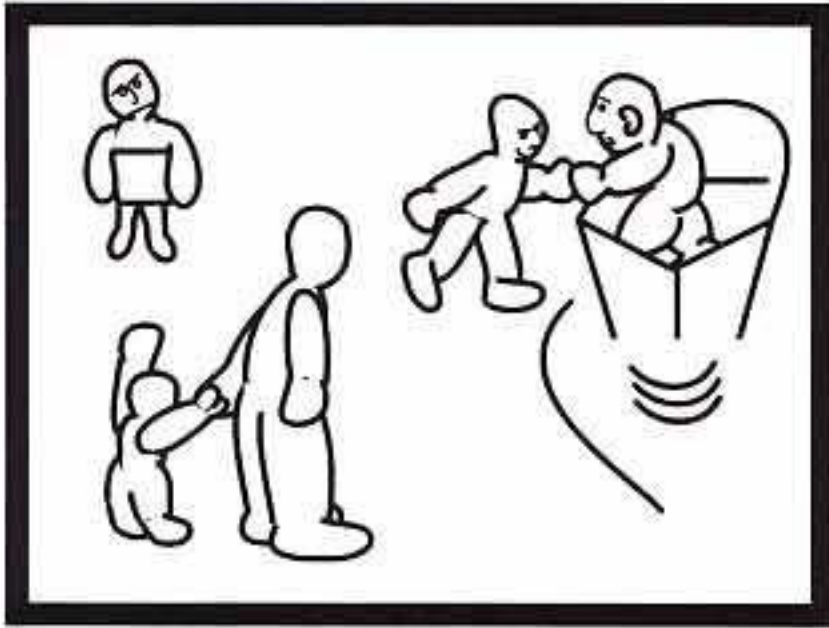


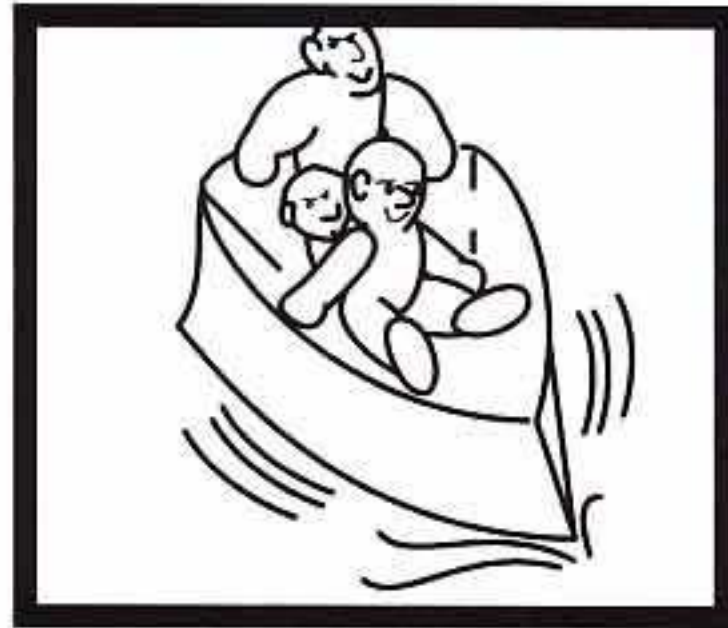
CHAPTER FIVE

THE THYMUS GLAND

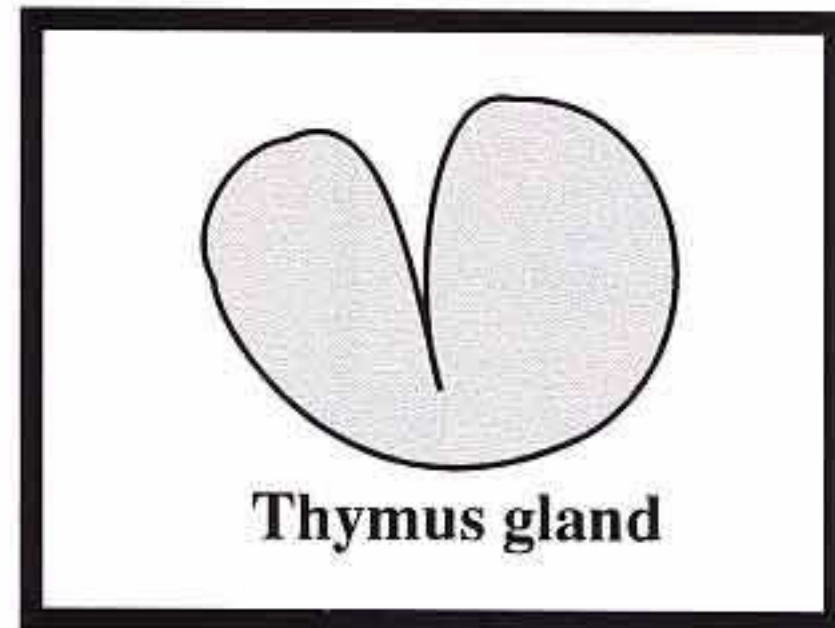
BABY T CELLS GROW UP IN THE THYMUS GLAND



