



DEPTH OF BIOLOGY

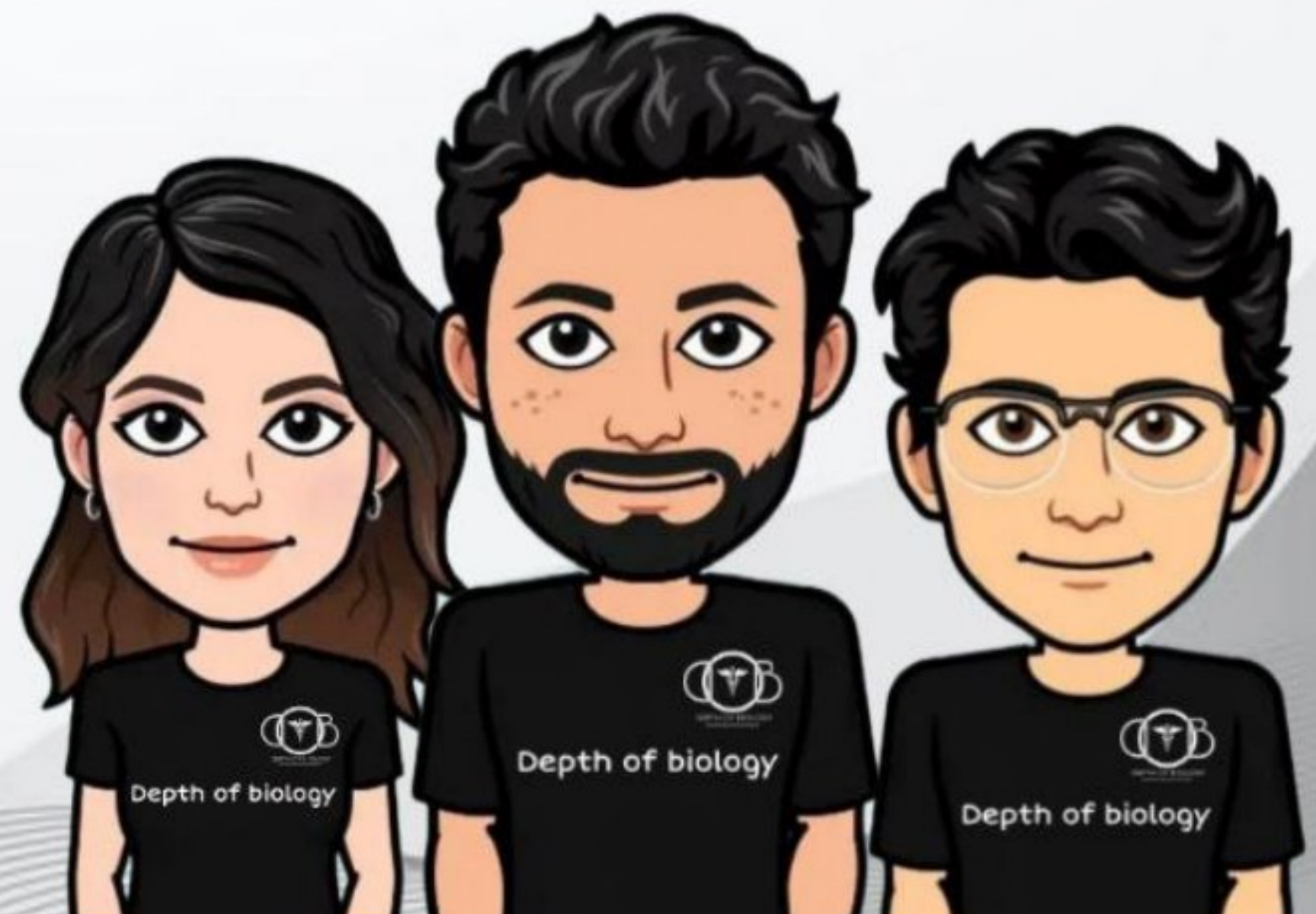
Medichem 5th sem.



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LET'S CONNECT AND GROW TOGETHER

**DOB**  
**COMMUNITY**



**1. Pharmacology of drugs acting on cardio vascular system**

- a. Introduction to hemodynamic and electrophysiology of heart.
- b. Drugs used in congestive heart failure
- c. Anti-hypertensive drugs.
- d. Anti-anginal drugs.
- e. Anti-arrhythmic drugs.
- f. Anti-hyperlipidemic drugs.

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# UNIT-3 (Medicinal Chemistry)

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## UNIT- III

10 Hours

**Anti-arrhythmic Drugs:** Quinidine sulphate, Procainamide hydrochloride, Disopyramide phosphate\*, Phenytoin sodium, Lidocaine hydrochloride, Tocainide hydrochloride, Mexiletine hydrochloride, Lorcainide hydrochloride, Amiodarone, Sotalol.

