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ELECTRIC ORGANS IN FISHES

INTRODUCTION

- In some fishes adaptive organs are developed such as electric organs, poison glands, bioluminescent organs.
- Electric organs are seen in approximately 250 species of fishes.
- These glands are not specific to any class.
- These glands discharge electric shock.
- Different species use electric organs for different functions.

DISTRIBUTION OF ELECTRIC ORGANS IN FISHES

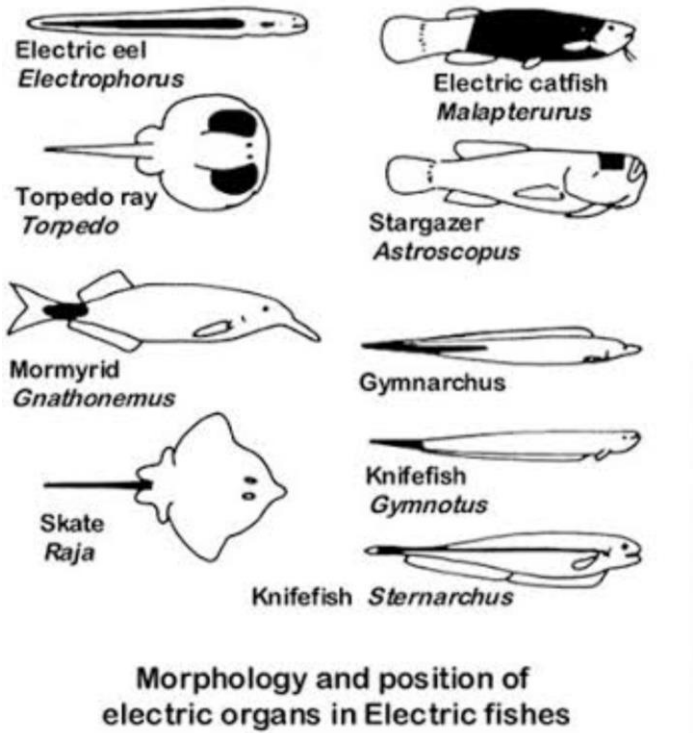
- Chondrichthyes

1. Torpedo
2. Raia
3. Narcine

- Osteichthyes

1. Electrophorus
2. Mormyrus
3. Malapterus
4. Star-gazer

LOCATION OF ELECTRIC ORGANS

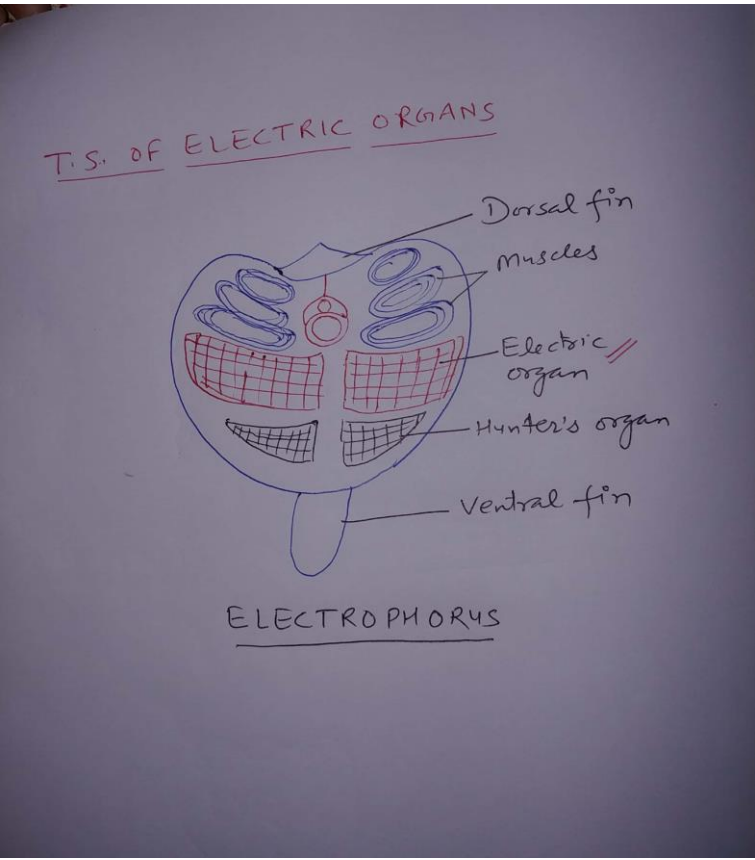


Morphology and position of electric organs in Electric fishes

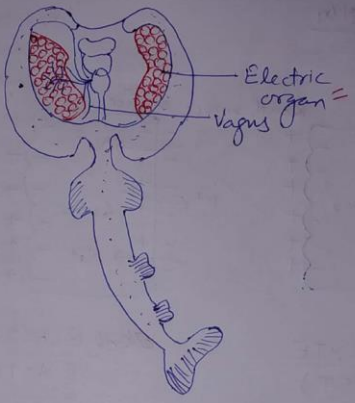
BASIC STRUCTURE OF ELECTRIC ORGAN

- Each organs is made of multinucleated cells called electroplates, having transparent cytoplasm.
- These cells are embedded in jelly like material.
- One face of cell is smooth, supplied by nerve fibres, while the other face i.e. the rough face bears papillae.
- Each end of organ represents a pole.