To mature, all baby T cells must leave the bone marrow for the thymus gland.



To get there, they travel via the blood.



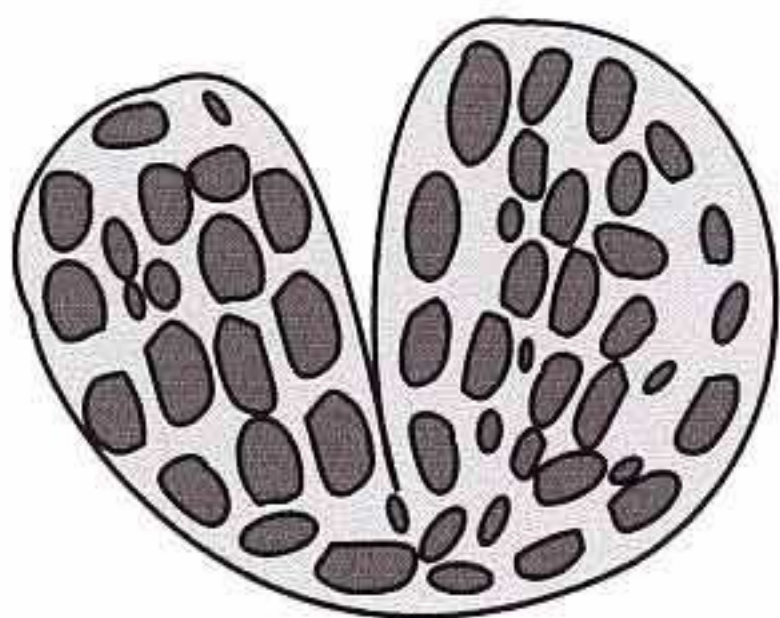
Maturation then occurs in one of the thymus gland's many lobules.