**Anti-hyperlipidemic agents:** Clofibrate, Lovastatin, Cholesteramine and Cholestipol

**Coagulant & Anticoagulants:** Menadione, Acetomenadione, Warfarin\*, Anisindione, clopidogrel

**Drugs used in Congestive Heart Failure:** Digoxin, Digitoxin, Nesiritide, Bosentan, Tezosentan.

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## I. Anti-Arrhythmic



Check Description  
[A to Z] knowledge.

A condition in which the heart beats with an irregular or abnormal rhythm.

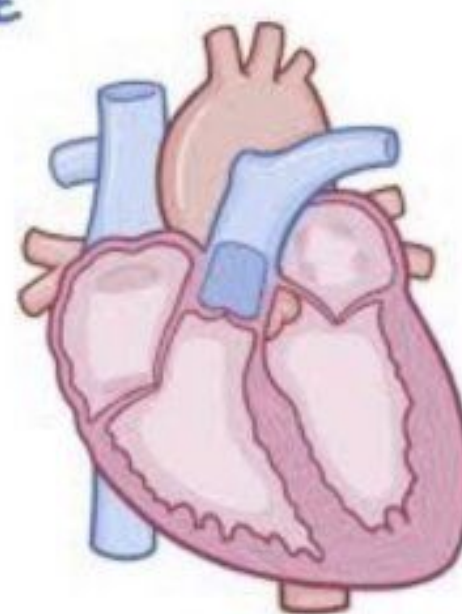
### ARRHYTHMIAS

\* IRREGULAR HEARTBEATS due to any DISTURBANCE in:

- ~ RATE
- ~ RHYTHM
- ~ SITE of ORIGIN
- ~ CONDUCTION of CARDIAC ELECTRICAL IMPULSE



CAN AFFECT HEART'S  
ABILITY to PUMP BLOOD



### 2 Types

BradyCardia  
Heart rate ↓ (<60bpm)

Tachycardia.  
(>100bpm) Heart rate ↑

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1. Class-I  $\Rightarrow$  Sodium Channel Blocker

Class-IA  $\rightarrow$  Prolong Repolarisation = Quinidine, Procainamide

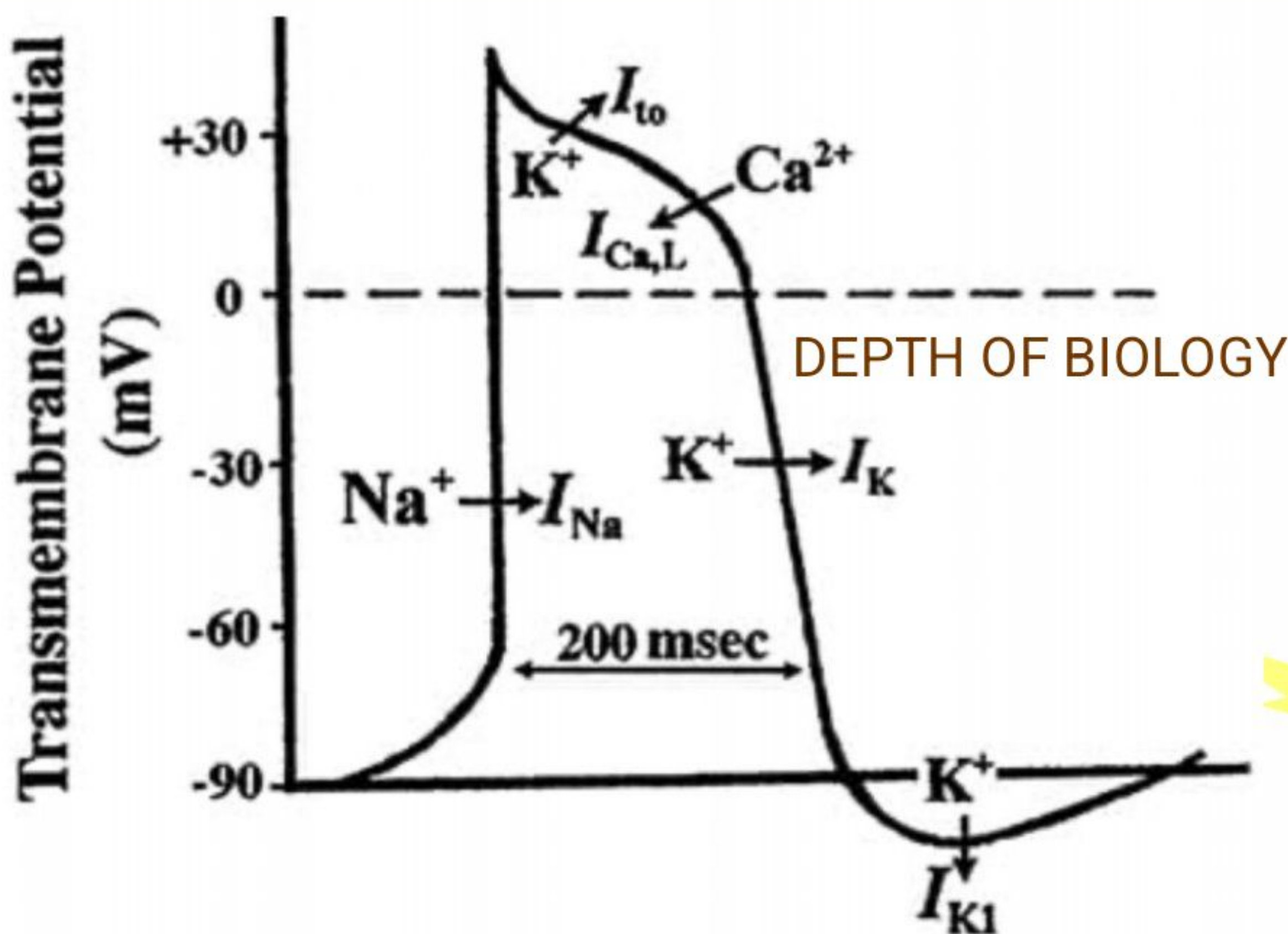
Class-IB  $\rightarrow$  Shorten Repolarisation = Lignocaine, Phenytoin

