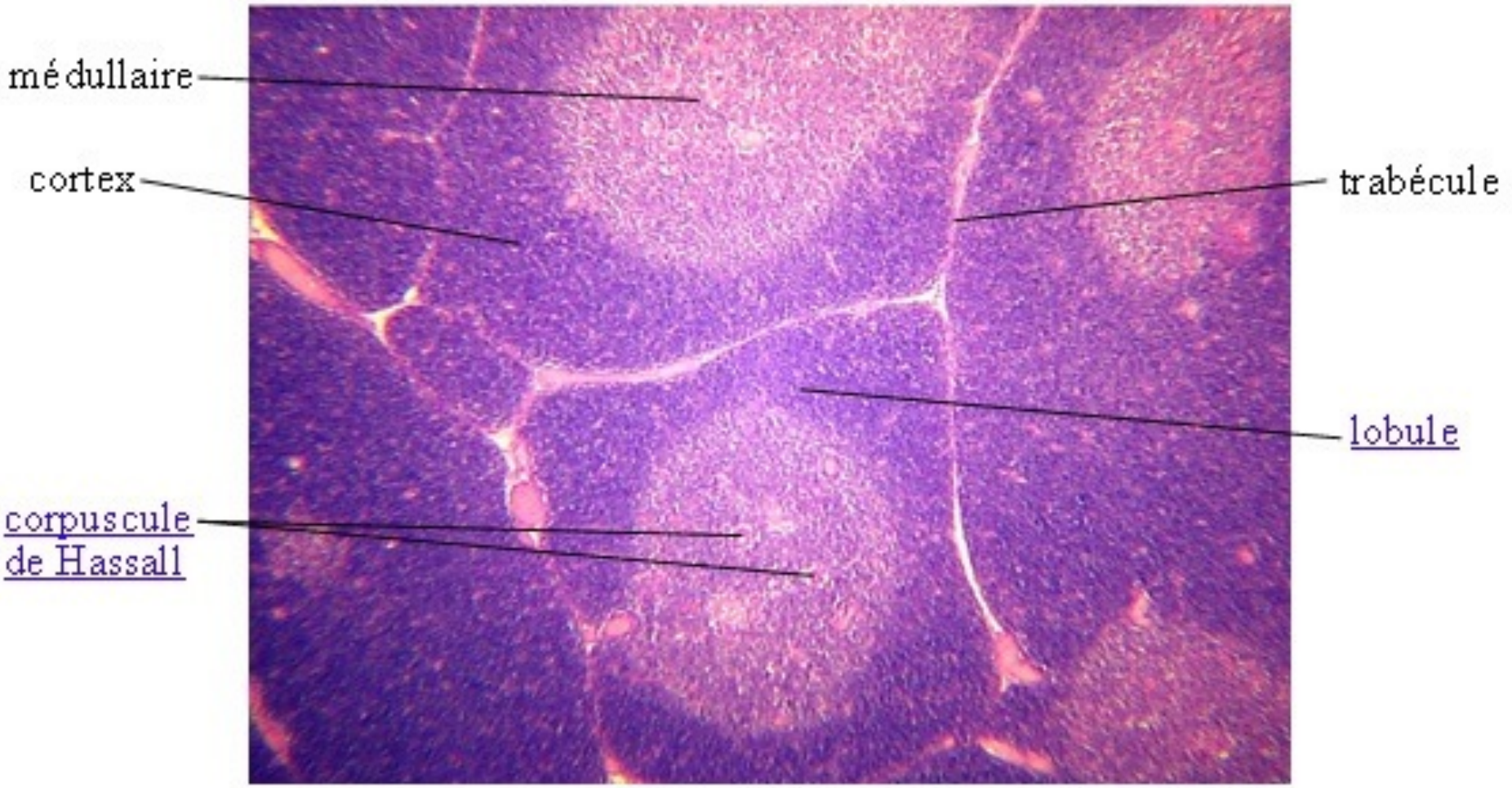


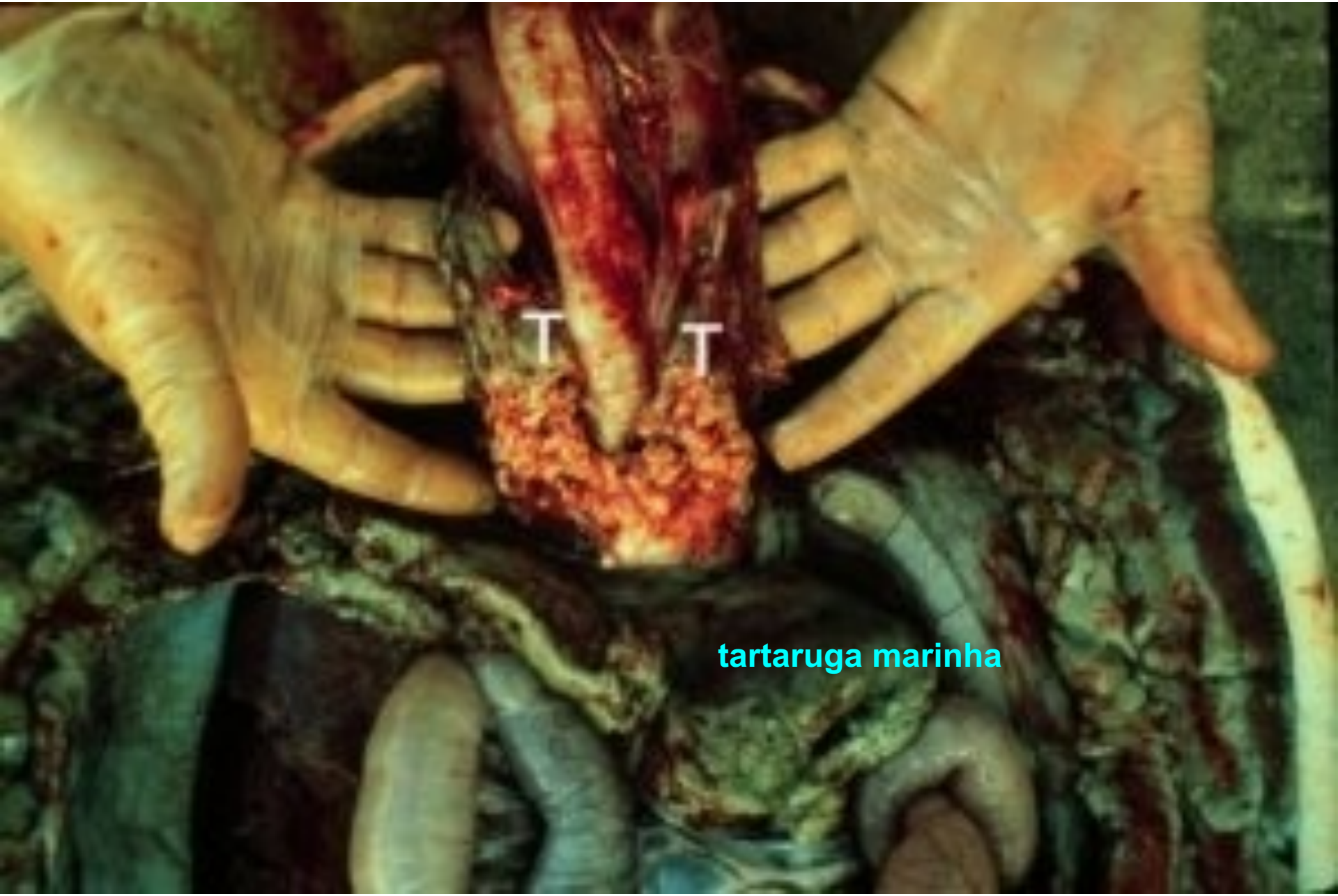
Figure 1.8 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

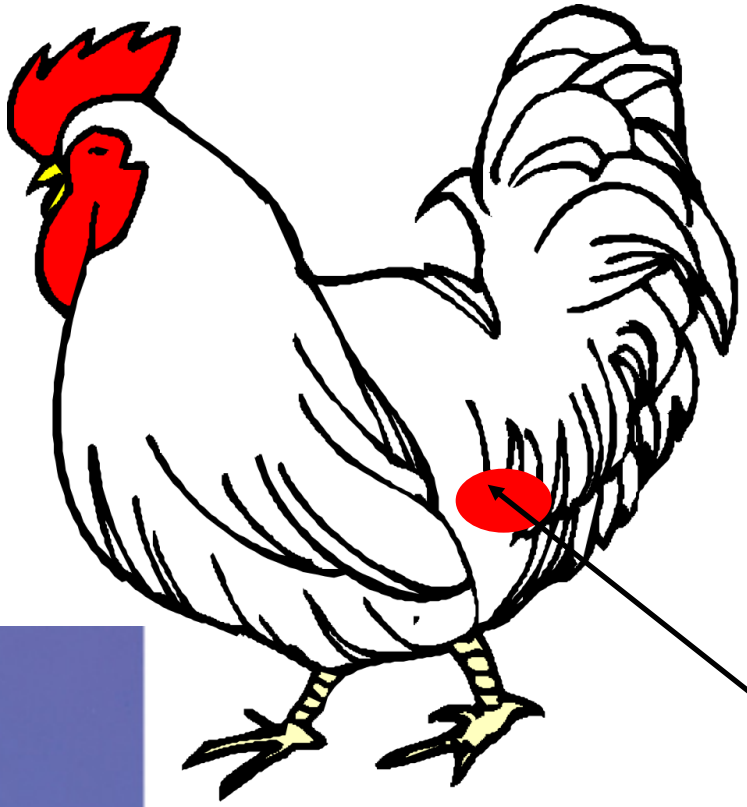
PRODUÇÃO
DIFERENCIAÇÃO

conceito importante!


Luftröhre
Thymus
Lunge


médullaire
cortex
trabécule
lobule
corpuscule de Hassall


T
T
tartaruga marinha



Bursa de Fabricius
90% linfócitos B

FIGURE 10-5 The bursa of Fabricius obtained from a 1-week-old chicken. It has been cut open to reveal the folds inside.

