

# **Fish Farm Construction and Maintenance**

**(Paper VI Applied Zoology 1008E2)**

**By**

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# Introduction

## Aquaculture

- It refers to the **cultivation of aquatic organisms in controlled or semi controlled aquatic environments** for commercial, recreational or human purpose.
- In aquaculture the **breeding, rearing and harvesting animals and plants** takes place in all aquatic environment like ponds, rivers, lakes, the ocean etc.

# Why is it important?

**The overfishing from natural resources is continuously increasing and human need alternate sources to feed the growing population on earth.**

## Other purposes includes:

- To protect threatened and endangered species
- Habitat restoration
- Wild stock enhancement
- Production of baitfish
- Fish culture for zoos and aquariums

- **Marine aquaculture** refers specifically to the culturing of oceanic species.

- Ex. **oysters, clams, mussels, shrimp, salmon and algae etc.**

- **Freshwater aquaculture** refers specifically to the culturing of freshwater species

- Ex. **Carps, trout, catfish, tilapia etc.**

# Fish pond construction

## Why land Survey?

- **Land survey is essential to find out determine soil topography.**
- **The first step in the construction of a fish pond is to make area of proposed pond.**
- **The natural slope where the main wall is to be built should be ascertained.**

## **a. Site Selection**

- **The site selection is most important factors for the success of fish farm.**
- **The water retention capacity of the soil and the soil fertility influence the productivity of farm pond.**
- **The selected site should have adequate water supply throughout they ear.**
- **The pond construction has to be based on the topographic area of land.**
- **The self-draining ponds are ideal for higher elevation areas.**
- **The site should be easily accessible by road.**
- **The site should be free from pollution, industrial waste, domestic waste and any other harmful activities.**

## **b. Ecological, biological, social and economical factors**

### **1. The ecological factors includes**

#### **Soil**

- ✓ **The soil quality influences the pond productivity and determines the dyke construction.**
- ✓ **The properties of soil texture and soil permeability are determined to decide the suitability of a site.**
- ✓ **Pond bottom should have the ability to hold the water.**
- ✓ **Loamy, clay loamy and silt clay soil types are most suitable for pond construction.**
- ✓ **In good quality soil- gravel should not exceed 10 percent.**
- ✓ **The rocky, sandy, gravel and limestone soil types are to be avoided.**

## 2. Water

- ❑ An adequate amount of water is required to build the fish farm
- ❑ Natural water bodies such as reservoir, river, and lakes have stable water quality parameters  
(Water temperature, dissolved oxygen, pH, alkalinity and water hardness)
- ❑ The site should be away from the flood area.
- ❑ Water should not be acidic or alkaline and if found to be so, suitable correction is to be done
- ❑ The ideal water temperature is 20 – 30°C for a fish farm.

## 3. Topography

- ✓ Normally, flood prone areas and poor rainfall areas need to be avoided.
- ✓ Areas such as industrial zones, fields with underground oil pipelines, irregular land area, fields with high electricity poles and radio masts and highly rooted vegetation area are also not recommended for pond construction

## 4. Biological factors

- ✓ Biological factors include the species to be cultured, seed source and culture type and they need to be considered before site selection of farm.



## **c. Economic factors**

- ❑ The services directly or indirectly linked with aquaculture sector such as transportation, storage, wholesale market aspects etc are to be considered.**
- ❑ The land identified for farm should be without legal issues and fish farming should be accepted by the local people.**
- ❑ Other factors include availability of labour, electricity, medical facilities and transportation.**

**Thank You**

# **FISH FARM CONSTRUCTION AND MAINTENANCE**

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# INTRODUCTION

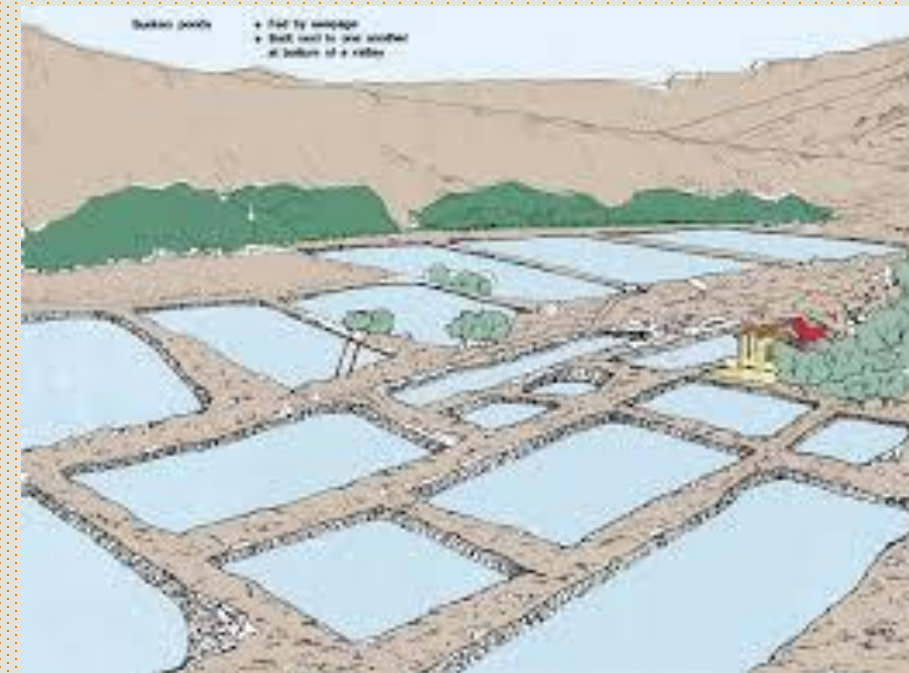
- **A fish culture required different types of ponds for rearing of fish.**

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- **The design of fish farm, number and size of the ponds depends on the species of the fish to be cultured.**
- **The primary consideration in constructing a fish farm is the site which has to be selected on the basis of soil , water and drainage.**

## **TYPE OF PONDS-** On the basis of the local land topography.

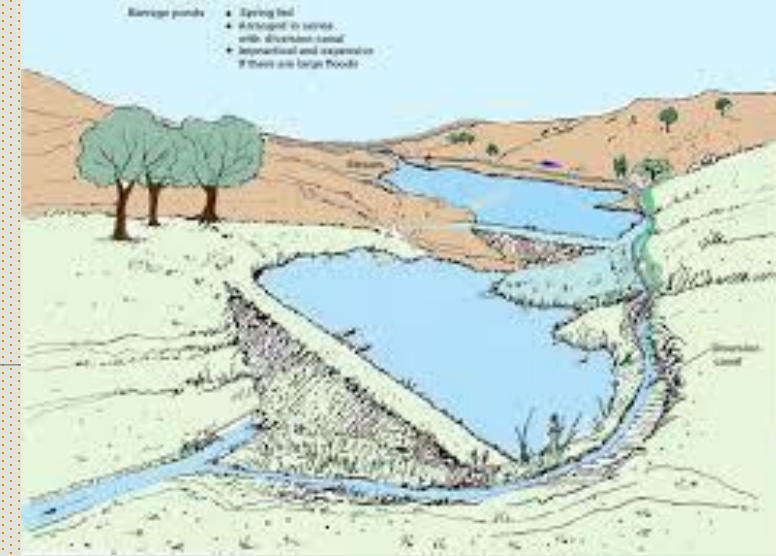
### **Sunken Pond:**

- **The pond floor is below the level of the surrounding land**
- **Directly fed by groundwater or rainfall**
- **Undrainable or only partially drainable**