Class-IC  $\rightarrow$  Little effect on Repolarisation = Propafenone.

2. Class-II  $\Rightarrow$   $\beta$ -Adrenergic blocker = Propranolol.

3. Class-III  $\Rightarrow$   $K^+$  Channel blocker  $\rightarrow$  Prolonged repolarisation  
 $\searrow$   
 SOTALOL

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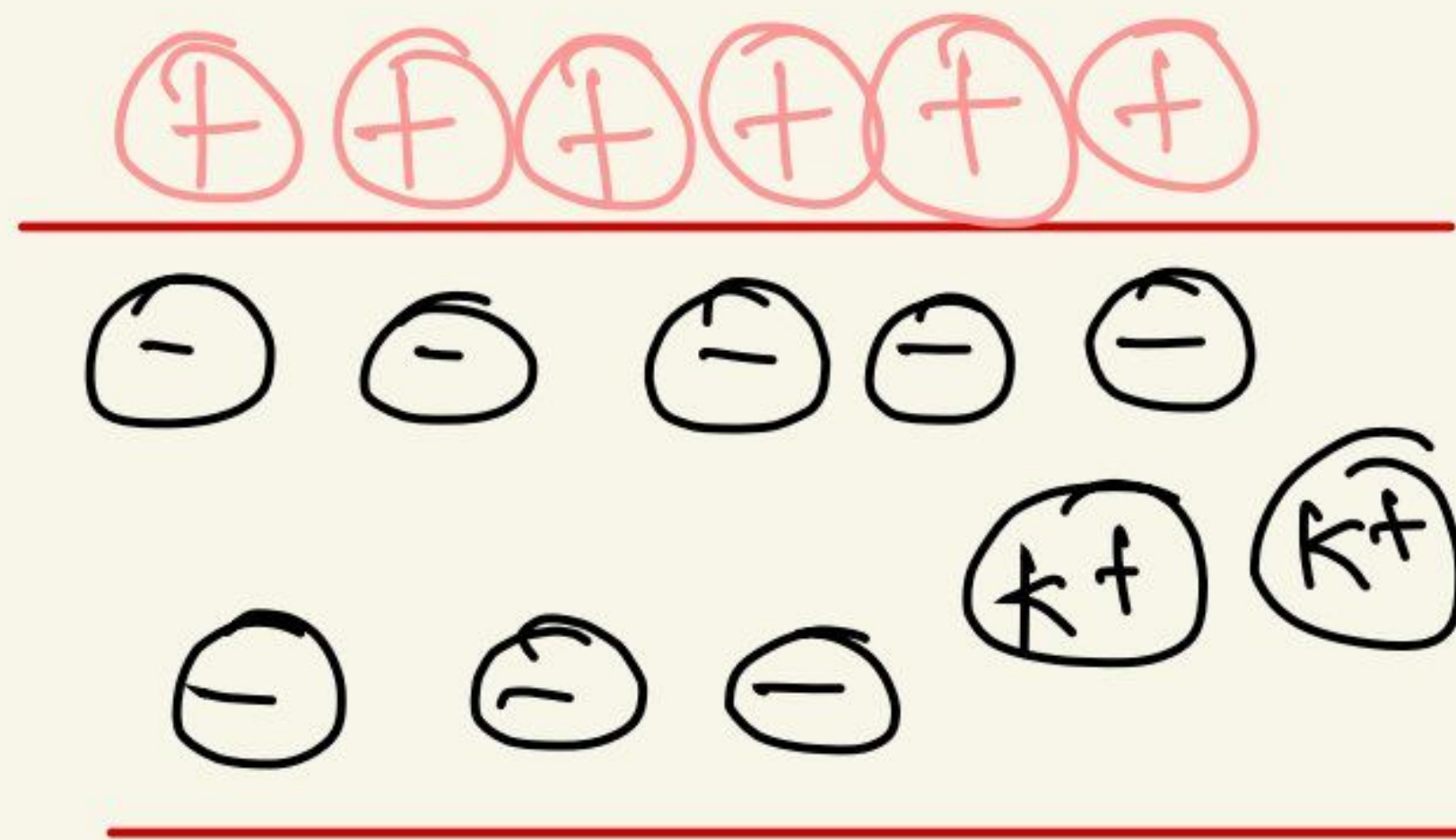
(a) Depolarisation

(b) Repolarisation.

