INDUSTRIAL PRODUCTION, ESTIMATION AND UTILIZATION OF PHYTOCONSTITUENTS (DIGOXIN AND ATROPINE)

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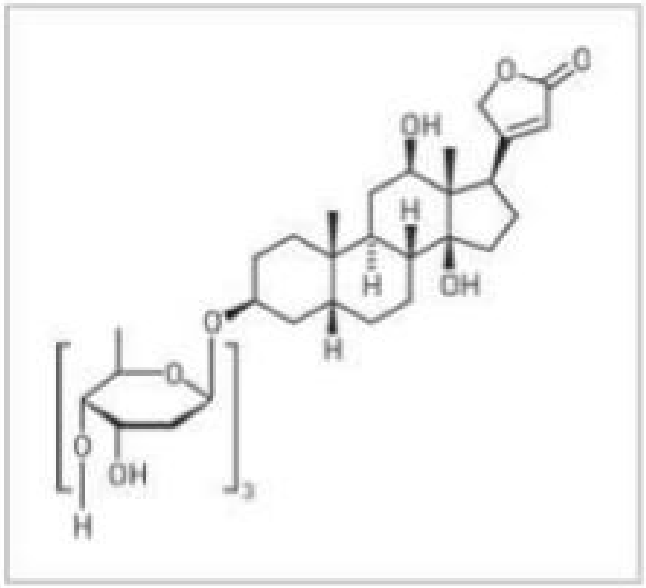
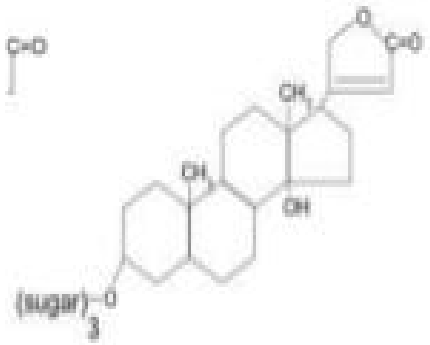
DIGOXIN

- **Source:** Cardiac glycoside obtained from leaves of *Digitalis lanata.*

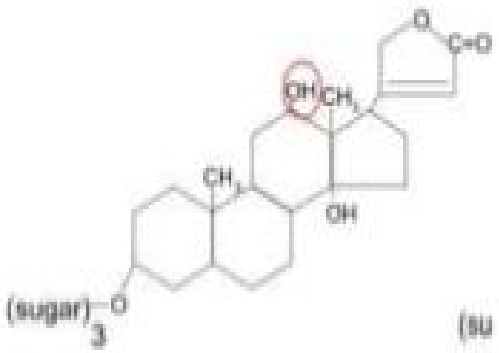
  Family- Scrophularia



DIGOXIN



Digitoxin



Digoxin

- **Cell culture conditions**: Stock suspension cultures of the *Digitalis lanata* cell line W.1.4 were grown in Erlenmeyer flasks kept in the dark at 24°C on gyratory shakers (120 rpm). Cells were subcultured every 10.5 d by inoculating 20 g cells (wet weight) into 300 ml of fresh GM1
- **Growth media**: The maintenance medium (GM1) was based on MS medium with twice the MS phosphate and glycine and no caseine hydrolysate added.
- Phytohormones were omitted and the glucose concentration was 3%. Growth medium 2 (GM2), with increased concentrations of sulfate, phosphate, ammonium, magnesium, potassium and glucose, was used to supply fresh medium when the cells were grown in the semi-continuous mode.

Industrial Production

- **Production media:** Production medium 1 (PM1), *i.e.*, an 8% glucose solution with the pH adjusted to 5.5, was used as the production medium for all experiments run in the batch mode. For the production of digoxin under semi-continuous culture conditions a medium termed PM 3 (16% glucose solution, pH 5.5) was used to replace part of the GM 2 at the beginning of the pre-incubation phase.