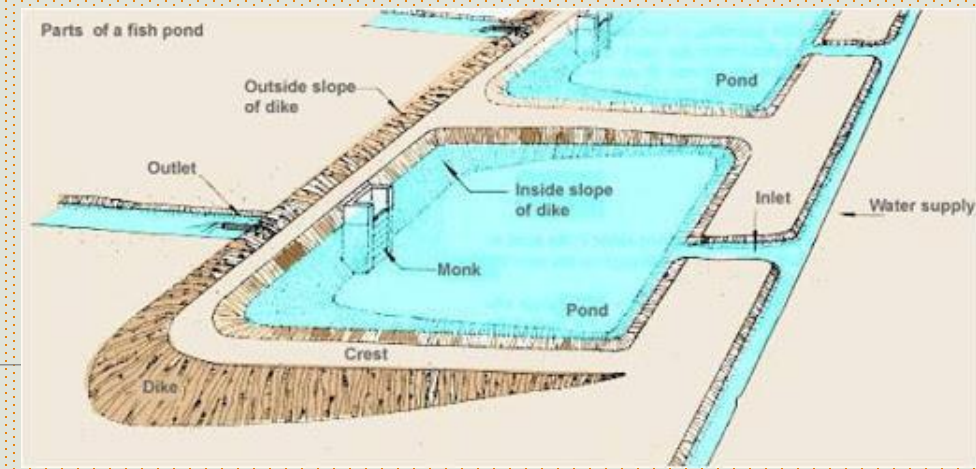


## Barrage Pond:

- They are created in the bottom of a valley.
- Building a dam across the lower end of the valley.
- It is drainable.
- The excess water is normally diverted around one side of the pond to keep the level in the pond constant.
- Directly fed from a nearby spring, stream or reservoir.
- To protect the dike from floods a spill way should be built.



# Divergent Pond



- ❑ It fed by pumping through a diversion canal from a spring, stream, lake or reservoir.
- ❑ There is an inlet and an outlet for each pond.
- ❑ 2. It is constructed: either on sloping ground or on flat ground.
- ❑ 3. It is usually drainable.

# TYPES OF POND - on the basis of construction

- **CEMENTED POND**

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- **For large scale fish production commercial purpose**
- **Selected land ploughing and covered with the hep of plaster, make boundary, fill 5 inch soil and hydrilla plant.**
- **Give the artificial feeding**
  - ❑ **Proper water exchange, proper disease control**
  - ❑ **Highly costly, require fish feeding daily.**



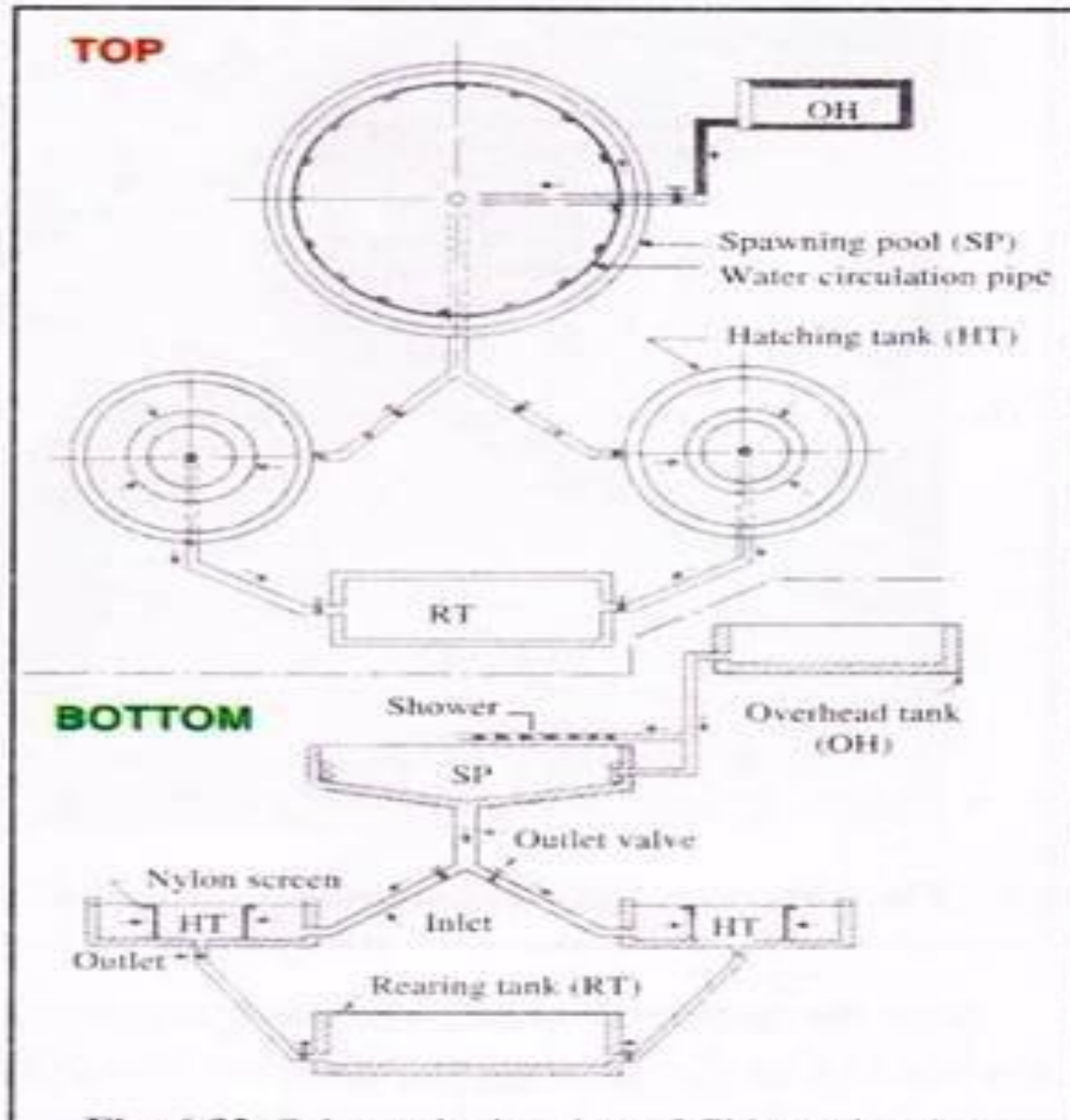


# EARTHEN POND

- Naturally made and man made pond
- Small plant planting near the pond and make the boundary surrounding pond.
- Natural feeding – algae, hydrill, zooplankton
  