Easy reading



Technical information

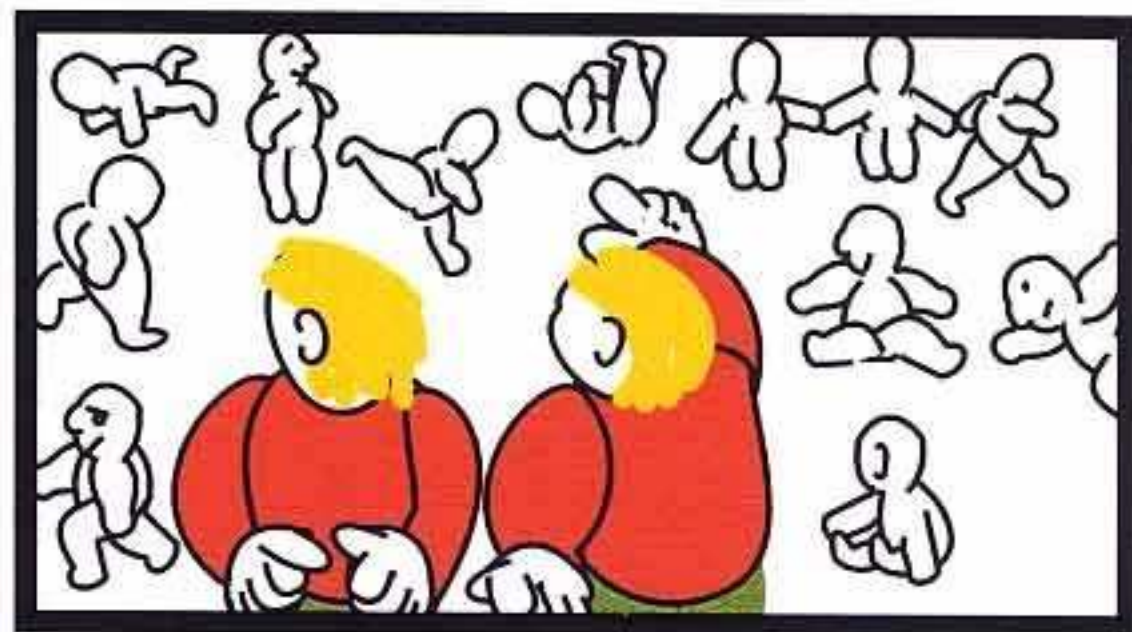
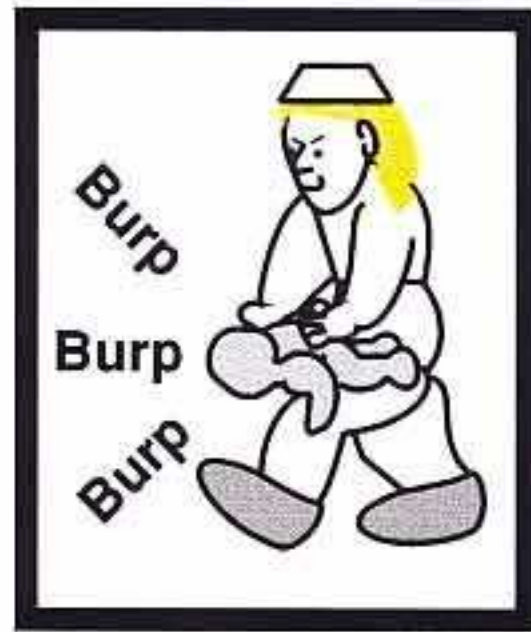


The thymus is made up of many lobules.

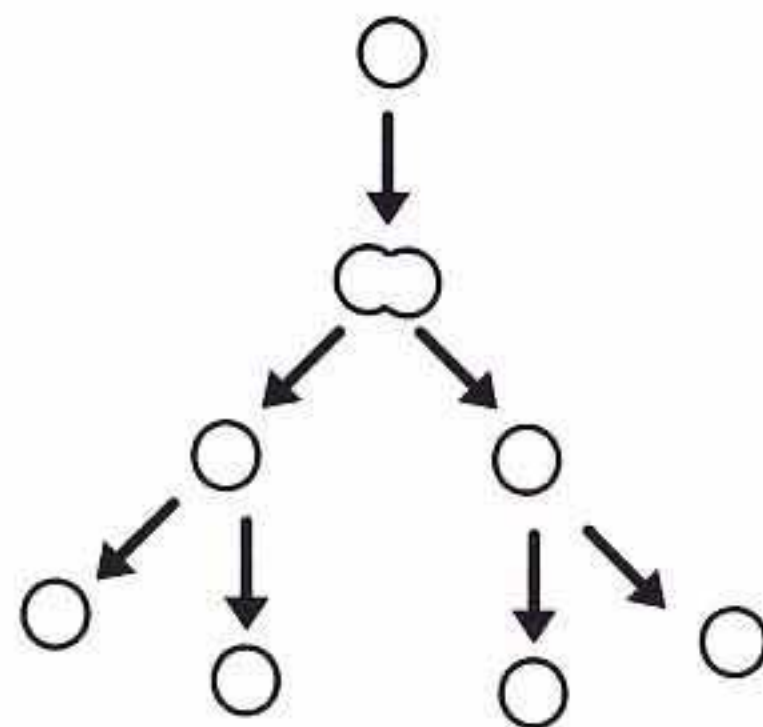


Each lobule has an inner medulla and an outer cortex.