(c) Hyperpolarisation

(d) R.O.M.P

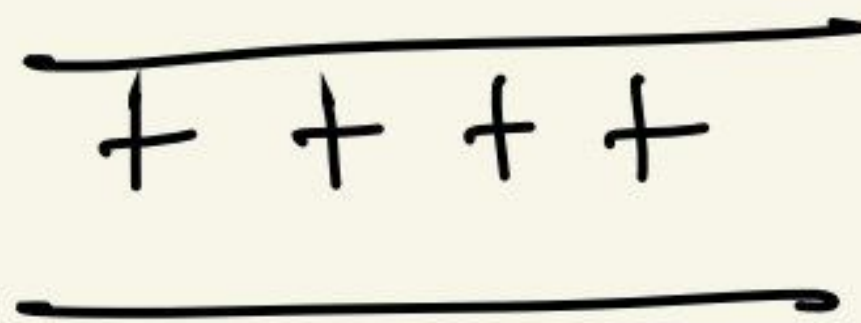
Lecture Link Available  
in Description.



RMP  
 $\Downarrow$   
 $-90\text{mV}$

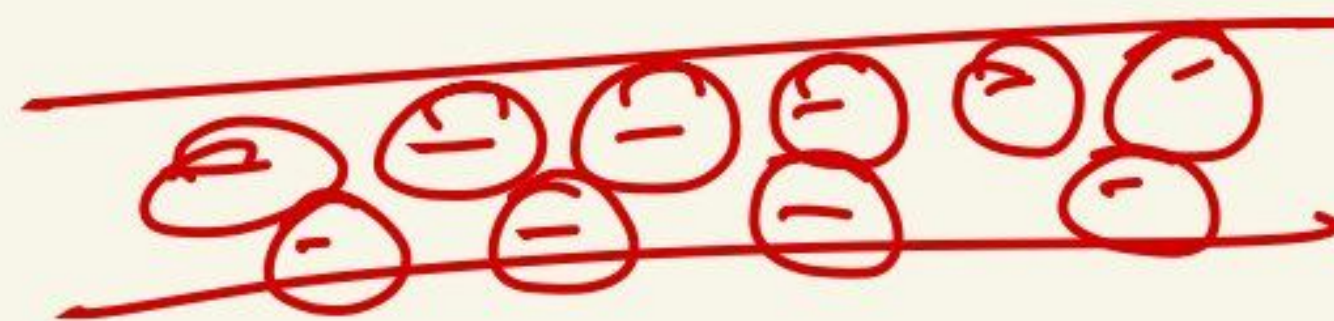
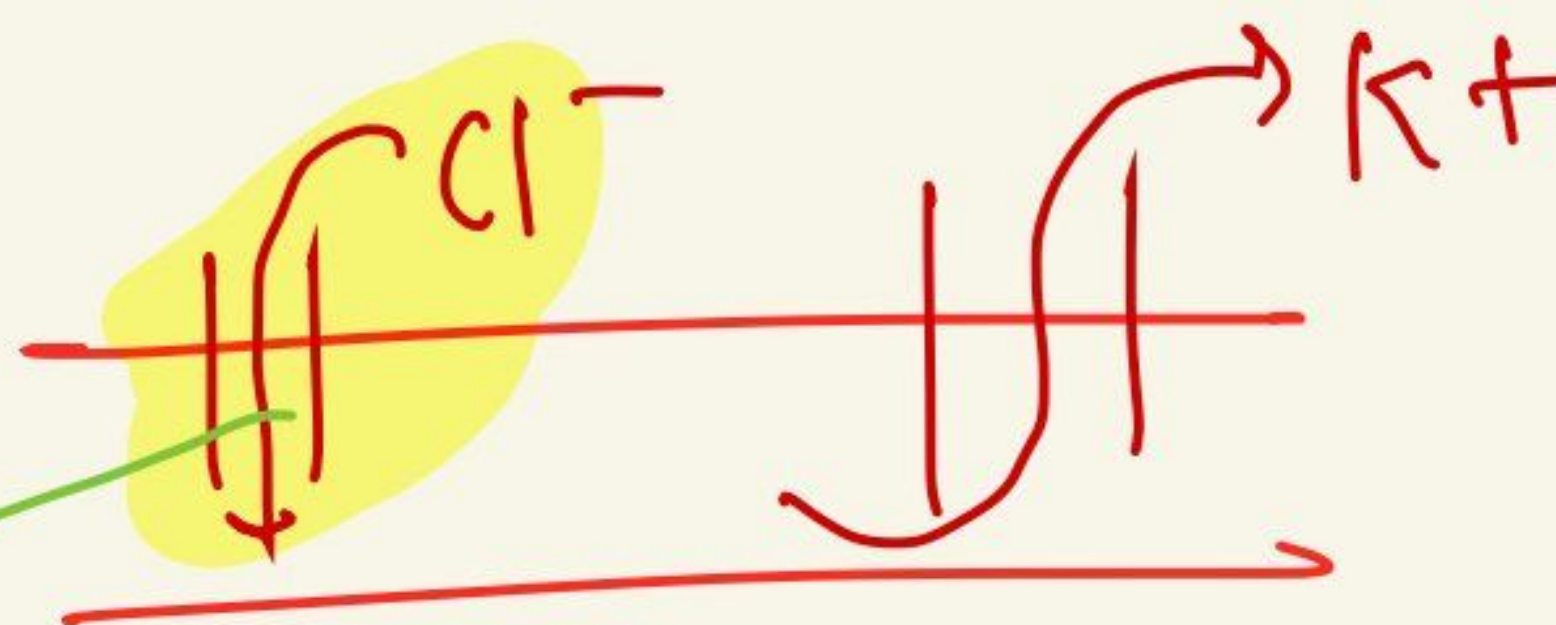
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Depolar.  $\text{Na}^+$  channel open ( $\text{Na}^+$  moves from ECF to ICF)