- Not more costly, easily can make
- Not easily maintain ( Costly maintenance)



# Chinese Circular Hatchery



## **INCUBATION POND**

- ❑ Two concrete incubation ponds in each unit and both of them are circular in shape**
- ❑ Each ponds has two chamber ; outer and inner chamber**
- ❑ The inner chamber with stop cocked exit pipe hole though which excess water removed**
- ❑ This circular tanks connect to breeding pond and hatchling receiving pond.**

## **HATCHLING RECEIVING POND**

**The inside dimensions are 4 x 2.5 x 1.2 m.**

**This is located at a lower level than the incubation pond, so as to drain out the water from it by gravity.**

## **NURSERY POND**

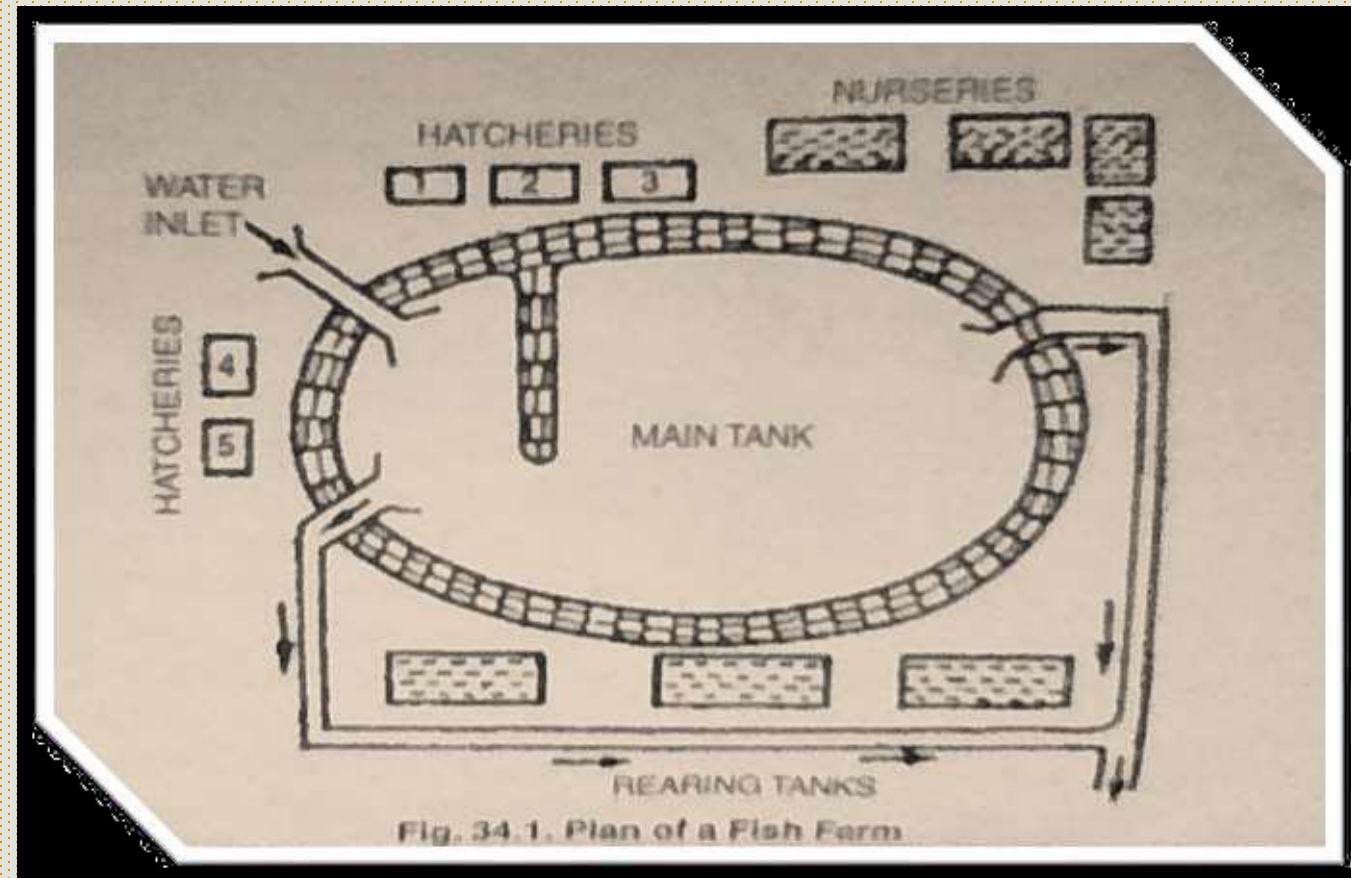
- Measure – **15 x 15 x 1.5m** and may be seasonal
- They are dry up during summer
- Eradication of fish enemies and increasing productivity

## **REARING POND**

- May be seasonal or perennial
- Used for rearing advanced fry for 2-3 months
- These ponds are made long and narrow
- Sloping to facilitate netting and deep 1.5 m
- Measure – **25 x 10 x 1.5 m**

**STOCKING POND** : THESE ARE LARGE PERENNIAL TANKS , ABOUT 2M DEEP.  
THEY ARE LONG 100 M OR MORE , FACILITATE NETTING.

## Plan of fish farm



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**Thank You**

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## **Excavation of the pond**