INSIDE THE CORTEX OF A LOBULE

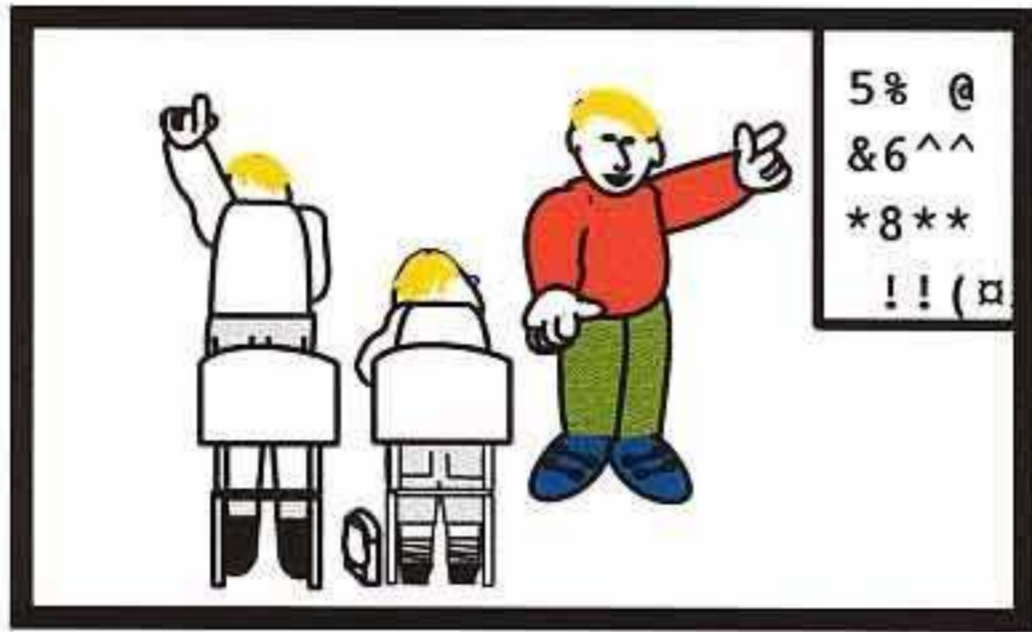


Resident nurse cells and macrophages, encourage the young T cells to grow and develop.



Before a young T cell matures, it will first replicate itself.