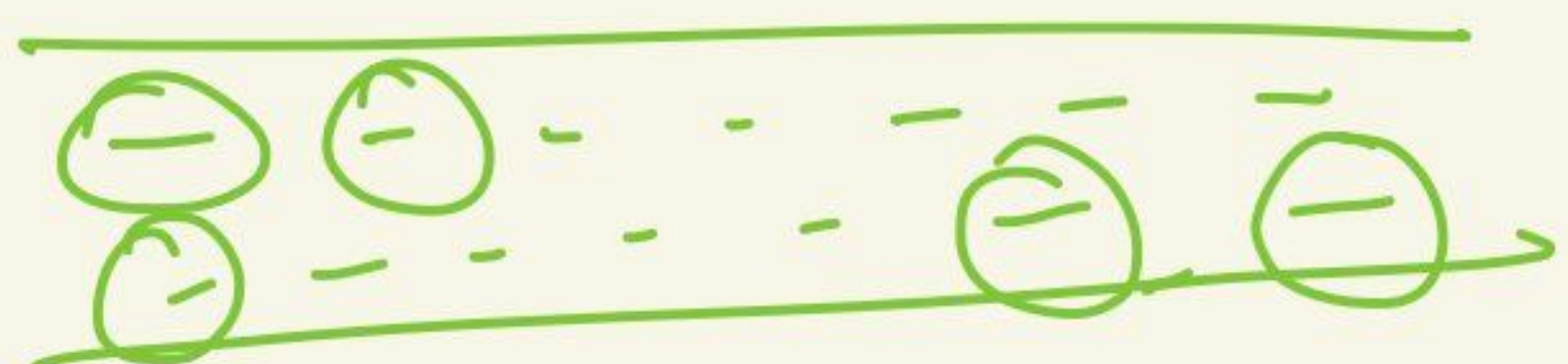
$+20/+30\text{mV}$

Repolar.  $\rightarrow$   
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Prolonged opening  
 $> -70\text{mV}$