T.S OF ELECTRIC ORGANS

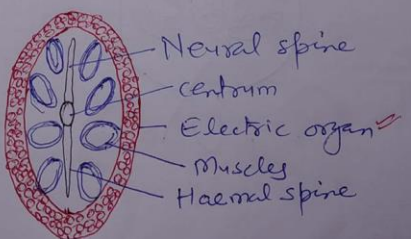


T.S OF ELECTRIC ORGANS



TORPEDO

T.S OF ELECTRIC ORGANS

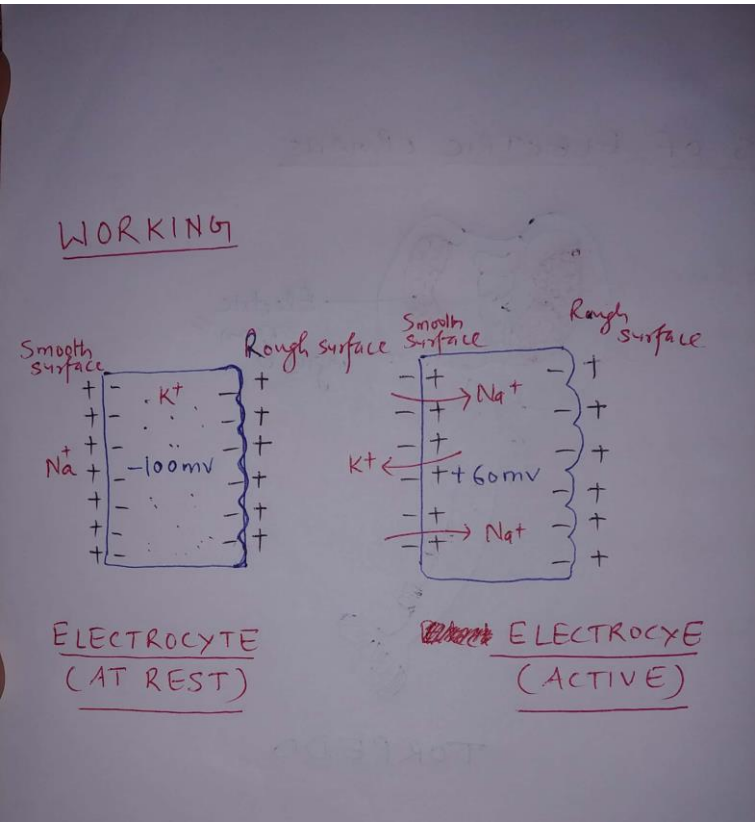


MALAPTERUS

Electric Discharge from Different Fishes:

1.	**Electrophorus** (Electric eel)	—	Maximum-500-600V by large electric organs
		—	Minimum-10V by small electric organs
2.	**Melapterurus** (Electric catfish)		350-450 V
3.	**Astroscopus** (Star-gazer)	—	50 V
4.	**Torpedo** (Electric Ray)	—	40–50V
5.	**Narcina** (Ray)	—	35-37V
6.	**Raja** (Skate)	—	4V
7.	**Gymnotus**	—	0.5-1.0V
8.	**Stenarchids**	—	High frequency 1700 Hz.

WORKING


WORKING
Smooth surface
Rough surface
K+
Na+
-100mv
ELECTROCYTE
(AT REST)
Smooth surface
Rough surface
Na+
K+
+60mv
Na+
ELECTROCYE
(ACTIVE)

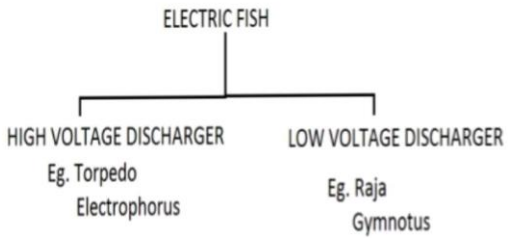
WORKING

- Initially a potential of -100mV is maintained by high influx of potassium and low influx of sodium.
- At excitation state, this potential is inversed momentarily at nervous surface (smooth surface)of electroplates, due to high influx of sodium inside electroplates.
- This momentary change builds up potential of +60mV or even more in some.

WORKING

- This change in potential shifts to adjacent electroplates, and causes a current flow.
- Impulse of excitation is received from brain through nerves.
- The direction of shift in potential varies in different species of fishes from dorsal to ventral, head to tail or vice-versa.

TYPES OF ELECTRIC FISH



FUNCTIONS OF ELECTRIC ORGANS

- Catching food.
- As defense organ.
- As a warning device
- Maintaining territory.
- Species Recognition.

ORIGIN OF ELCTRIC ORGANS

- Basically, electric cells in fishes are developed from muscle cells.
- At embryo stage, electric organs are filled with muscle fibers, just like region surrounding it.
- But slowly it muscles swell up and further differentiates into electric organs.
- In different species muscles of different area are used.

ORIGIN OF ELCTRIC ORGANS

Fish	Muscle
Torpedo	Branchial muscles
Mormyridea	Tail muscles
Malapterurus	Body muscles
Star -gazer	Eye muscles
Electrophorus	Tail muscle

Thank You