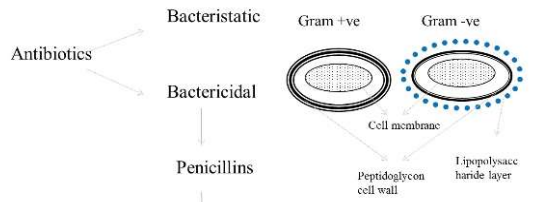
Antibiotics

- An **antibiotic** is an agent that either kills or inhibits the growth of a microorganism.
- Excludes substances that kill bacteria but that are not produced by microorganisms such as Gastric juices & Hydrogen Peroxide.
- Also excludes synthetic antibacterial compound such as sulfonamides.
- Penicillin is the first natural antibiotic discovered by Alexander Fleming in 1928.

Antibiotics: Mode of Action

- Inhibitors of DNA synthesis
- Inhibitors of bacterial protein synthesis
- Inhibitors of bacterial cell wall synthesis
- Interference with metabolism
- Impairment of nucleic acids

Mechanism of action



Inhibit the synthesis of peptidoglycon layer containing NAM &NAG connected by penicillin binding proteins(PBP)

Acts on PBP and inhibits the synthesis of Peptidoglycon.

β- Lactam Antibiotics

β-lactam antibiotics, inhibit bacterial growt by interfering with bacterial cell wal synthesis.

The β-lactam antibiotics may be further sub divided into two categories:

- Penicillin
- Cephalosporin

Classification

- Penicillins
- Cephalosporins
- Other β-Lactam drugs
  - --Cephamycins
  - --Carbapenems
  - --Oxacephalosporins
  - --β-Lactamase inhibitors
  - --Monolactams

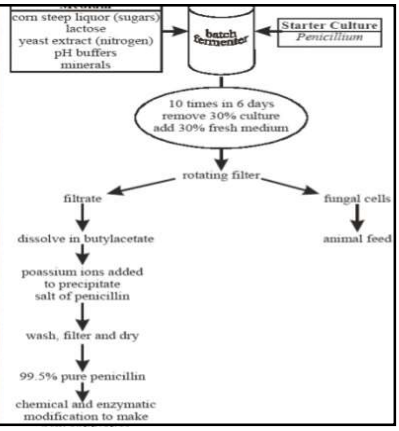
ommercial production of penicillin :

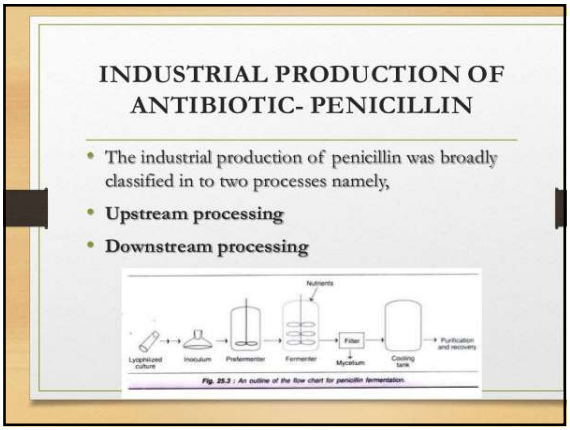
The Inoculum : Master stock (spores) is the source inoculum. Spores (*P. chrysogenum*) from working stocks cultur are suspended in water or non toxic lauryl sulphonate, then add to the flask containing wheat bran and nutrient soln. A shake fla culture of 4 day old is inoculated into a seed tank for 3 days.

The medium : Jackson in 1958 prepared a media for penici production . The major constituent of typical medium includes,

) Fermentable carbohydrate	Corn steep liquor(3.5%), lactose(3.5%),glucose(1%
) Potassium dihydrogen phosphate	0.4%
) Organic nitrogen source	
) Phenyl acetic acid precursor	
) Edible oil	0.25%
) Calcium carbonate (act as buffer)	1%
) P^H after sterilization	5.5% to 6.0%

Procedure :


corn steep liquor (sugars)
lactose
yeast extract (nitrogen)
pH buffers
minerals
batch fermenter
Starter Culture
Penicillium
10 times in 6 days
remove 30% culture
add 30% fresh medium
rotating filter
filtrate
fungal cells
dissolve in butylacetate
animal feed
poassium ions added
to precipitate
salt of penicillin
wash, filter and dry
99.5% pure penicillin
chemical and enzymatic
modification to make


INDUSTRIAL PRODUCTION OF ANTIBIOTIC- PENICILLIN
The industrial production of penicillin was broadly classified in to two processes namely,
Upstream processing
Downstream processing
Nutrients
Lyophilized culture
Inoculum
Prefermenter
Fermenter
Filter
Mycelium
Cooling tank
Purification and recovery
Fig. 25.3 : An outline of the flow chart for penicillin fermentation.