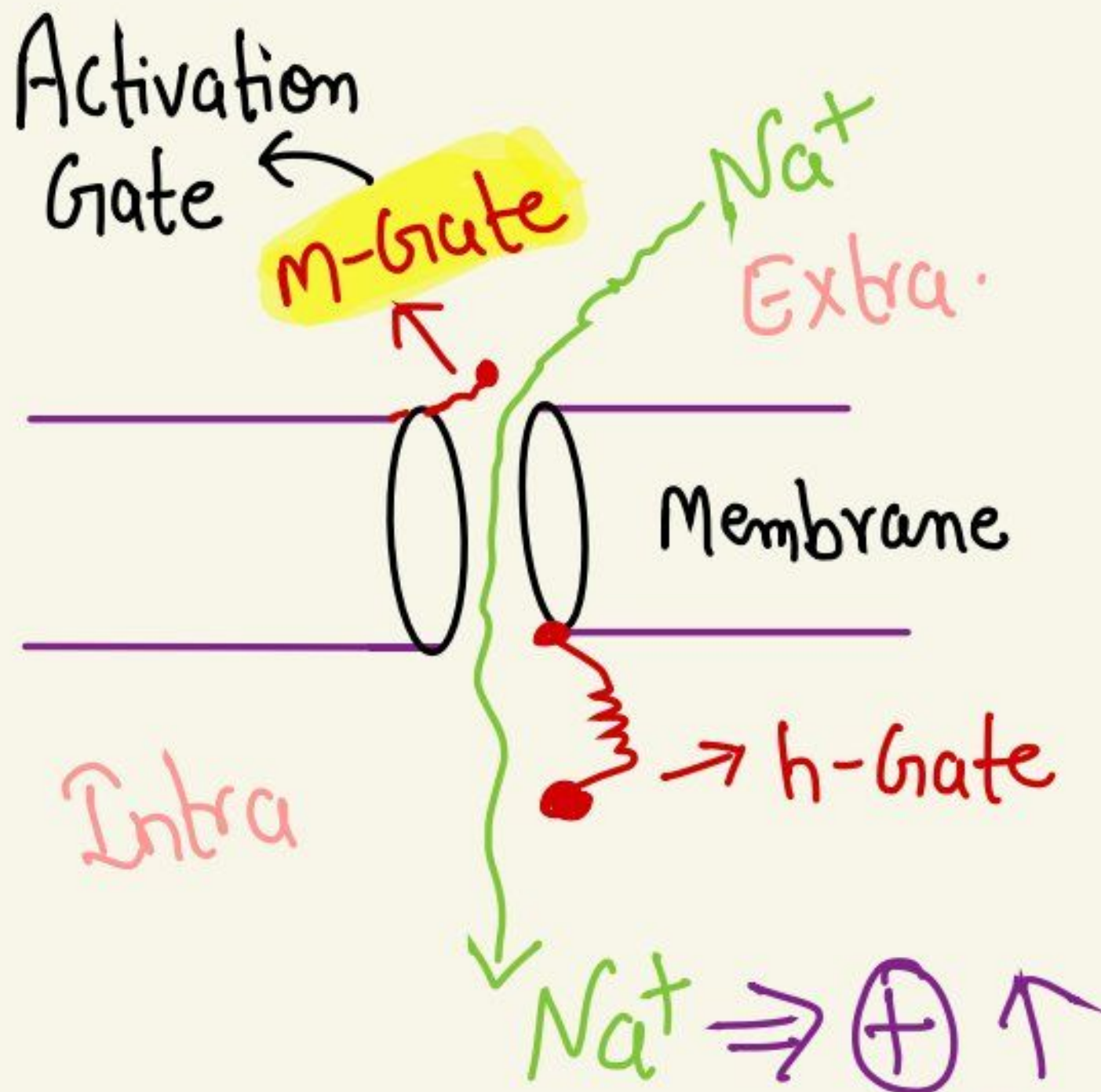


# Mechanism of Action

1. Class - I  $\Rightarrow$  Na<sup>+</sup> Channel Blocker

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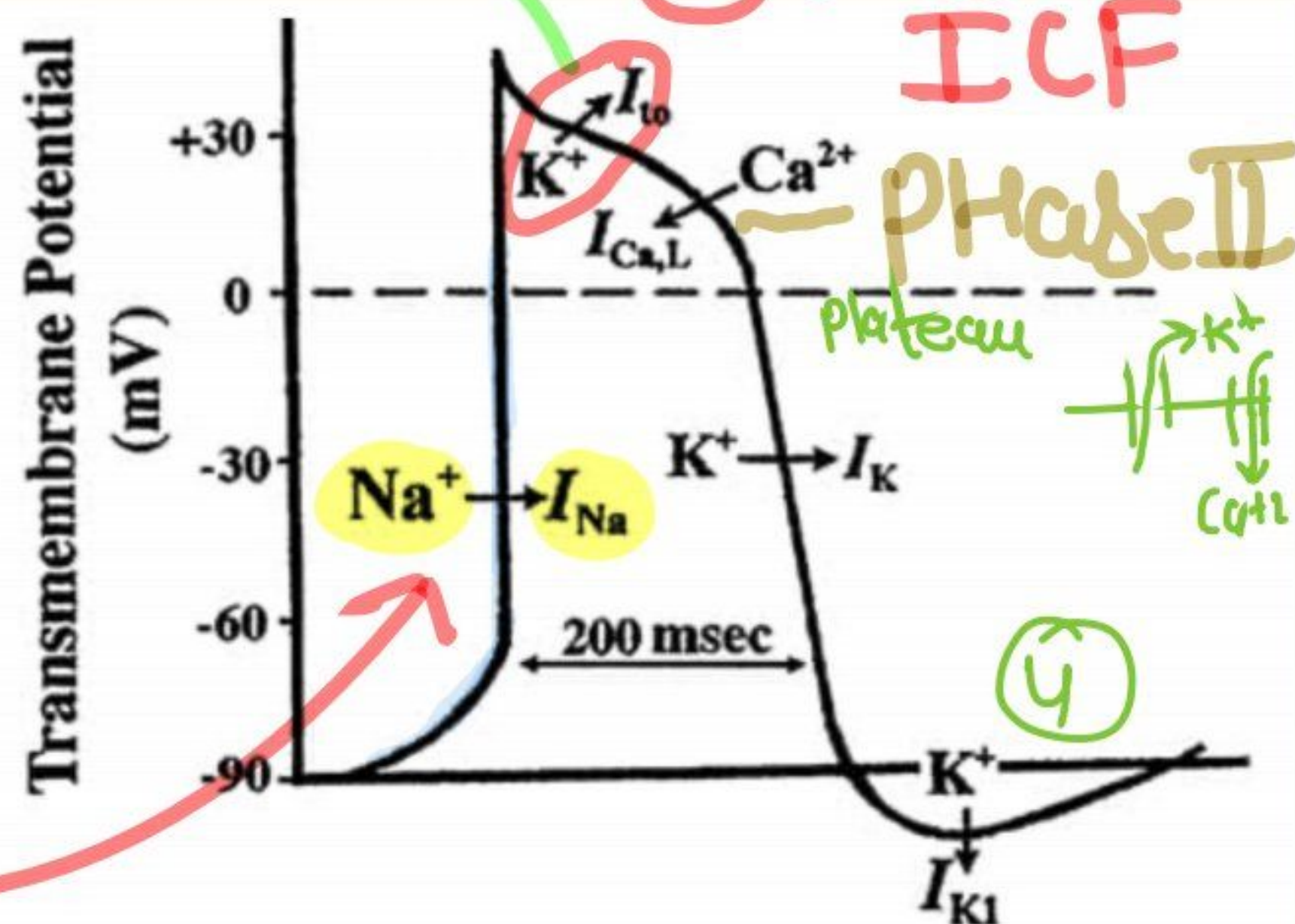
Prevent Inward Movement of Na<sup>+</sup>