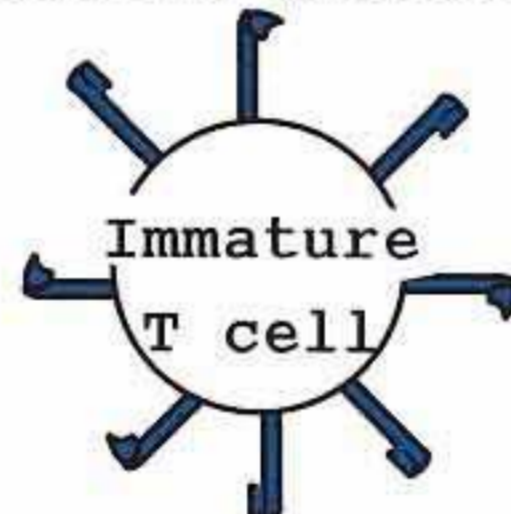
THYMIC EDUCATION



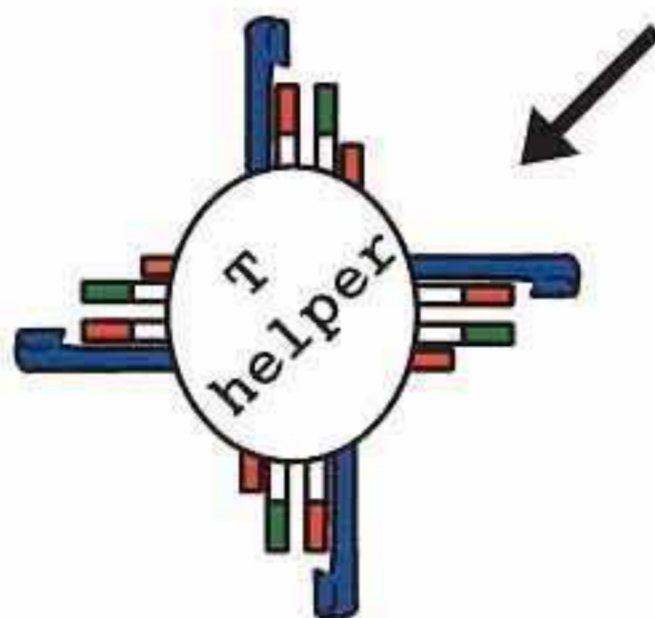
The time spent in the thymus by a T cell, is called "thymic education".

Any T cell which fails to fully develop, is killed off.

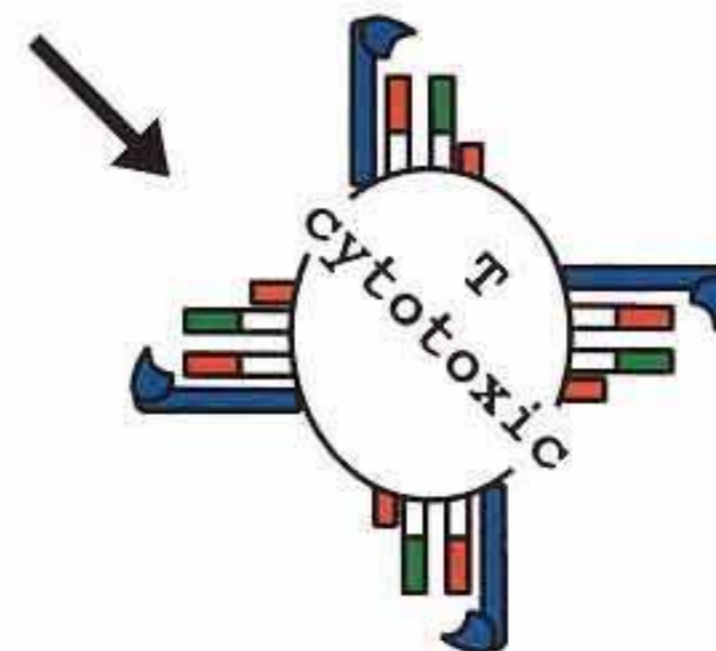
POSITIVE SELECTION



The immature T cell expresses both CD4 and CD8 molecules.



A mature T helper loses its CD8 molecules, but gains CD3 and Ti molecules.