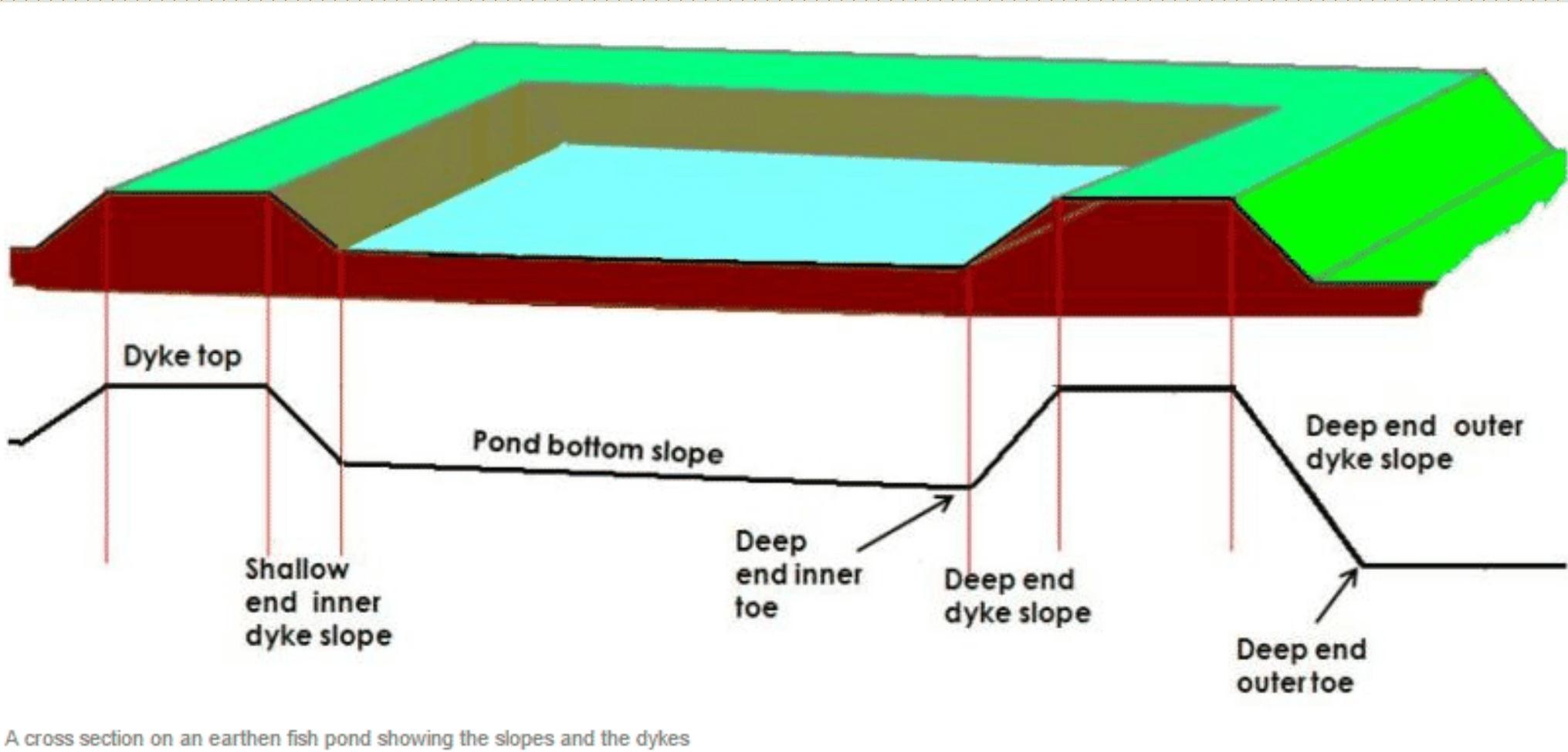
- ❑ Excavation can be carried out either by manual labour or by dozers (JCBs).**

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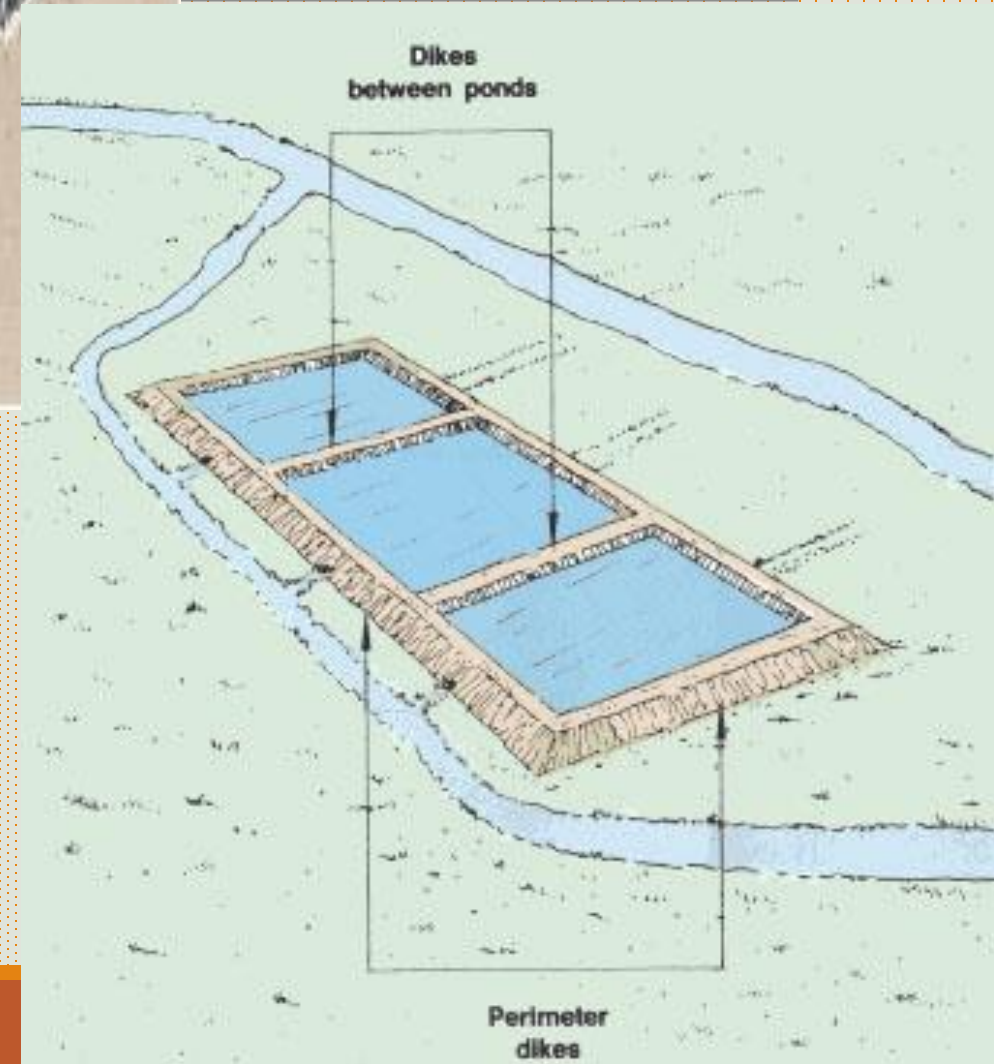
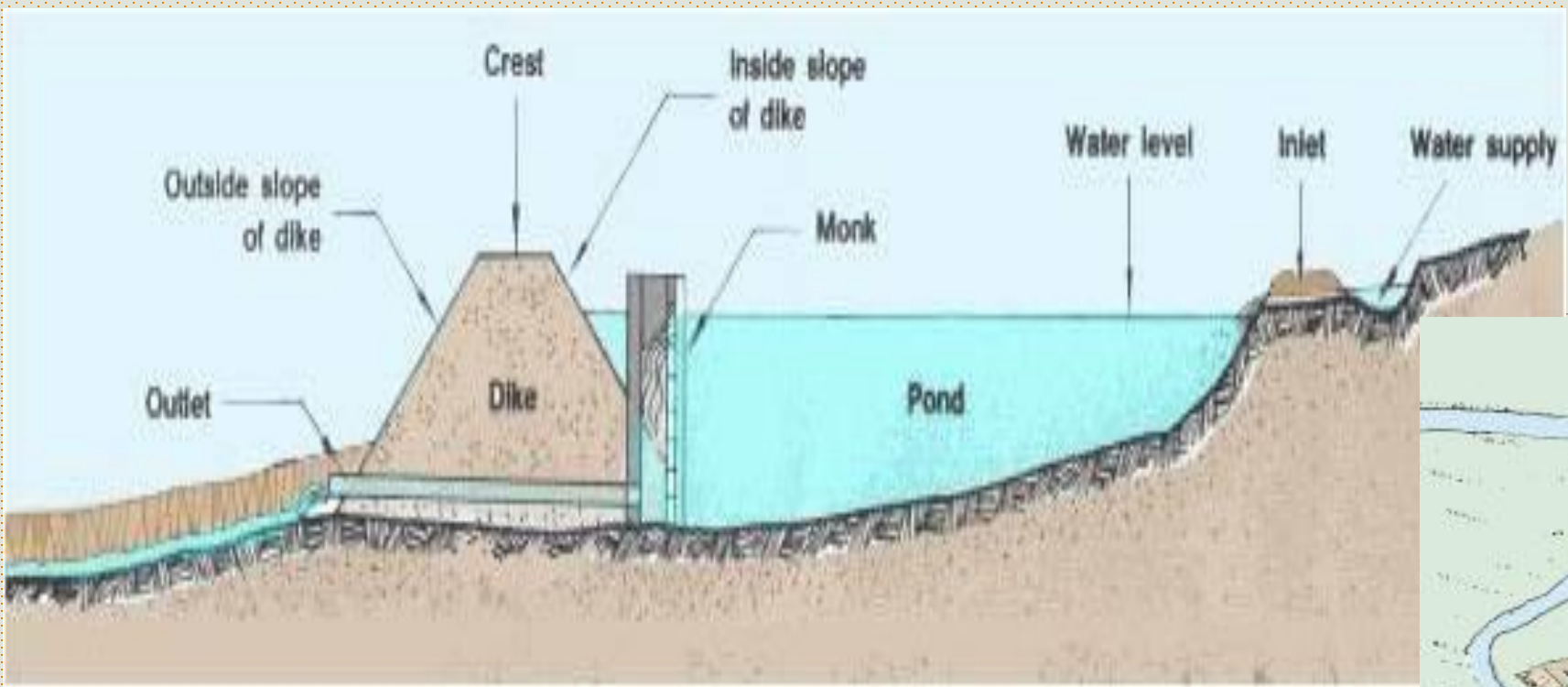
- ❑ The sides and bottom of ponds should be with good slope for drainage.**
- ❑ The pond bottom slope is about 2-5%.**
- ❑ The pond site has a natural slope, the dyke or main wall should be constructed at the low level side.**
- ❑ Removing small rocks, roots, and stump**
- ❑ It would be essential to provide a clay core in order to prevent seepage.**
- ❑ Turf, humus or peaty soils should not be used.**
- ❑ All stones, wood pieces and other material must be removed**