Peyer's patches are covered by an epithelial layer containing specialized cells called M cells which have characteristic membrane ruffles

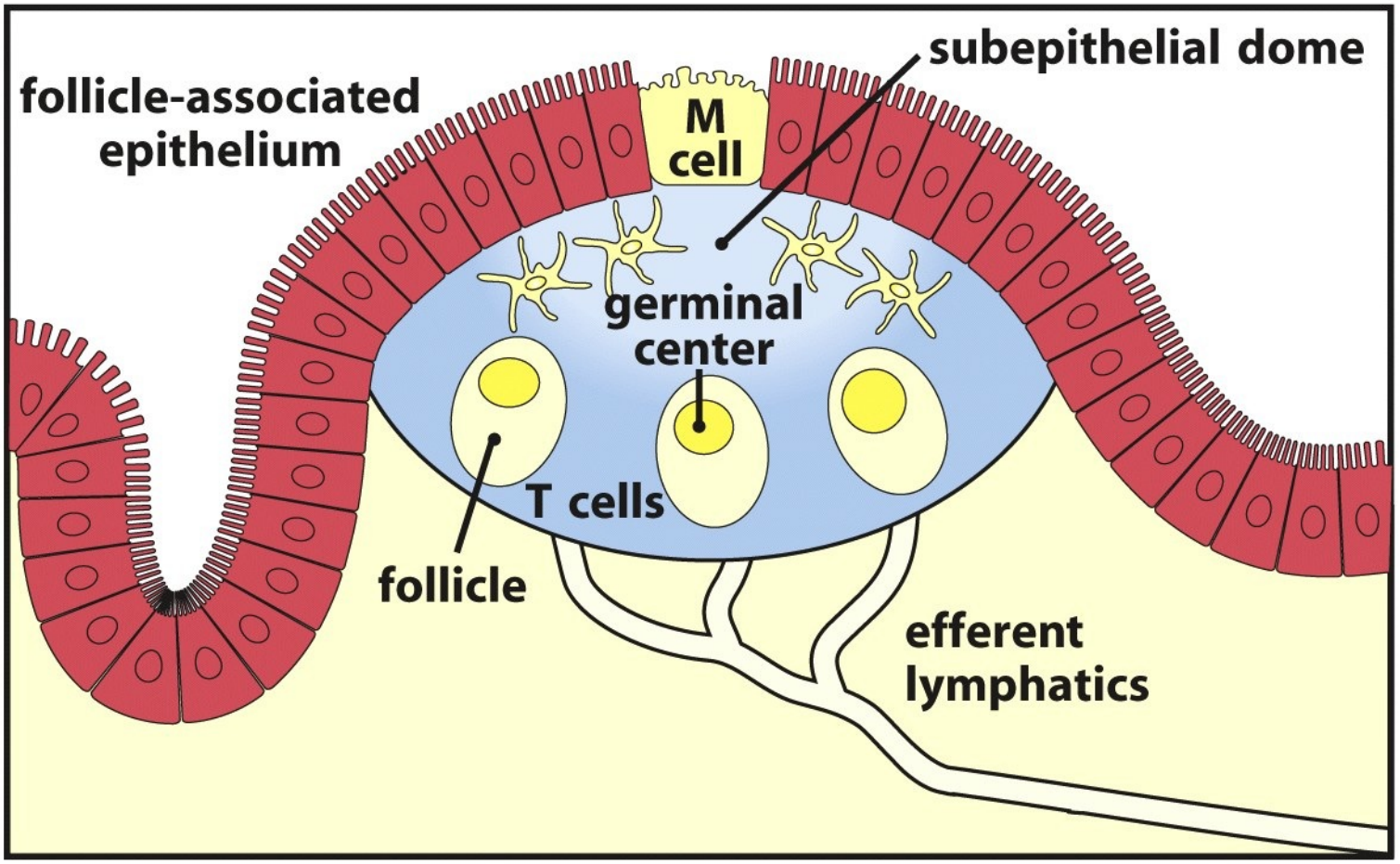


Figure 1.20 part 1 of 2 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

Produção e diferenciação de linfócitos B (~ Bursa)

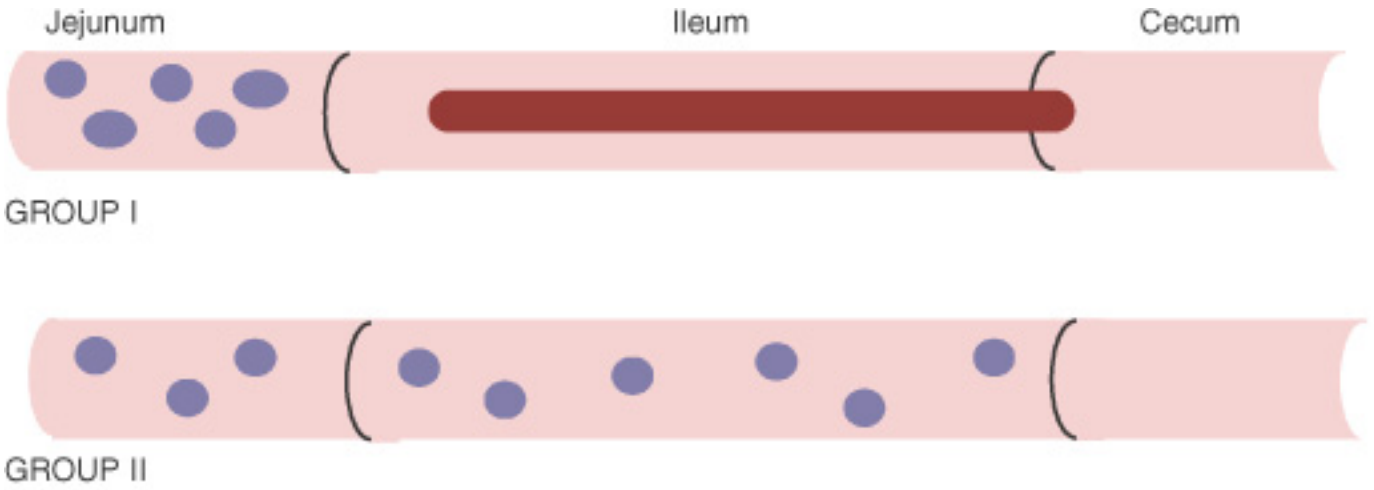
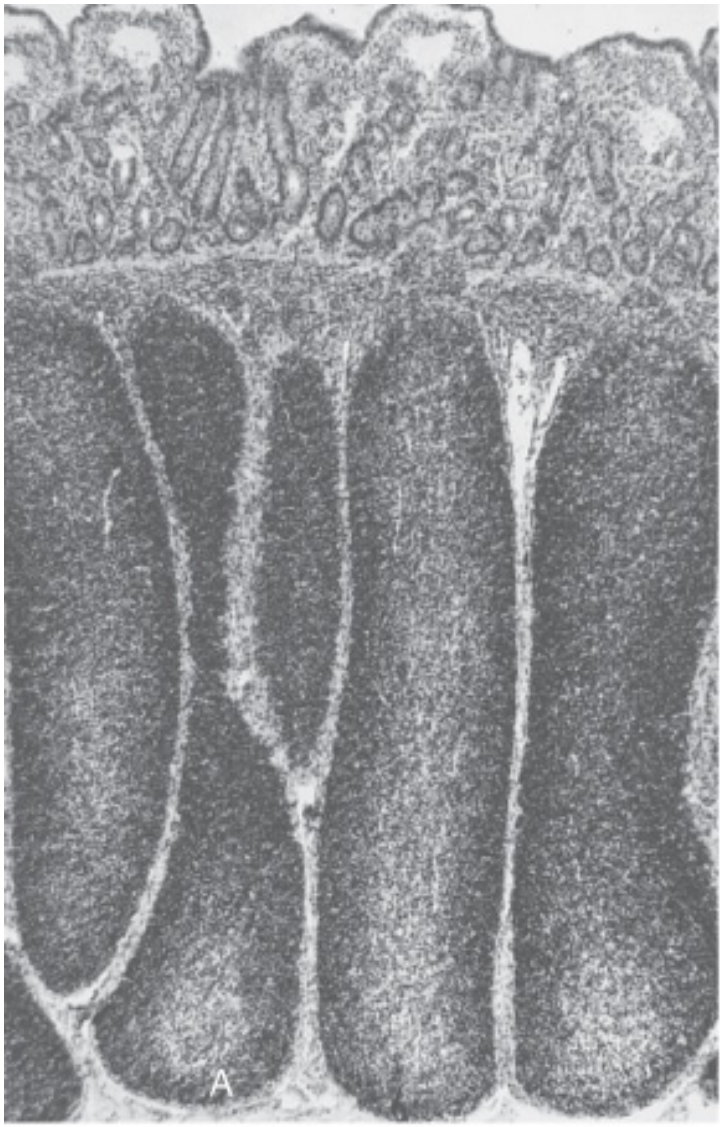


FIGURE 10-7 Schematic diagram showing the differences between the arrangement of Peyer's patches (PPs) in group 1 and group II mammals. The large ileal PP in group I mammals is a primary lymphoid organ that regresses at about a year of age.