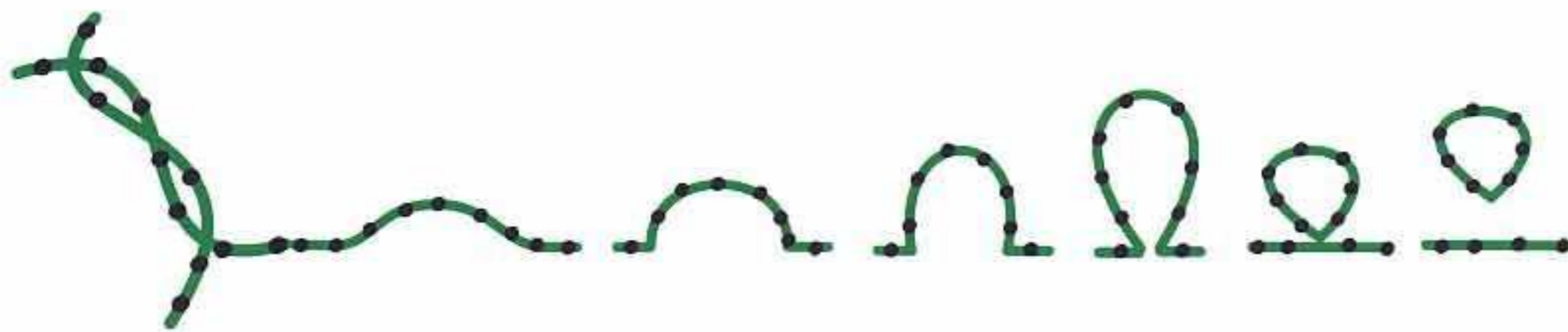
A mature T cytotoxic cell loses its CD4 molecules, but gains CD3 and Ti molecules.



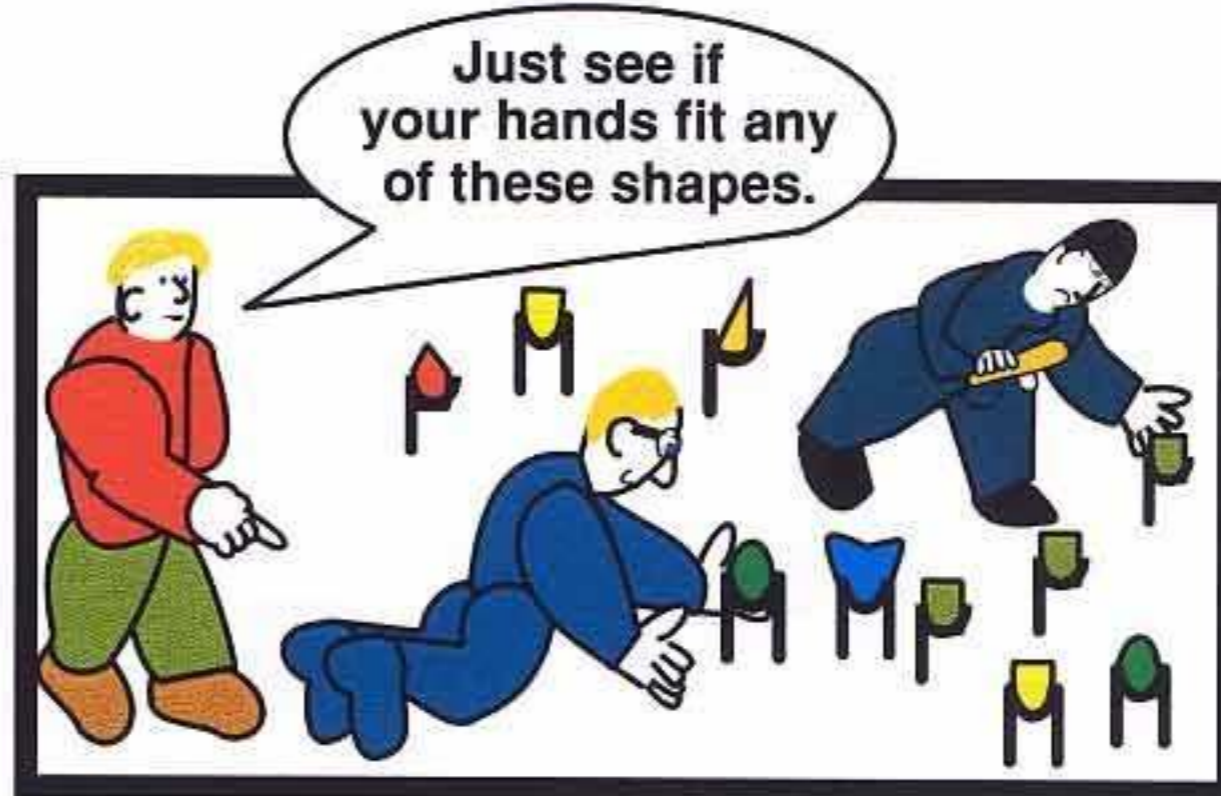
As each T cell develops into either a T helper or a T cytotoxic cell, it also acquires a unique fixed 'hand' shape.