**Left**



## Structure of fish pond



## Structure of Dyke

# Construction of dyke

- The earth work for the dykes should be very compacted.
- The dykes of a pond should be strong enough to withstand weather action and water pressure.
- Brick or stone pitching may be provided to arrest erosion of dykes.
- Earthen dykes can be protected from erosions with bamboo piling.
- Holes should be closed immediately with stiff clay mixed with lime and cementing material.
- By using concrete blocks, stones or bricks the earthen dykes will be protected.
- Soil with a lot of clay in it can have a greater slope on the outside wall than on the inside wall.
- A typical embankment is built with an outside slope of 1:1 and an inside slope of 1:2.
- A slope of 1:2 means that for every increase in 2m width there is a change of 1 m in height.
- The grass roots help to hold the wall together and prevent erosion of the soil.

## **Conclusion**

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- **The success of production system in agriculture depends on design and construction.**
- **A well designed and constructed system provides the foundation for successful operations.**
- **The best management techniques increase production in poorly designed and inadequately constructed systems.**

# HAEMATOPOISIS

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# Contents

- Basic overview of haematopoiesis
- Stem cells & differentiation
- Myeloid & lymphoid lineages
- Role of immunoglobulins

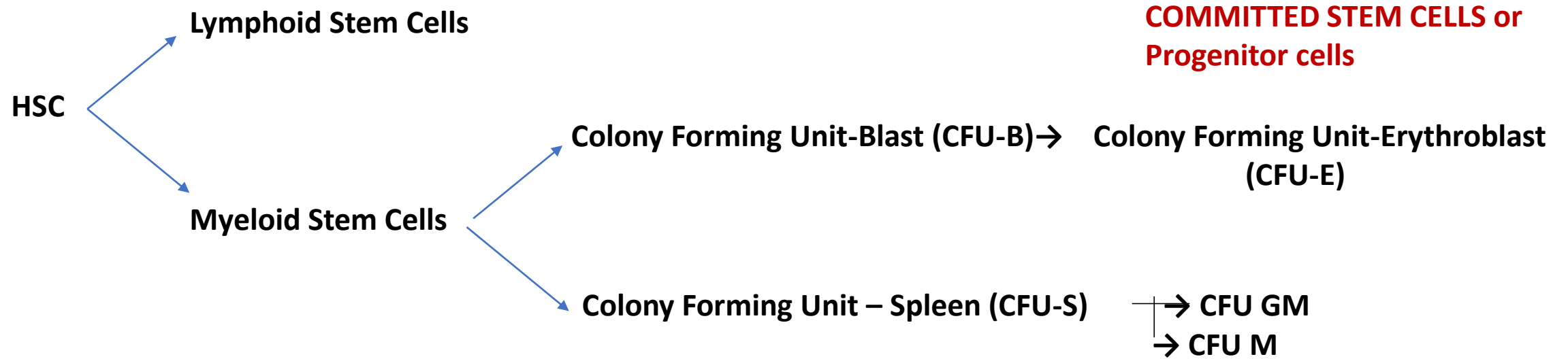
- **Stem cells**
- **Process of erythropoiesis - site, stages**
- **Factors affecting erythropoiesis**