Grupo I - humanos, cães, cavalos, porcos e ruminantes
* maturidade máxima logo após nascimento
* PPs do íleo regridem em adultos

Grupo II - outros primatas, roedores e coelhos
* desenvolvimento depende de microbiota intestinal
* persiste na vida adulta



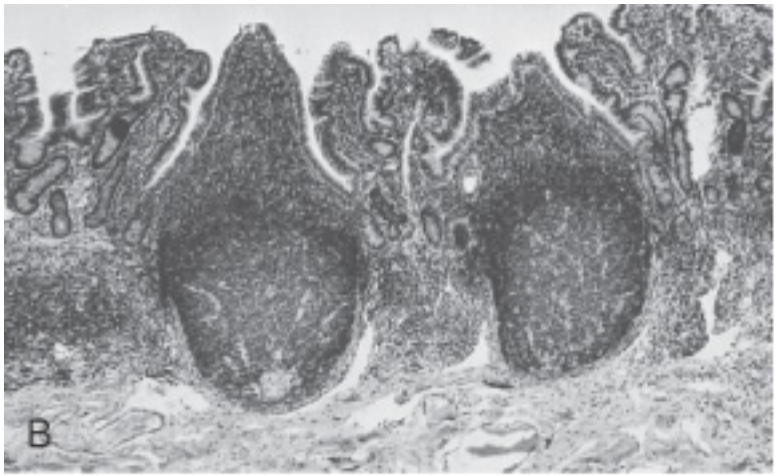
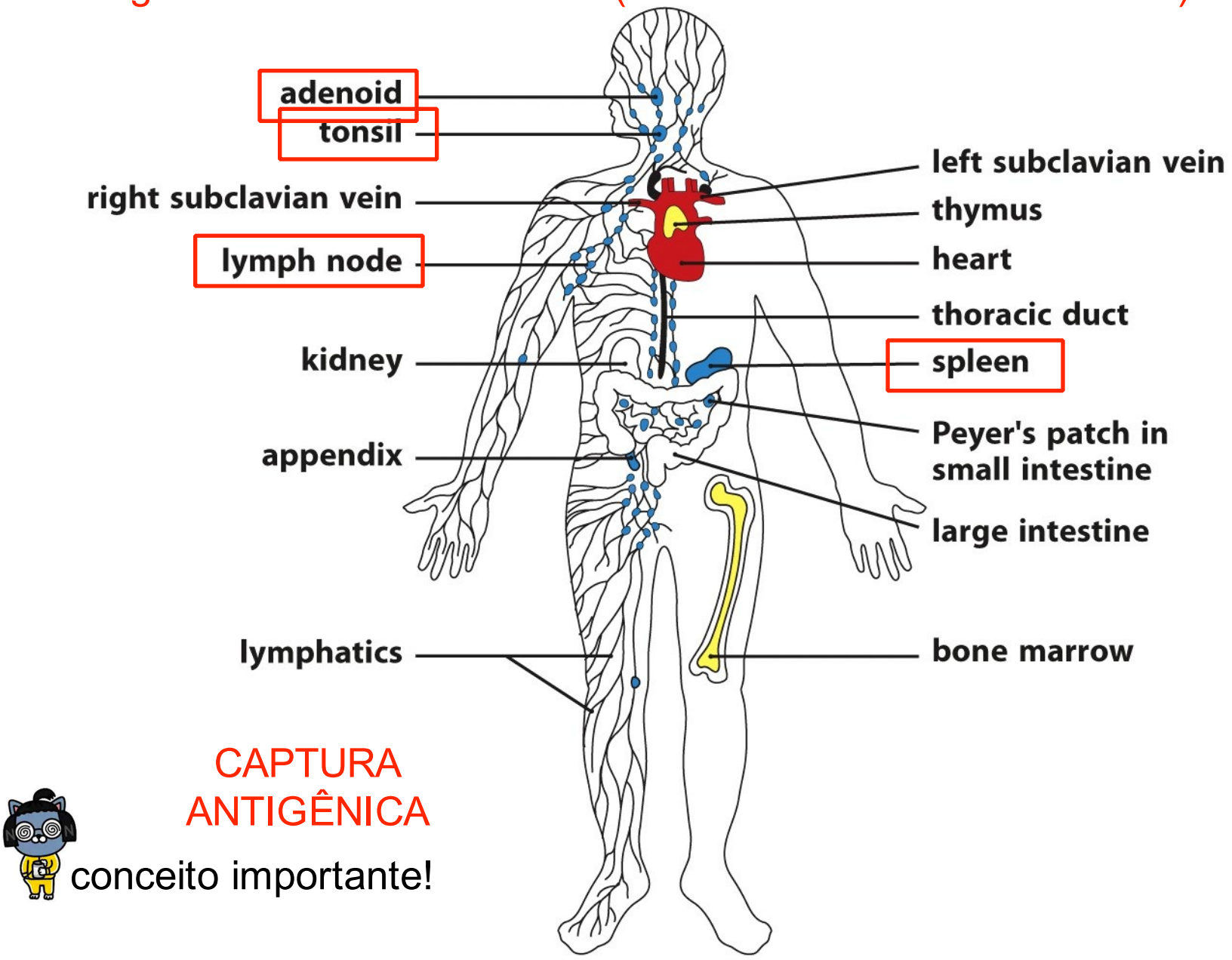


FIGURE 10-8A Structure of the two different types of Peyer's patch (PP) in sheep. **A,** An ileal PP at age 8 weeks. **B,** A PP from the jejunum, also at 8 weeks. Original magnification ×32.

(From Reynolds JD, Morris B: *Eur J Immunol* 13:631, 1983.)


PLAYTIME
RULES
SHARE YOUR TOYS
MAKE NEW FRIENDS
TAKE TURNS
LAUGH AND GIGGLE
TIDY UP AFTER YOURSELF
PLAY FUN GAMES
SAY PLEASE AND THANK YOU
NO FIGHTING
BE NICE TO EACH OTHER
HAVE FUN!

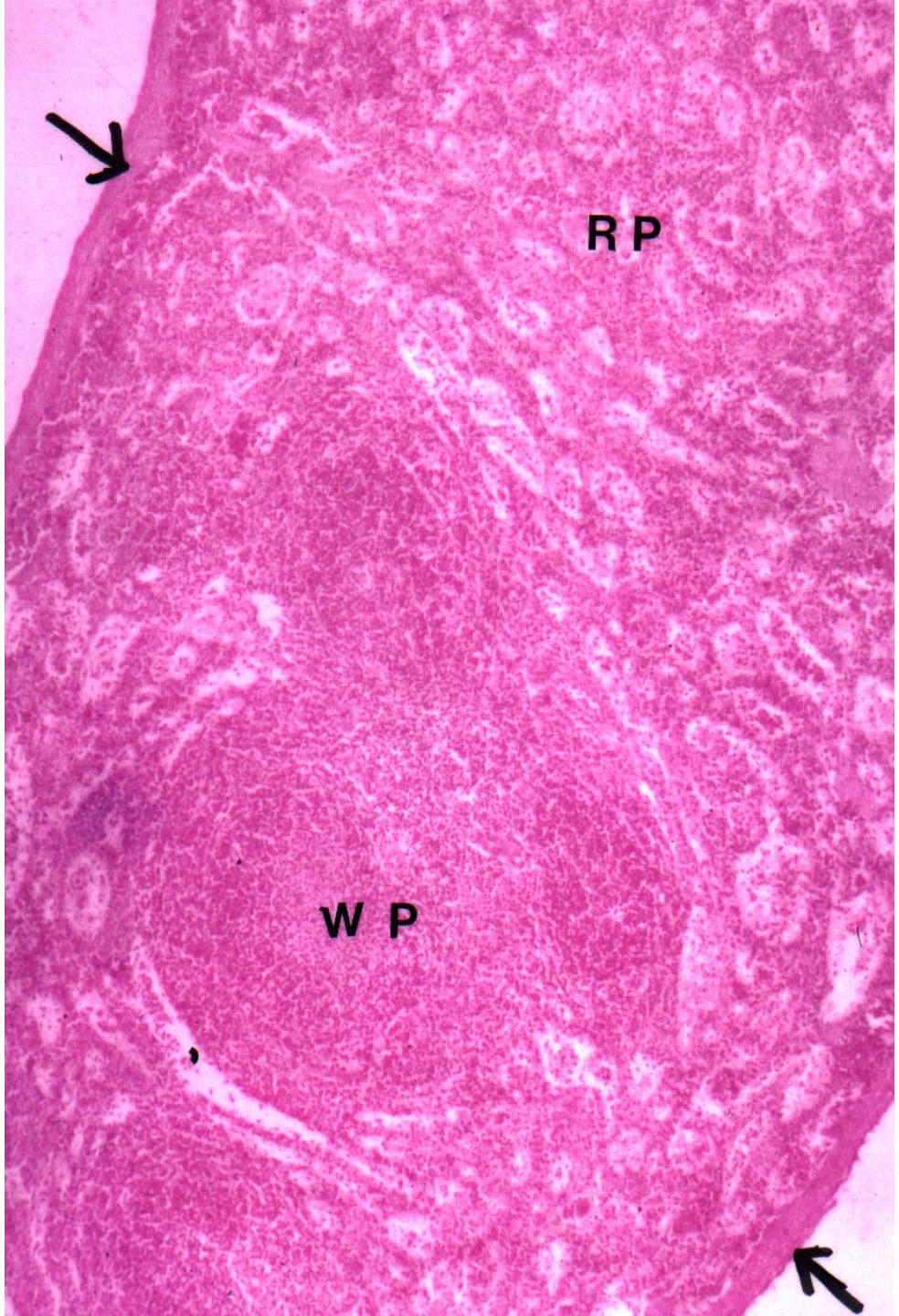
Orgãos linfóides secundários (maioria dos mamíferos adultos)



CAPTURA ANTIGÊNICA

conceito importante!

Figure 1.8 Janeway's Immunobiology, 8ed. (© Garland Science 2012)



O tecido linfóide **secundário** coordena as respostas imunes ao proporcionar **organização espacial** para as **interações** entre linfócitos e células apresentadoras de antígenos (macrófagos, células dendríticas e linfócitos B).