- Growth of cell supension cultures in bioreactors. The contents of 24 stock culture flasks (for a total of 7.7 l suspension) were added to 28 1 GM 2 in a 40-1 air-lift bioreactor, which was used to produce the inoculum for a 300-1 bioreactor.

Production of digoxin in bioreactors:

- In preliminary runs digoxin production was achieved in a 1-1 exsiccator vessel fitted with an aeration line ending in a ring-shaped sparger fixed to the bottom of the jar.
- The vessel was filled with 300-400 ml of cell suspensions pre-incubated for 48 h in an 8% glucose solution. The suspension was agitated by sparged air at an aeration rate of 1 1 min^{-1}.
- These portable glass jars were sterilized in an autoclave and then each filled with 18-19 L of cell suspension withdrawn from the 300-L bioreactor. During incubation the glass vessels were shaded.
- The suspensions were aerated at 4.5-12.0 1 min with sterile air and the incubation temperature was maintained at 21°C. The production cycle was started by the addition of 0.65 mmol 1^{-1} digitoxin.

• Industrial production:

1. • Fresh leaves made into paste & treated with neutral salt.
2. • Paste is defatted with benzene & followed by extraction with ethyl acetate
3. • Extract contain lanatoside C, which after hydrolysis yields digoxin.

- **Estimation:**

Assay- 40 mg test & std solution of digoxin dissolve in sufficient ethanol.

5 ml of resulting solution, add 3ml picric acid solution.

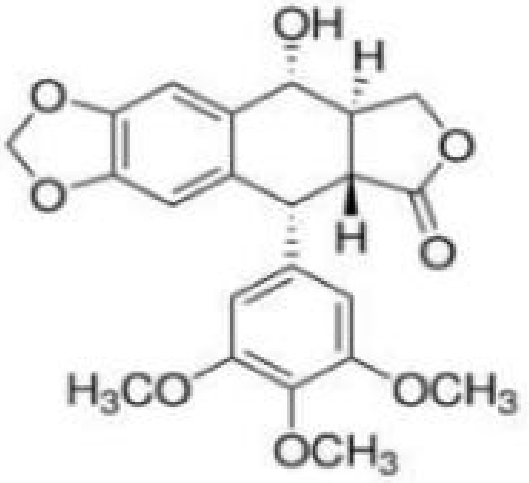
Measure absorbance at 495 nm.