# Introduction

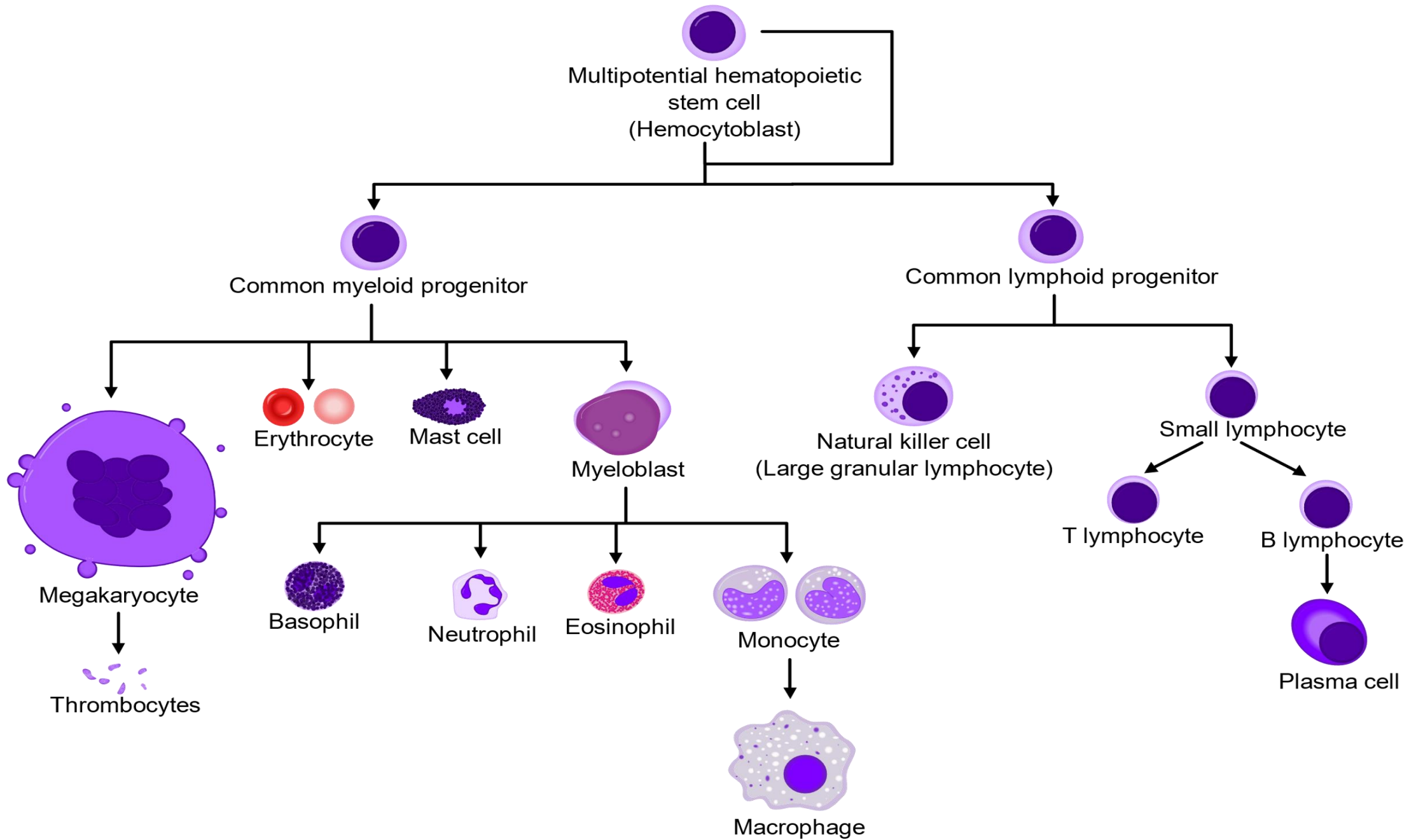
- Haematopoiesis is a highly organised differentiation process involving the ordered expression of different sets of genes
- It is controlled by factors in the developing blood cell – the bone marrow in adults
- Like any other developmental programme.



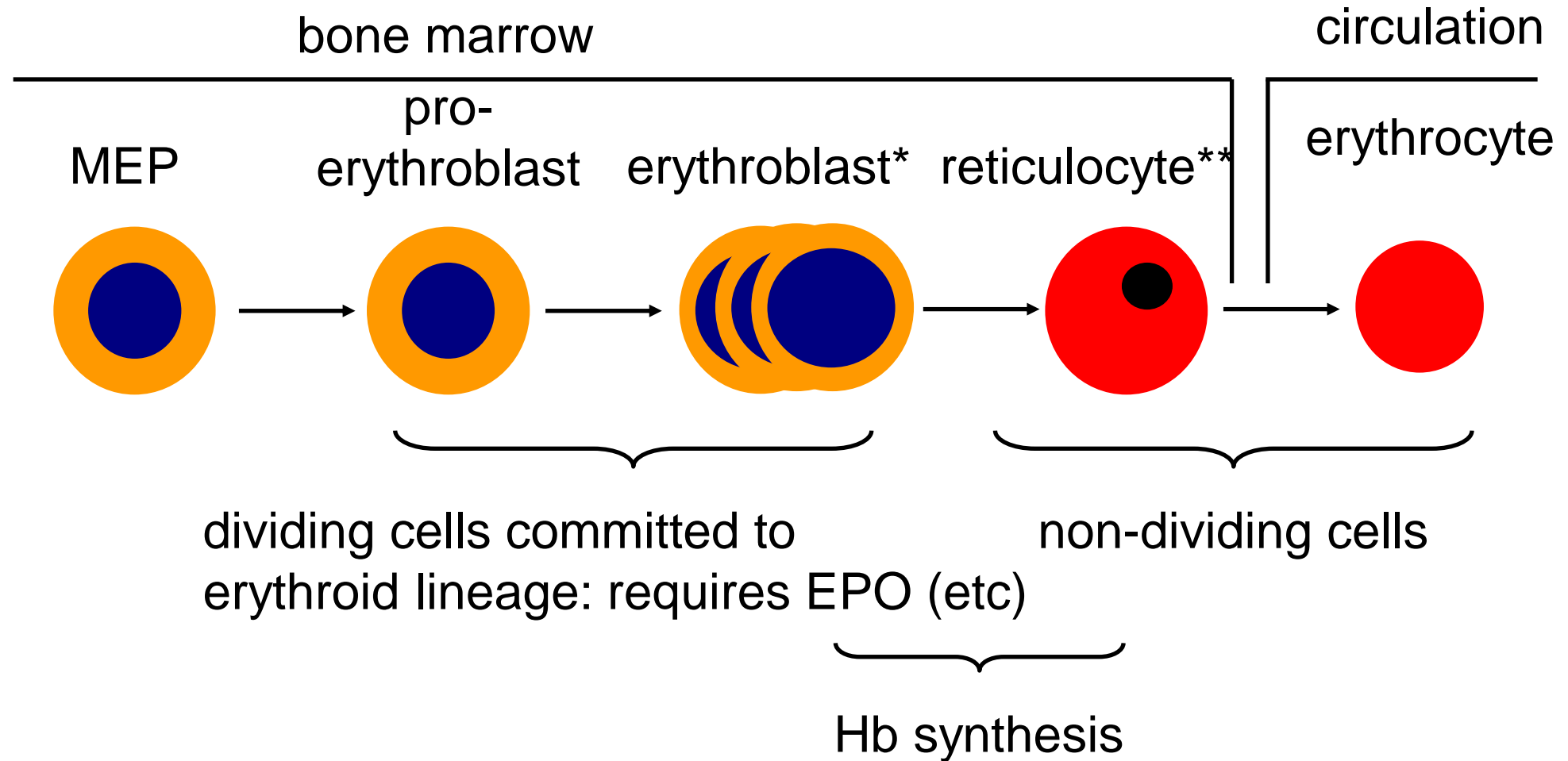
- Haematopoiesis is from greek meaning “ to make new blood”
- It refers to the formation of blood cellular components
- All blood cellular components are derived from a haematopoietic stem cells
- In a healthy adult approx. 200 Billion RBC, 11 Billion WBC, 400 Billion platelets are produced daily