RP

O tecido linfóide **secundário**

baladas

A lymph node

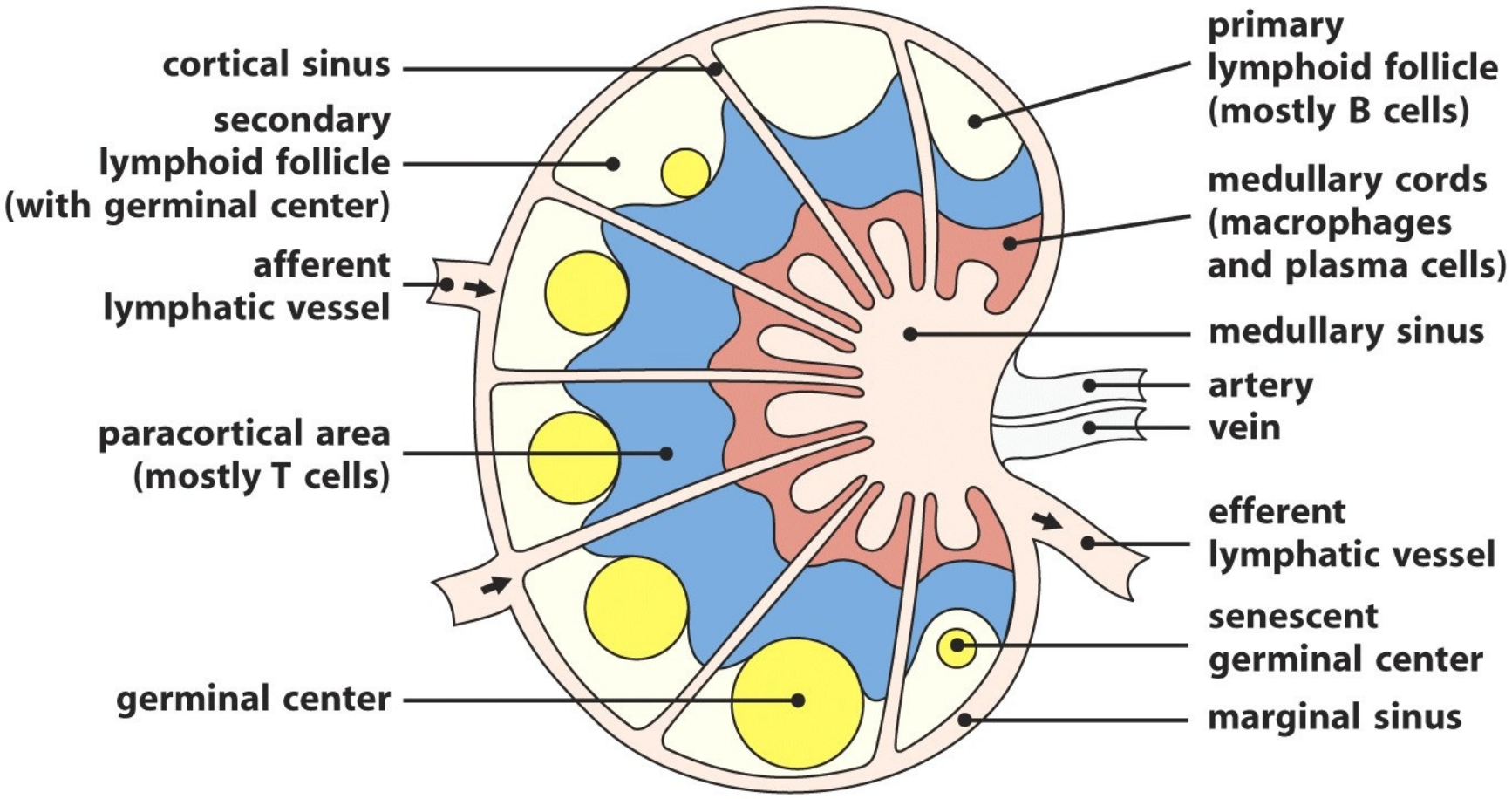


Figure 1.18 part 1 of 2 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

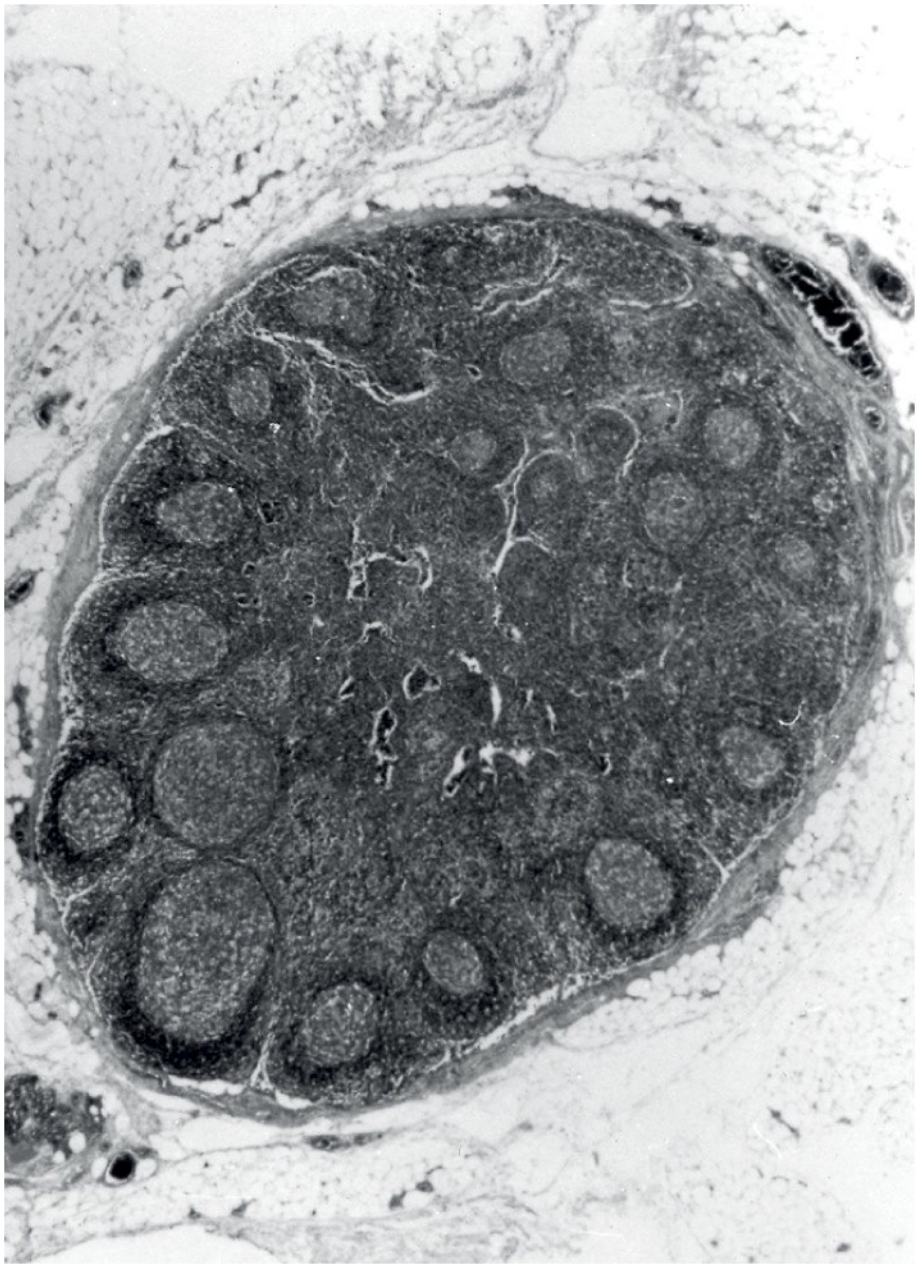


Figure 1.18 part 2 of 2 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

Estrutura do linfonodo de suínos, hipopótamos, rinocerontes e golfinhos

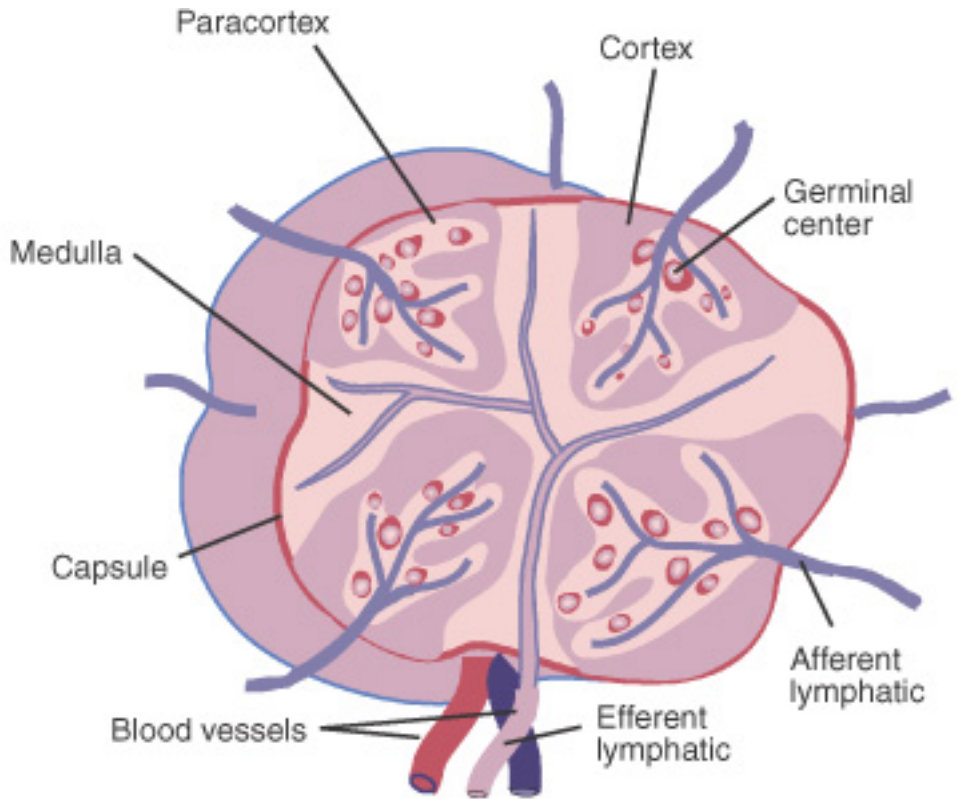


FIGURE 10-17 Structure of a pig lymph node. Compare this with Figure 10-18.