- **Utilization:**

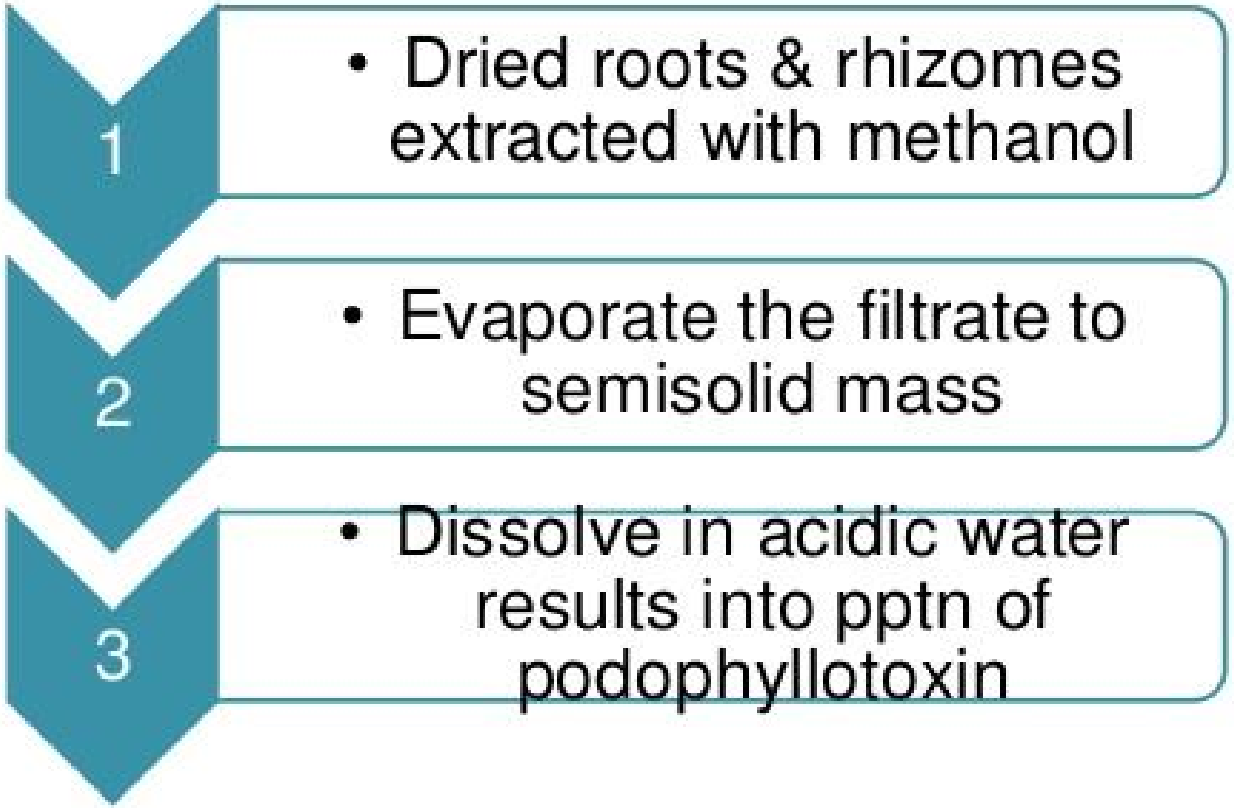
treatment of cardiac disorders.

PODOPHYLLOTOXIN

- **Source:** resin, roots & rhizomes of *Podophyllum hexandrum, P. emodi & P. peltatum.*
- Family- Berberidaceae.



- **Industrial production:**



- **Estimation:**

HPLC

Mob. Phase- methanol: water (62: 38 v/v)

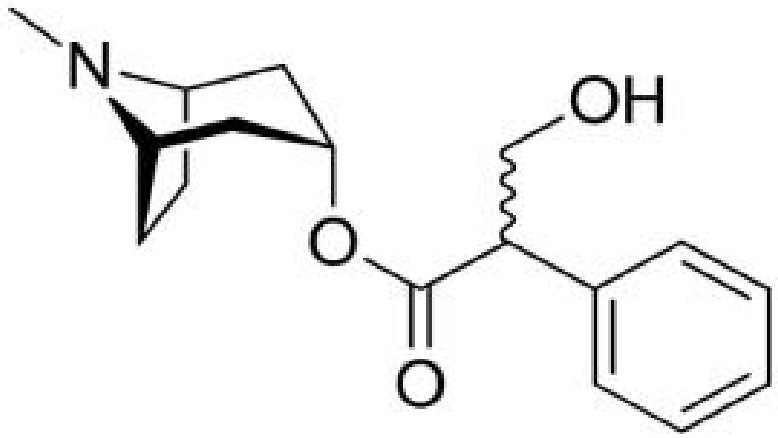
Detector wavelength- 280nm.

- **Utilization:**

1. Antitumour
2. Purgative
3. Emetic
4. Treatment of warts

ATROPINE

- **Source:** tropane alkaloid, flowering tops of *Atropa belladonna, Datura stramonium & Hyoscyamus niger.*
- Family- Solanaceae.



- **Industrial production:**

1. Powdered drug extracted with ether or benzene
2. Concentrate the non-polar extract & partitioned with acetic acid.
3. Add sodium bicarbonate leading to ppt alkaloid
4. Dry the ppt & crystallized by dissolving in solvent ether

- **Estimation:**

Assay- sulphate salt of atropine titrated against 0.1 N perchloric acid.

- **Utilization:**

1. As preanesthetic medication
2. Antispasmodic


Thank you
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