- MSC ▪ CFU-B ▪ CFU-E
- MEP-Megakaryocyte erythroid progenitor
- Pronormoblast
- Basophilic normoblast
- Polychromatophilic Normoblast
- Orthochromatophilic Normoblast
- Reticulocyte
- Mature Red Blood Cell



# Erythropoiesis



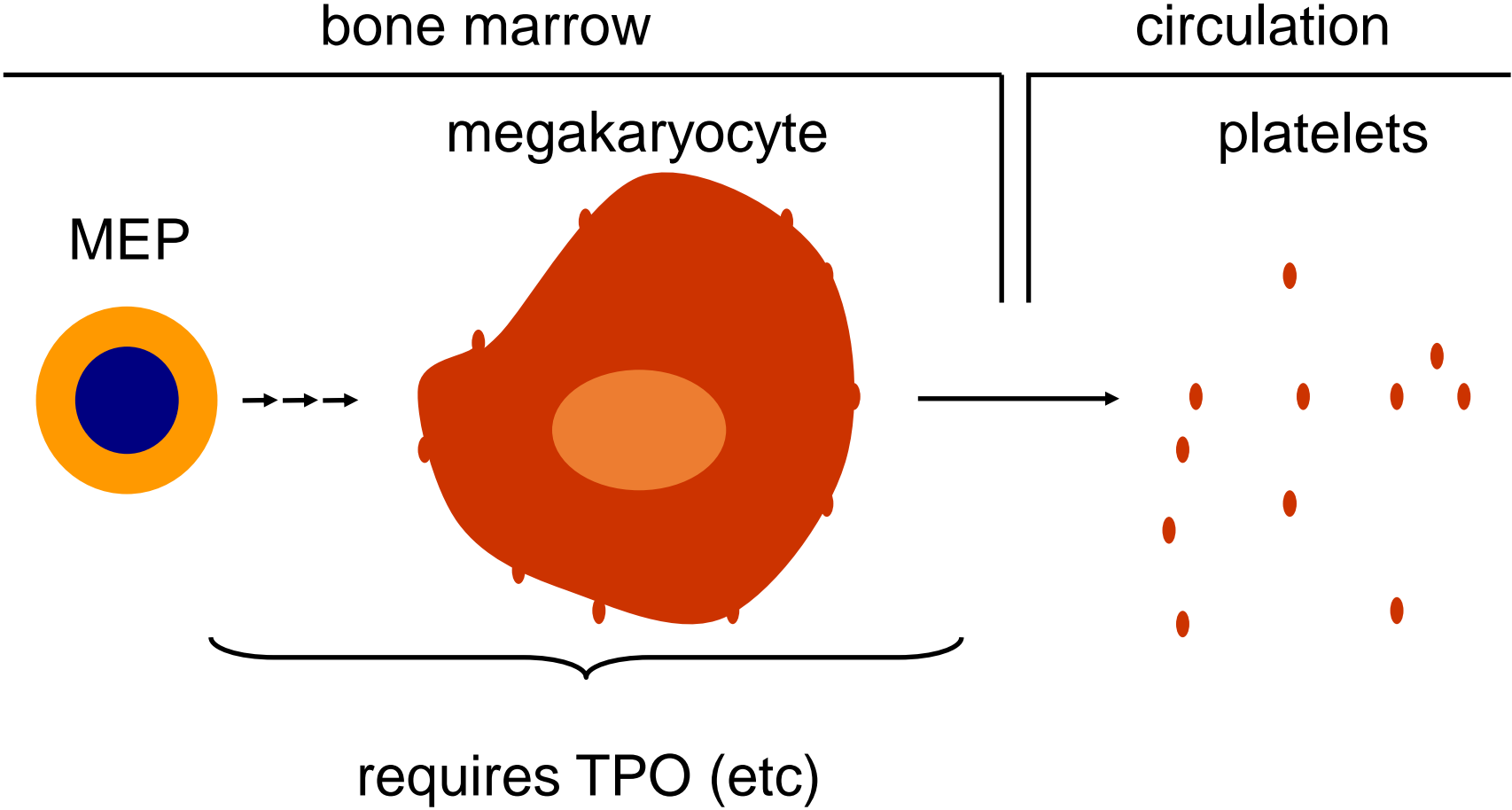
\*The suffix “-blast” indicates a large, proliferating cell. There are several different kinds of erythroblast.

\*\*The reticulocyte nucleus is condensed and inactive.

- Erythrocyte clearance:
  - removed by liver and spleen after 120 days
  - as the erythrocyte ages surface proteins particularly “band 3” are progressively oxidised
  - this provides a target for phagocytosis by macrophages lining liver & spleen sinuses.