The spleen

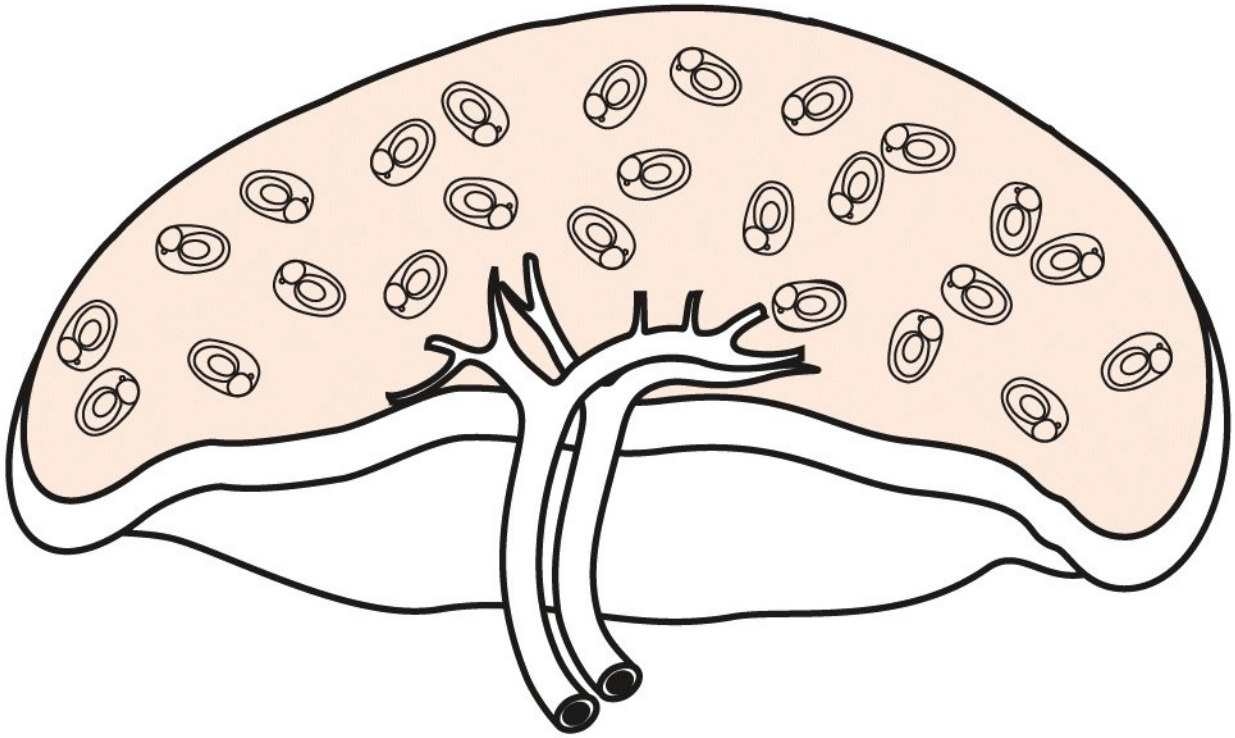


Figure 1.19 part 1 of 3 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

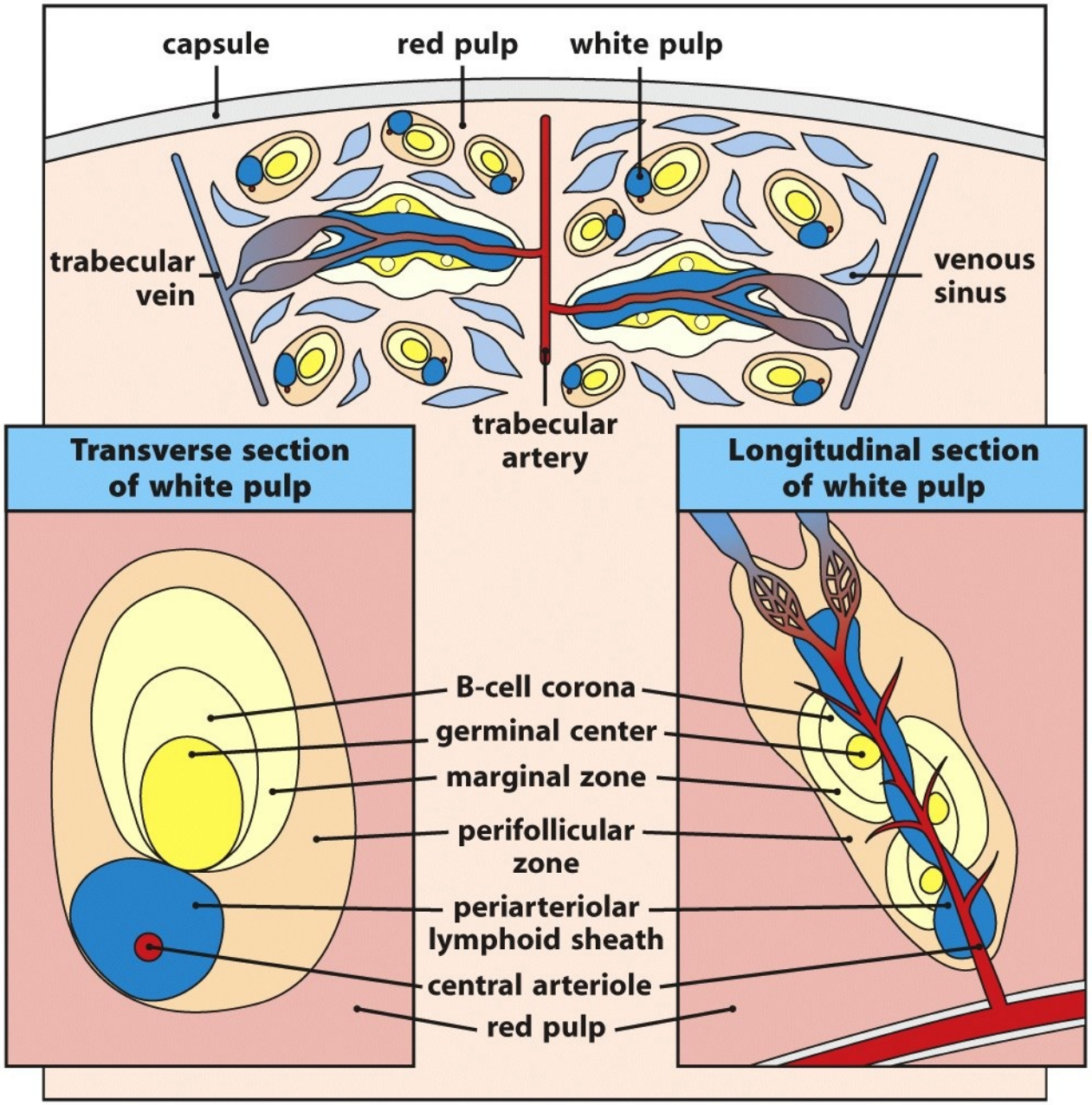


Figure 1.19 part 2 of 3 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

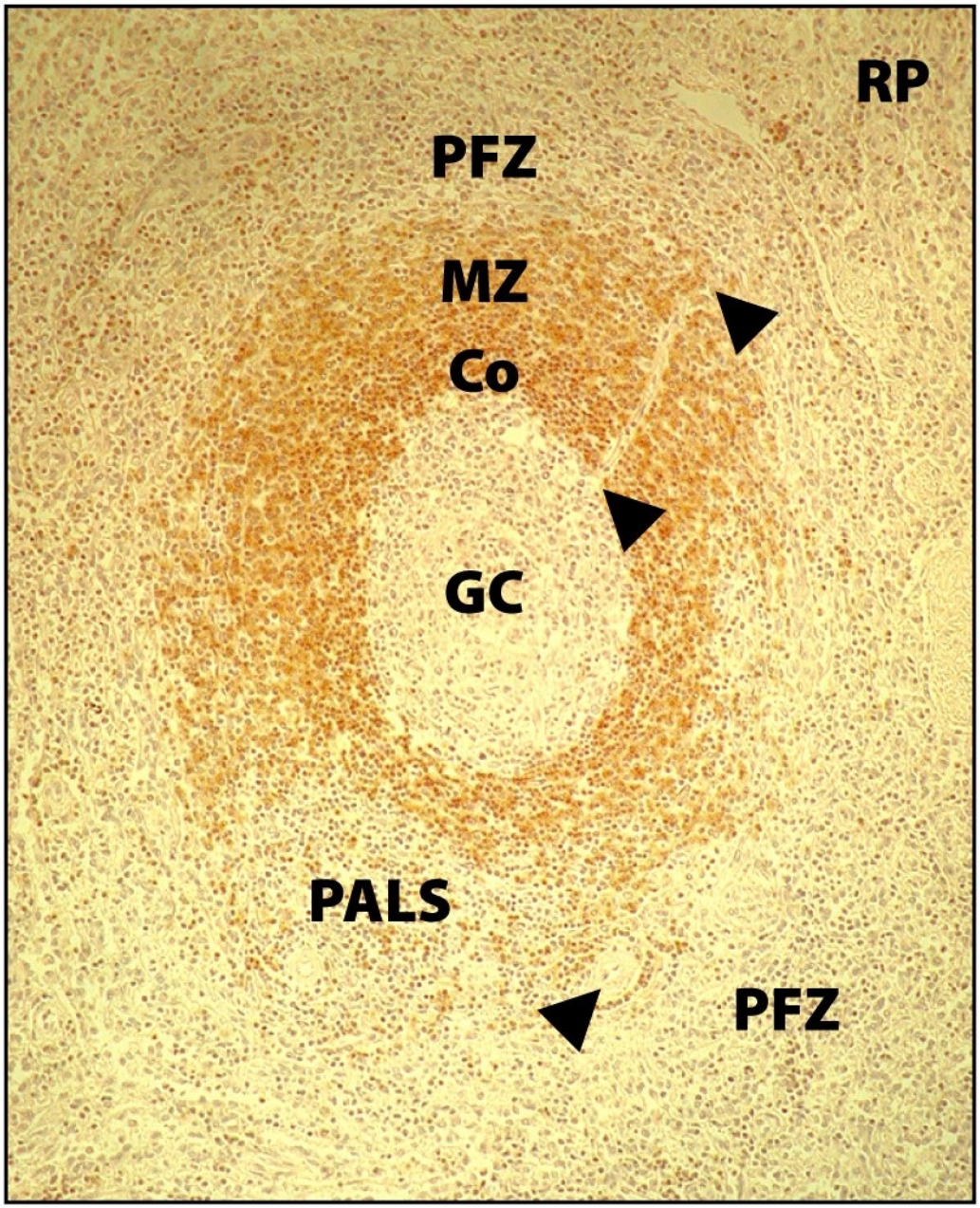