Depolarisation (Phase Zero)

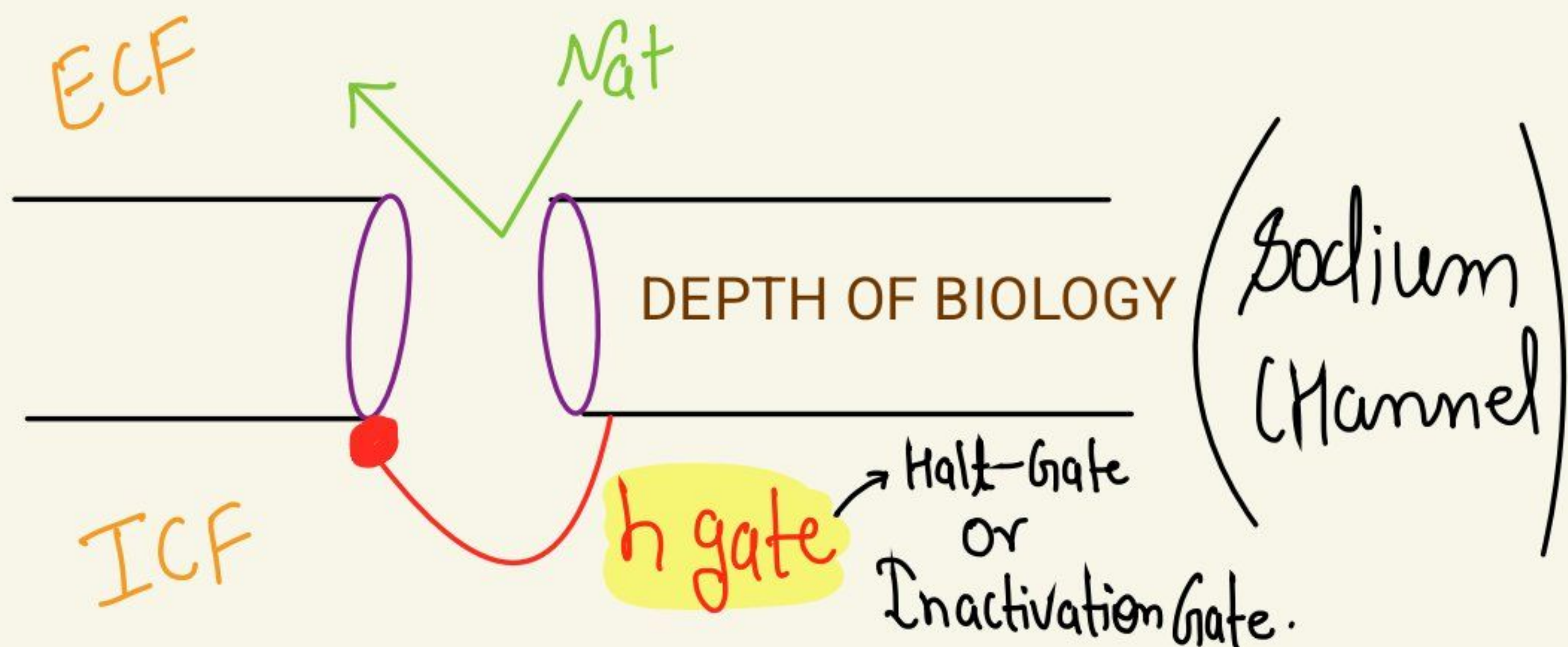
Phase I

⊕ve ↓ in ICF



Action Potential start  $\rightarrow$  Conduction start  $\rightarrow$  Heart beat (Excess).  
[Tachycardia].

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# Mechanism of Action → (a) Class I-A ⇒

1. Decrease Autonomicity in Heart all Cell
2. Decrease Phase Zero Depolarisation. (Na<sup>+</sup> Influx) (ELF) (ICF) ↓
3. Increase Threshold Excitability. (Heart को Excite होने में Time लगेगा अब)
4. Prolongation of Action Potential.