The mature T cell's unique 'hand' shape was featured on pages 84 and 114.

INSIDE THE IMMATURE T CELL



Genes coding for an immature T cell's 'hand' shape, undergo random gene rearrangement (ie small lengths of DNA are removed). So although there are millions of T cells, each has a unique fixed 'hand' (Ti) shape.

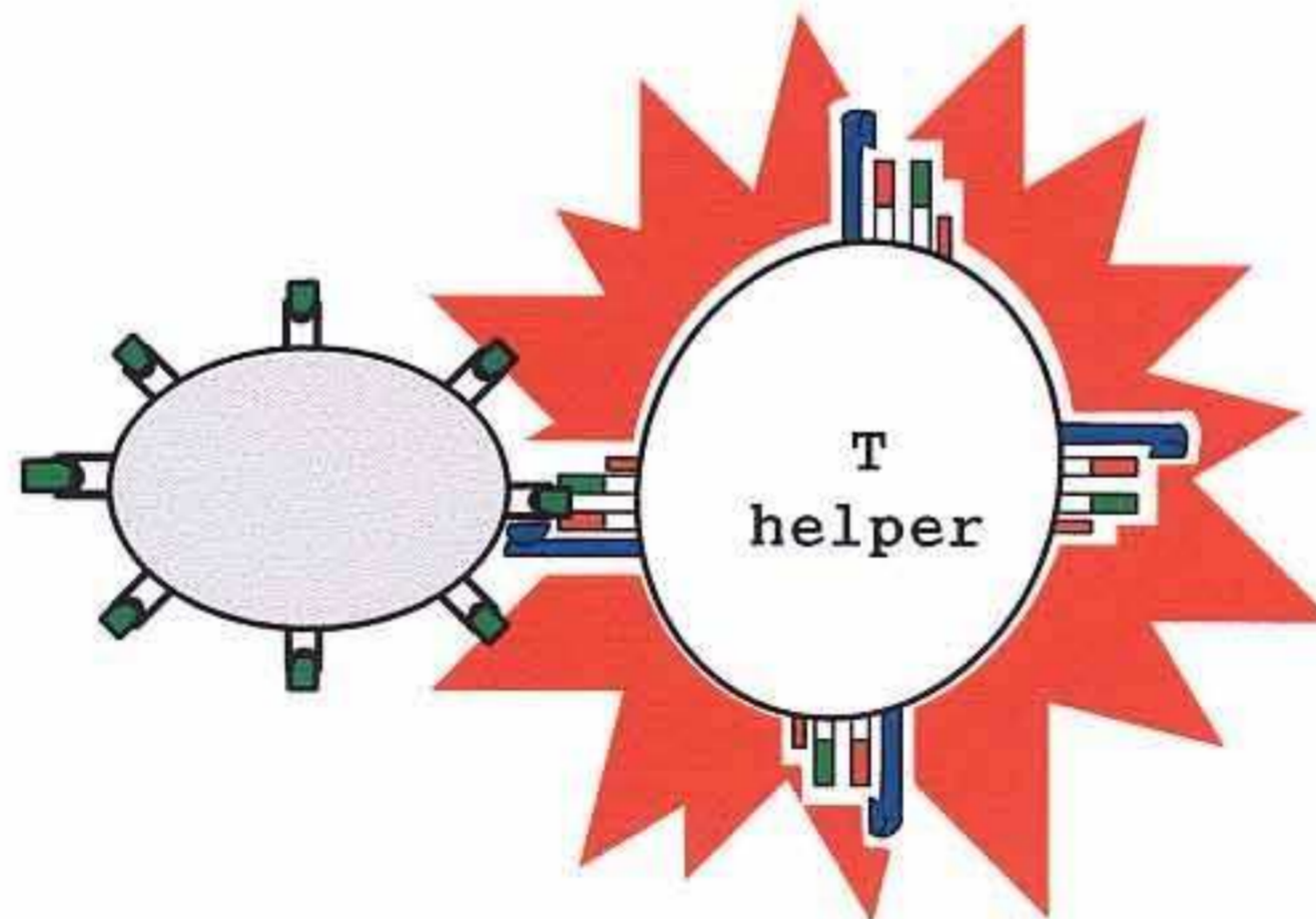


But before a mature T cell can leave the thymus gland, it must undergo negative selection.

95% OF ALL T CELLS IN THE THYMUS WILL DIE



NEGATIVE SELECTION



Once they are fully developed, T cells are exposed to 'attack' and 'defence' proteins, holding pieces of protein belonging to the host. If their 'hands' fit, like the T helper above, they will die.