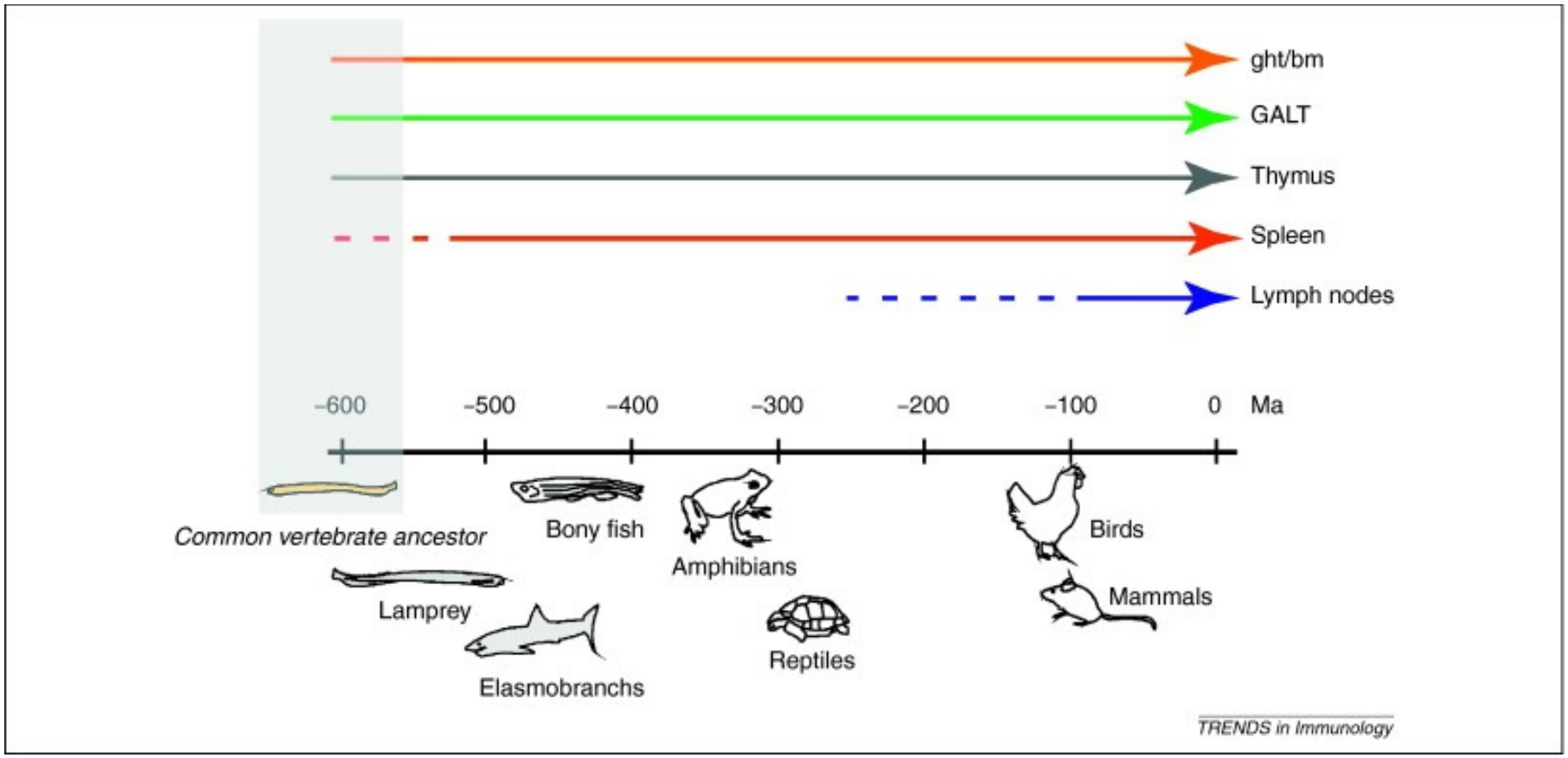


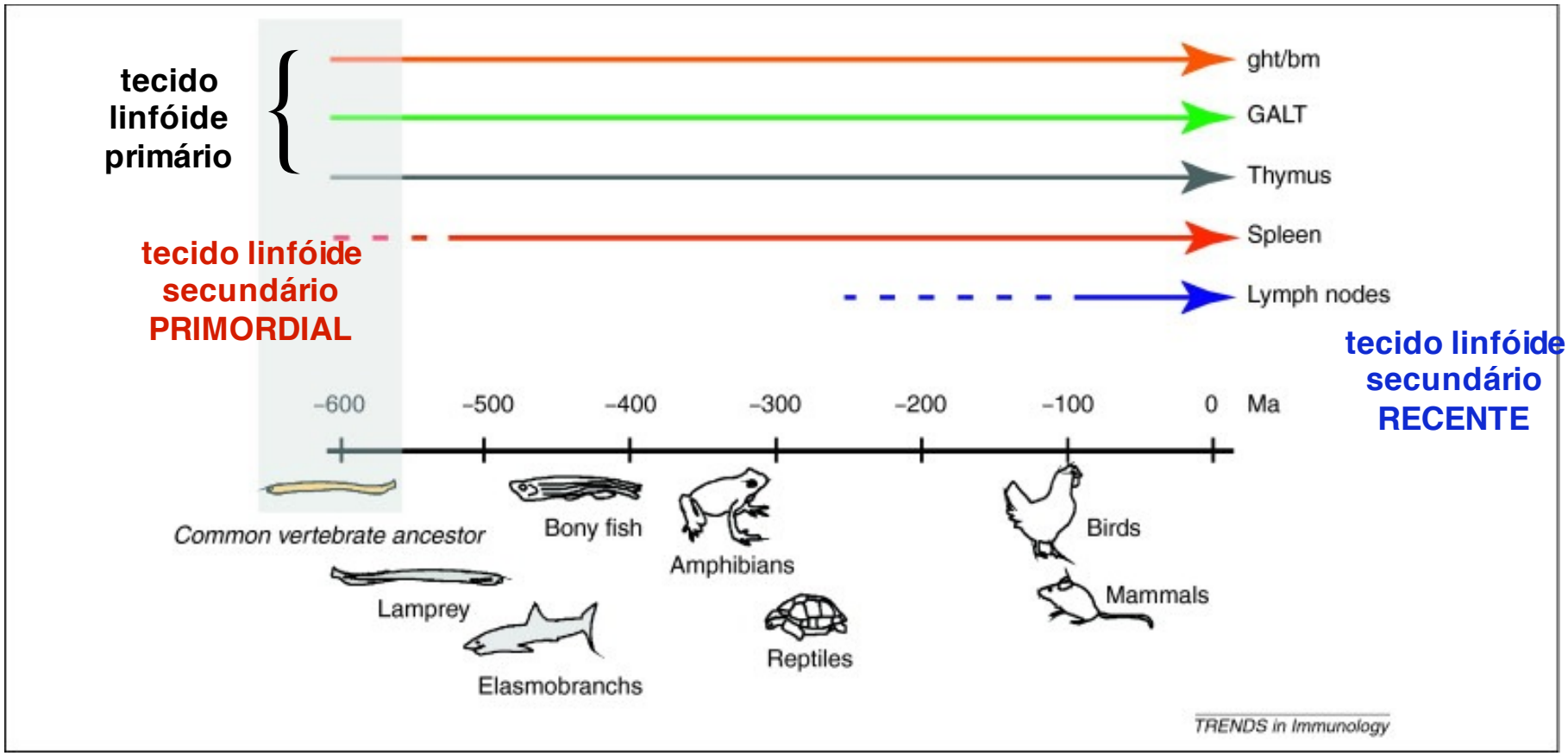
Figure 1.19 part 3 of 3 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

Se olharmos o baço ao longo da evolução, suas funções de homeostasia das células hematopoiéticas ANTECEDEM suas funções imunológicas