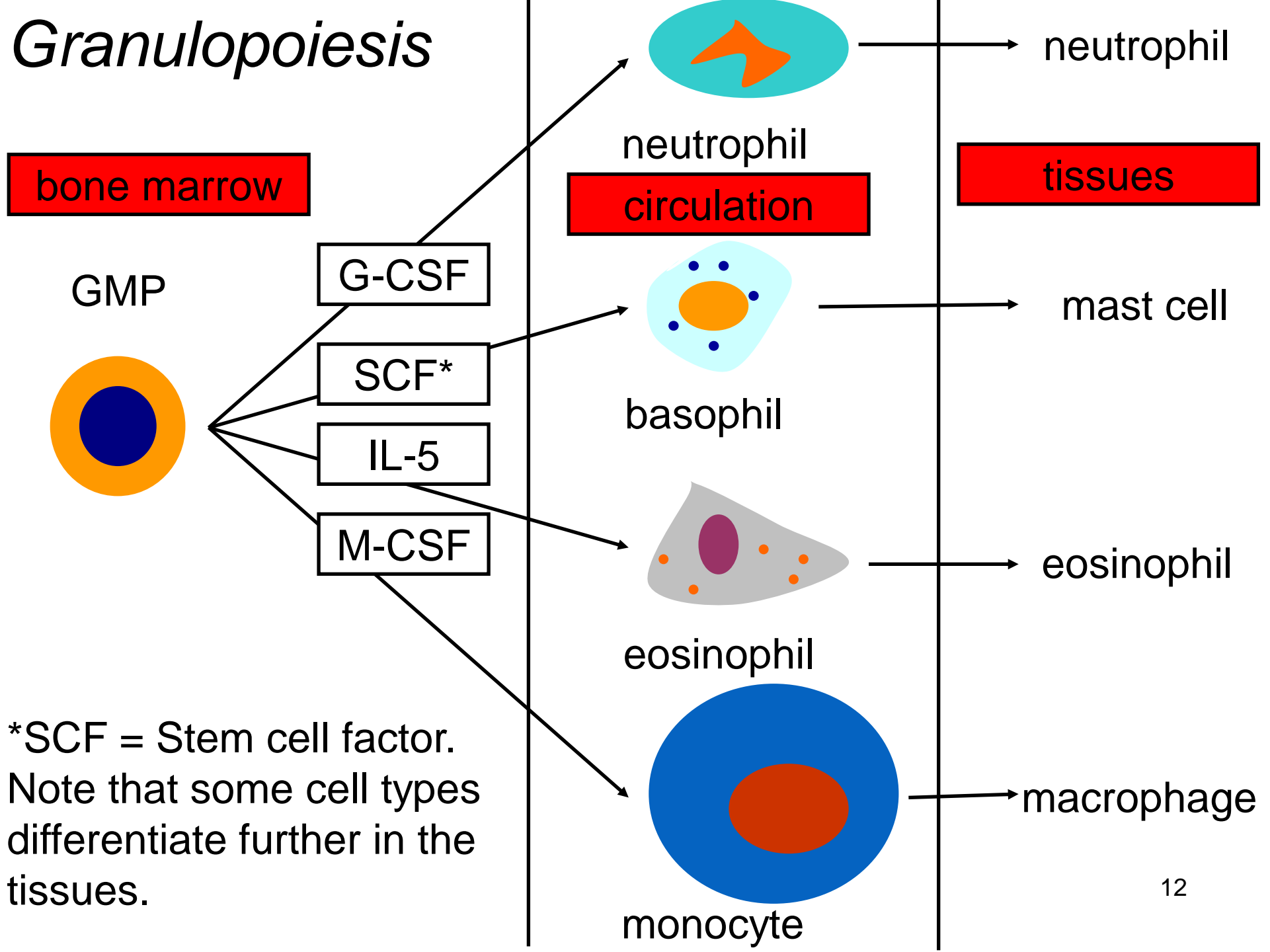
- Generation of platelets (thrombopoiesis):
  - stimulated by *thrombopoietin* (TPO) & other non-specific growth factors.
  - TPO produced constitutively mostly by liver.
  - Inflammation can double production by liver via cytokine IL-6.
  - In thrombocytopenia (reduced platelets) BM stromal cells also produce TPO.
  - Platelets have TPO receptors and so remove TPO from circulation (-ve feedback).

# Thrombopoiesis



Platelets (1,000s) bud off surface of megakaryocyte.

# Granulopoiesis



\*SCF = Stem cell factor.  
Note that some cell types differentiate further in the tissues.



DN = negative for both CD4, 8; DP = positive for both; SP = positive for one or other

IL-7R = IL-7 receptor

CD4/8 +ve = expressing one, other or both of these T cell markers

CD25 +ve = expressing IL-2 receptor

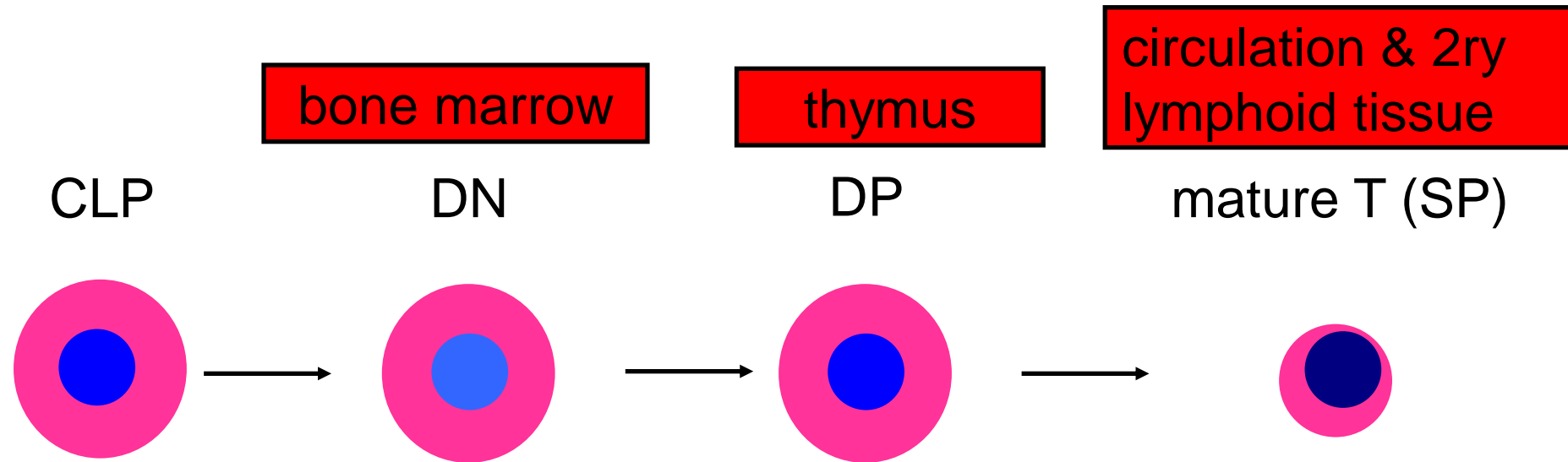
$\alpha$  chain,  $\beta$  chain re-arrangement = formation of T cell receptor

IgM =ve = synthesising IgM

CD19 +ve = expressing standard B cell marker

H chain, L chain re-arrangement = formation of mature Ig genes

# *T lymphopoiesis*



# *B lymphopoiesis*