T cells whose 'hands' do not fit anything, leave the cortex and enter the lobule's medulla.



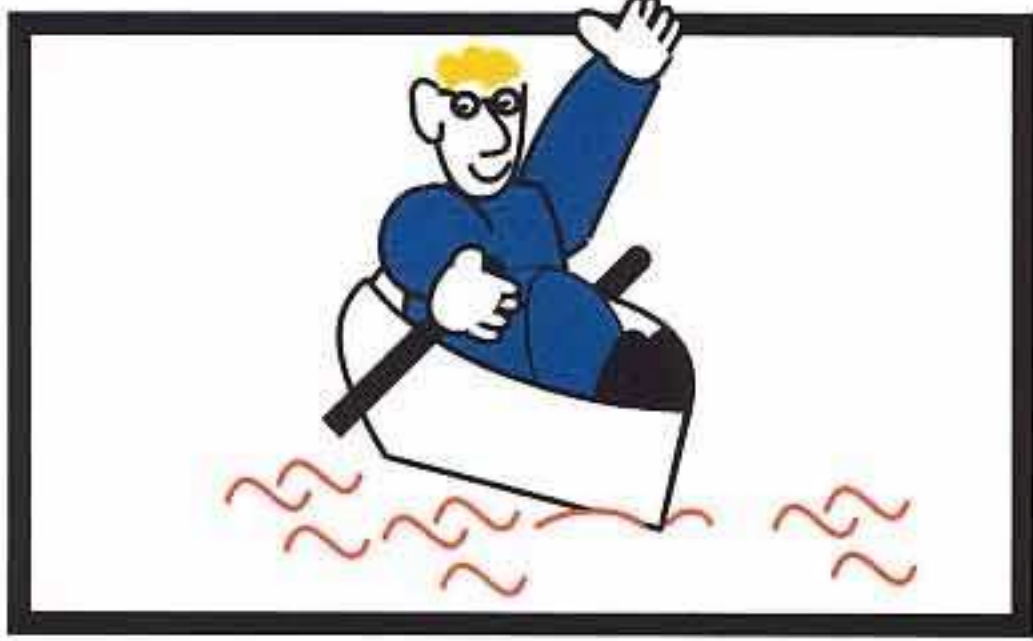
From the medulla, they will pass out into the blood, to start their life's work.

The T cell receptor must only be able to attach onto:-

Foreign protein + 'attack' protein (see page 85).

OR

Foreign protein + 'defence' protein (see page 115).



T helper lymphocytes are sometimes called "CD4" or "T4" cells.



T cytotoxic lymphocytes can be referred to as "CD8" or "T8" cells.

Both these cells will now live for years.



Lymphocytes have a large nucleus.

B lymphocytes are so called, because they were first discovered in the bursa of Fabricus, in birds.

T lymphocytes must mature in the thymus gland, hence they acquired the title of T cells.