Thomas Boehm, Isabell Hess, Jeremy B. Swann
Evolution of lymphoid tissues

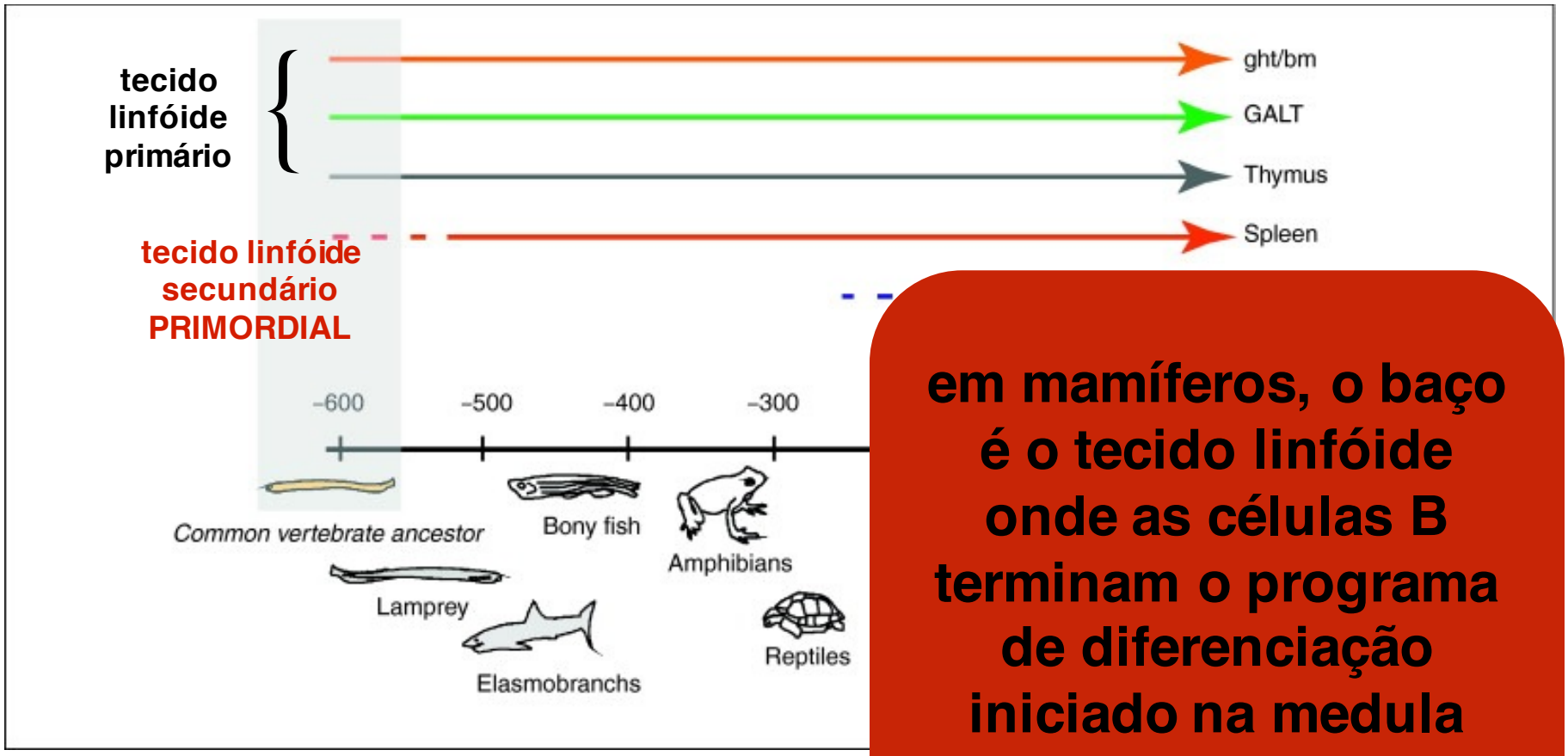
Se olharmos o baço ao longo da evolução, suas funções de homeostasia das células hematopoiéticas ANTECEDEM suas funções imunológicas



Thomas Boehm, Isabell Hess, Jeremy B. Swann
Evolution of lymphoid tissues

conceito importante!

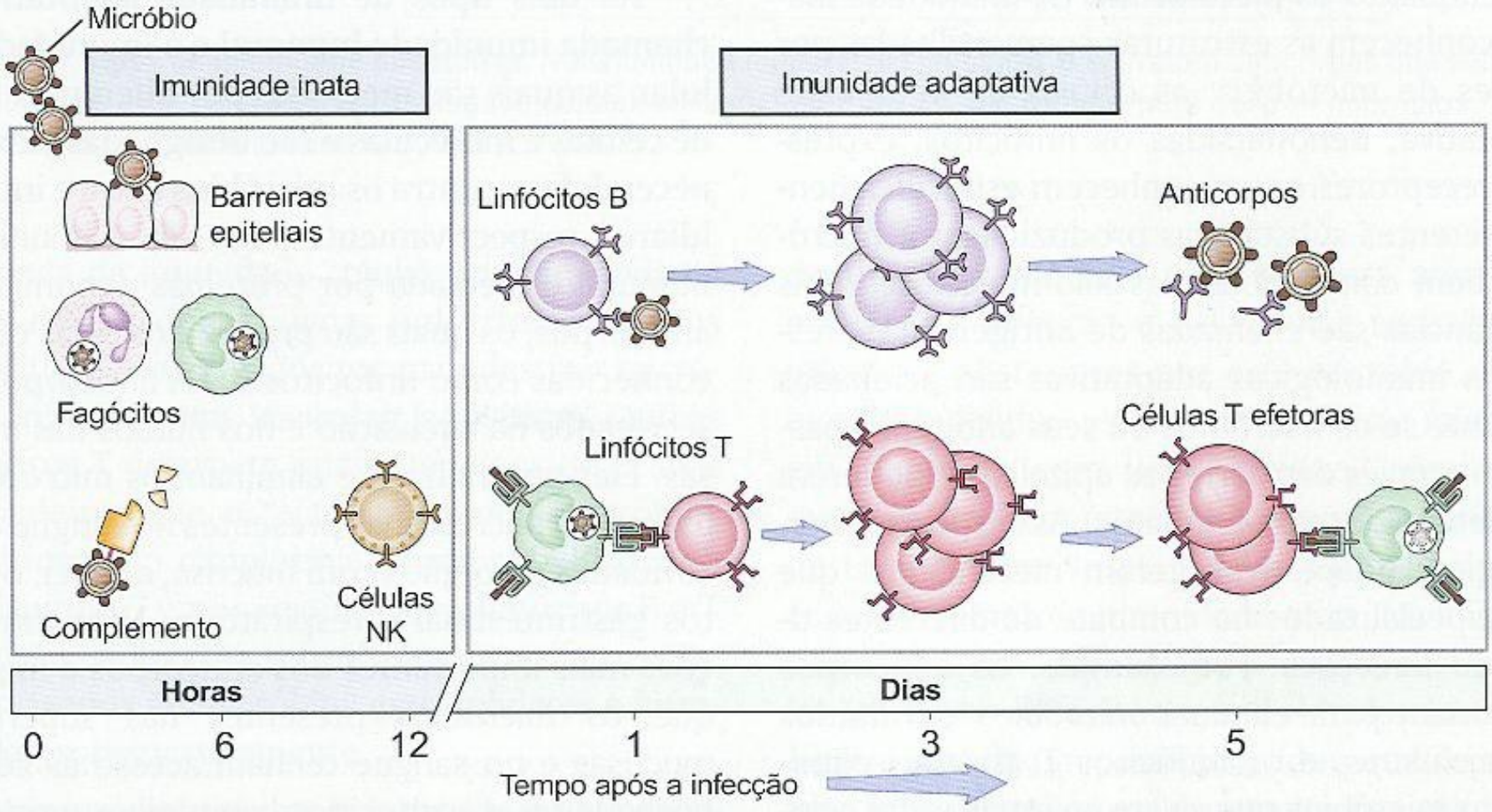
Se olharmos o baço ao longo da evolução, suas funções de homeostasia das células hematopoiéticas ANTECEDEM suas funções imunológicas



em mamíferos, o baço é o tecido linfóide onde as células B terminam o programa de diferenciação iniciado na medula óssea

Thomas Boehm, Isabell Hess, Jeremy B. Swann
Evolution of lymphoid tissues

conceito importante!



conceito importante!

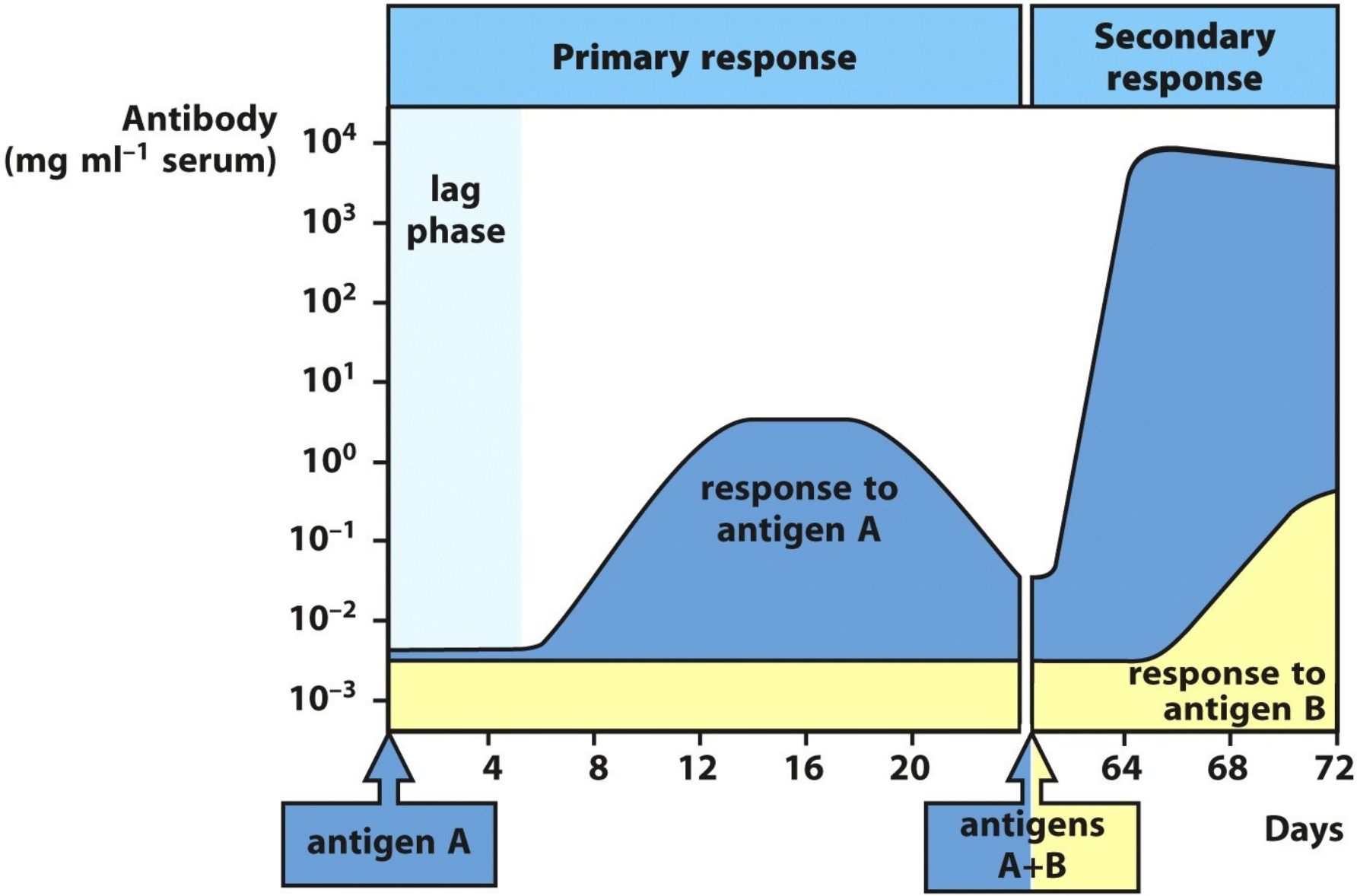


Figure 1.23 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

Phases of the immune response			
Response		**Typical time after infection to start of response**	**Duration of response**
Innate immune response	**Inflammation, complement activation, phagocytosis and destruction of pathogen**	**Minutes**	**Days**
Adaptive immune response	**Interaction between antigen-presenting dendritic cells and antigen-specific T cells: recognition of antigen, adhesion, co-stimulation, T-cell proliferation and differentiation**	**Hours**	**Days**
	Activation of antigen-specific B cells	**Hours**	**Days**
	Formation of effector and memory T cells	**Days**	**Weeks**
	Interaction of T cells with B cells, formation of germinal centers. Formation of effector B cells (plasma cells) and memory B cells. Production of antibody	**Days**	**Weeks**
	Emigration of effector lymphocytes from peripheral lymphoid organs	**A few days**	**Weeks**
	Effector cells and antibodies eliminate the pathogen	**A few days**	**Weeks**
Immunological memory	**Maintenance of memory B cells and T cells and high serum or mucosal antibody levels. Protection against reinfection**	**Days to weeks**	**Can be lifelong**

Figure 1.34 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

conceito importante!