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## Class - IB DEPTH OF BIOLOGY

- ① Decrease Autonomicity in Purkinje. (Conduction ↓) H.R ↓
- ② Abnormal & Triggered Activity (↓) se.
- ③ (↓) se Slope of Phase 4 Polarisation [Premature Depolarisation ↓]
- ④ No Change in duration of Action Potential.

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Premature → Normally Et Jaldi Na Ho Depolar

## Class - IC

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- ① Powerful  $\text{Na}^+$  Channel Blocker.
- ② (↓)se Premature Ventricular Depolarisation.  
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- ③ Alter Autonominicity in PaceMaker.
- ④ (↓)se Conduction.

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② B-Blocker → Propamolo

- a) (↓)se Slope of Phase 4  $\Rightarrow$  Lead to Delay in Depolarisation
- b) (↓)se Autonominicity in SA Node & Purkinje fiber
- c) (↓)se Conduction Velocity in A.V Node.
- d) (↓)se refractory period in A.V Node.
- e) They do not Alter duration of Action - Potential.

### ③ K<sup>+</sup> Channel Blocker ⇒

Eg → Amiodarone ⇒

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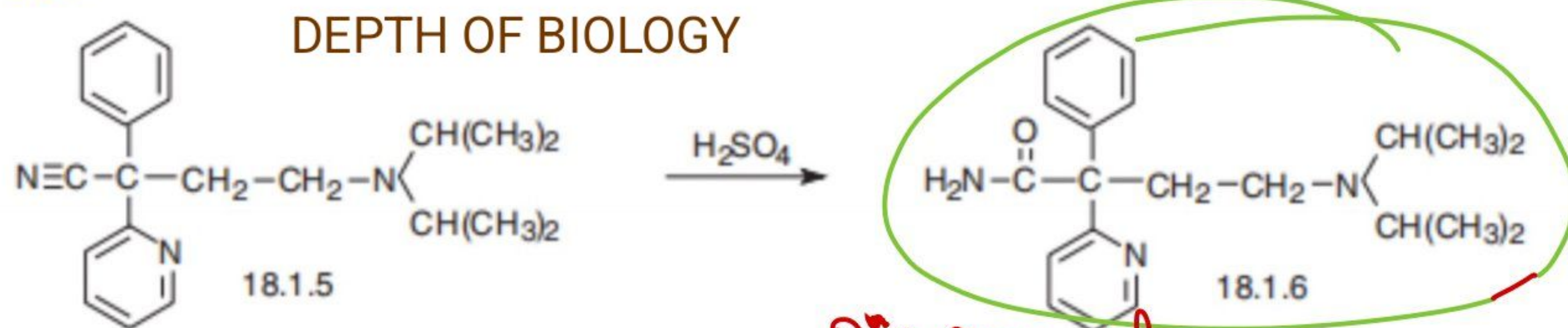
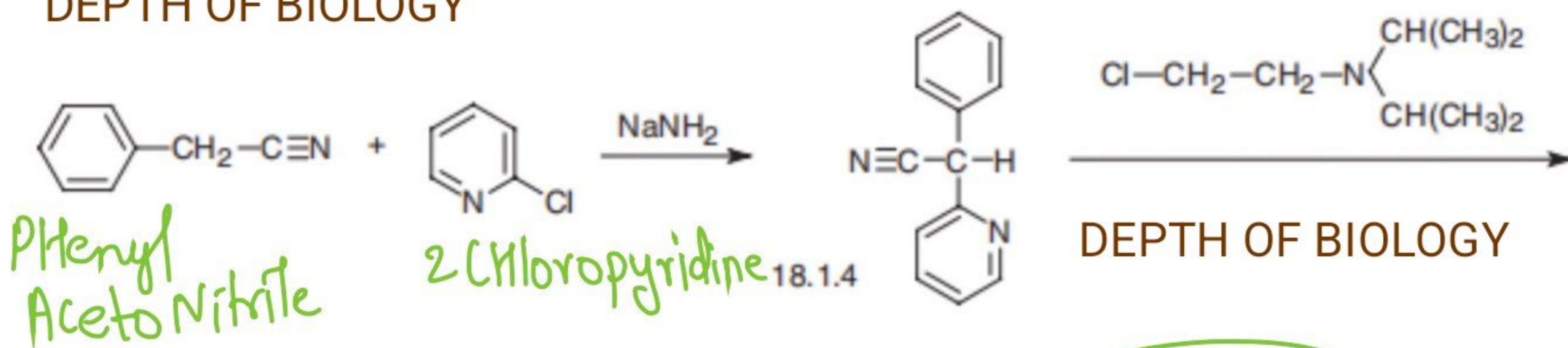
- Powerful - Anti Arrhythmic drug.
- Block K<sup>+</sup> Channel. & Prolong Action Potential.

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- Also block Na<sup>+</sup> & Ca<sup>2+</sup> Channel ★
- They block β-Adrenergic receptor. (Heart)
- They (↓)se the S.A Node Pacemaker Activity.

# Disopyramide phosphate (synthesis)

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Disopyramide

$\downarrow \text{H}_3\text{PO}_4$

$\bullet \text{H}_3\text{PO}_4$

D.P