Não confundir

tecido linfóide primário e secundário

com

resposta primária e secundária

com

imunidade inata e adaptativa

conceito importante!

Não confundir

tecido linfóide primário e secundário

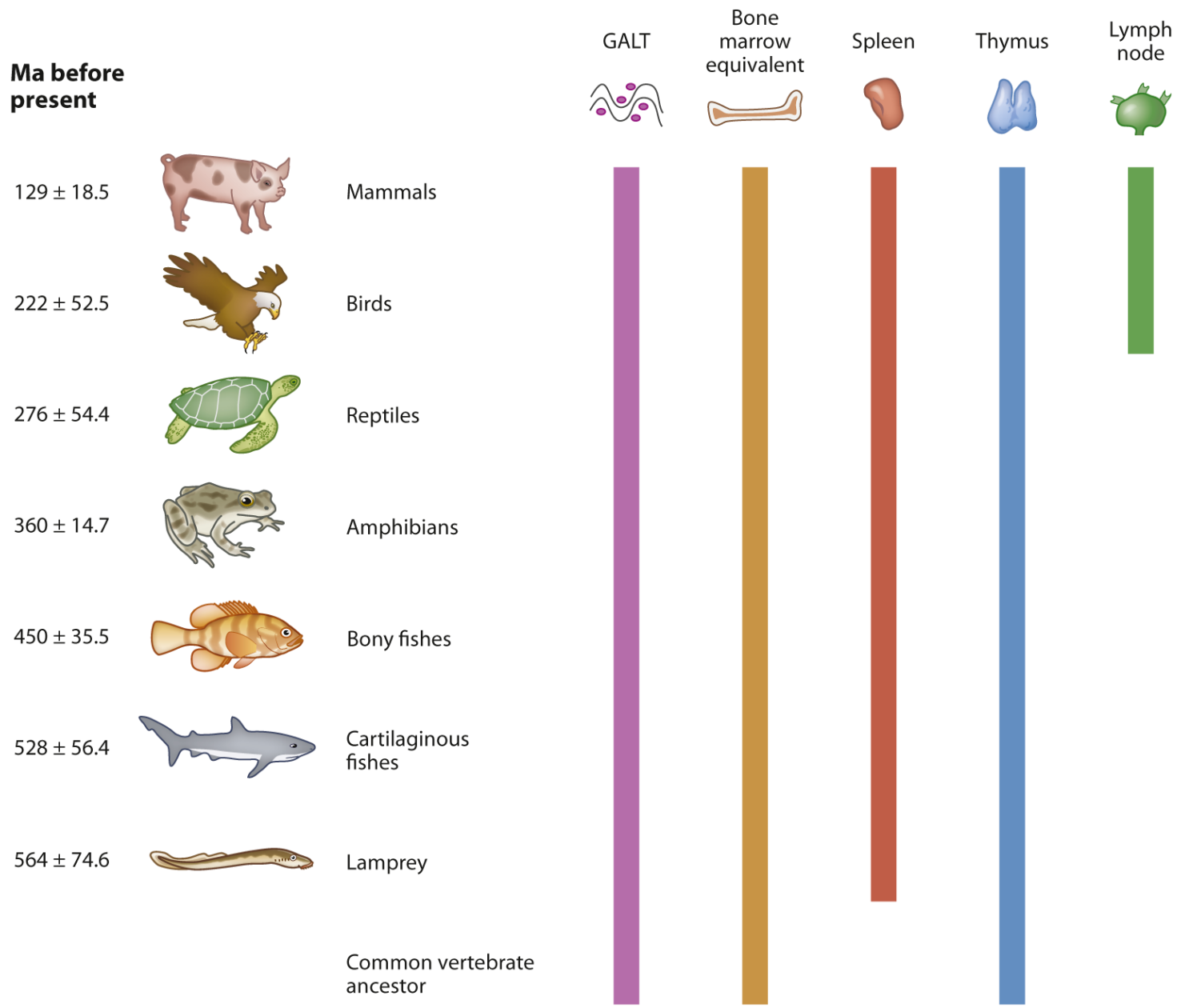
com

resposta primária e secundária

com

imunidade inata e adaptativa

conceito importante!



Boehm T, Swann JB. 2014.
Annu. Rev. Anim. Biosci. 2:259–283

The immune system protects against four classes of pathogens

Type of pathogen	Examples	Diseases
Extracellular bacteria, parasites, fungi	*Streptococcus pneumoniae* *Clostridium tetani* *Trypanosoma brucei* *Pneumocystis carinii*	Pneumonia Tetanus Sleeping sickness *Pneumocystis* pneumonia
Intracellular bacteria, parasites	*Mycobacterium leprae* *Leishmania donovani* *Plasmodium falciparum*	Leprosy Leishmaniasis Malaria
Viruses (intracellular)	Variola Influenza Varicella	Smallpox Flu Chickenpox
Parasitic worms (extracellular)	*Ascaris* *Schistosoma*	Ascariasis Schistosomiasis

Figure 1.24 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

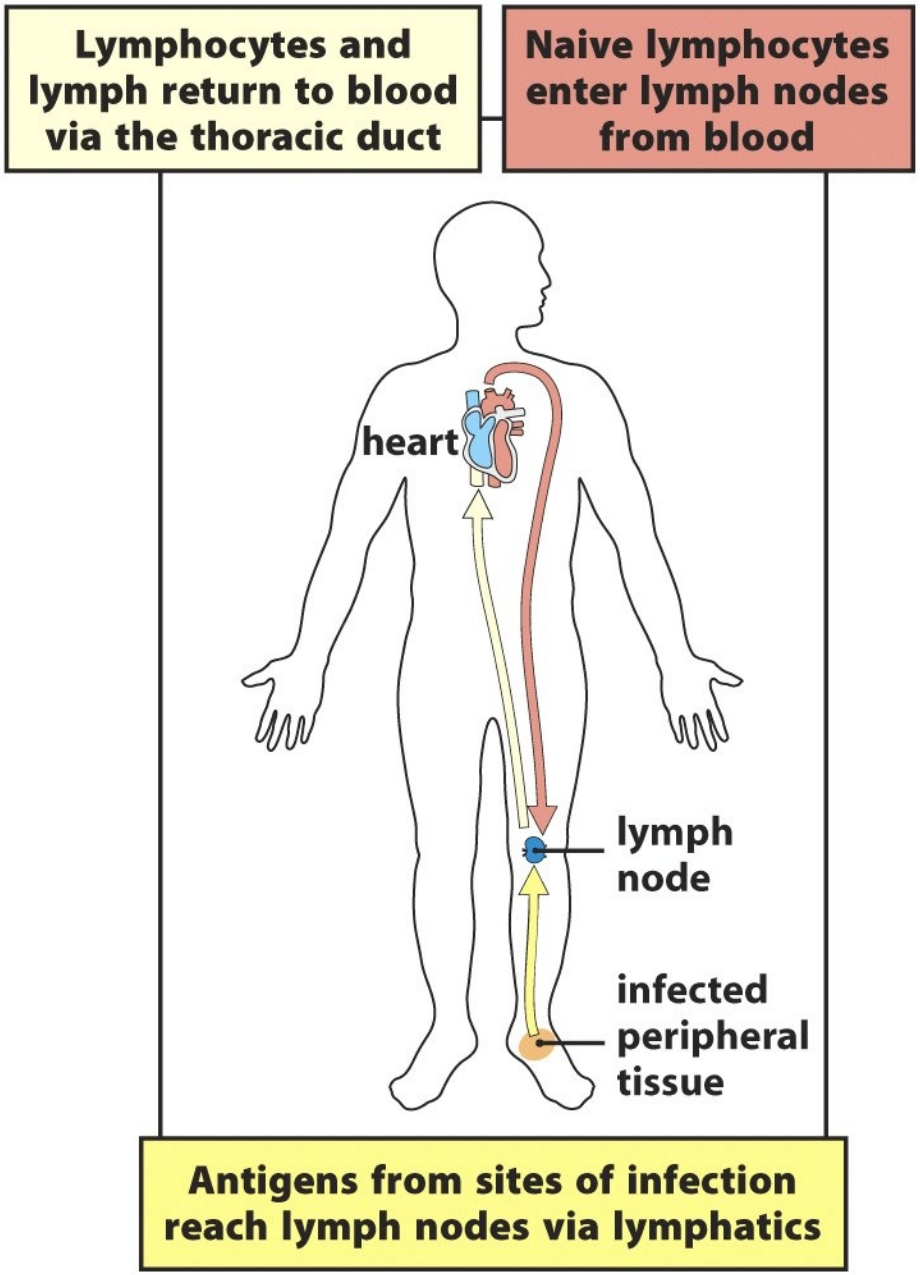


Figure 1.17 Janeway's Immunobiology, 8ed. (© Garland Science 2012)