PRELIMINARY OBSERVATIONS ON THE EFFECT OF A. C. CURRENT ON *CATLA CATLA* AND *OPHICEPHALUS PUNCTATUS*

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In order to evolve suitable electrical fishing gear for Inland waters, preliminary experiments have been conducted to observe effect of A. C. currents on *Catla catla* at voltages of 30, 90 and 120, pH 7.3 and 8.4, temperature 48°F, 78°F and 105°F, distance between electrodes 25 cm, 50 cm and 75 cm, size range of fish 100 mm, to 235 mm. Apparatus used was a 5 K. W; A. C., 60 cycles generator with resistance control. Larger sizes of fish were more prone to electric shock. Higher temperature increase the intensity of the shock, while variation of pH between 7.3 to 8.4 did not materially affect the intensity of the shock. Fishing with a mixed population of *Catla catla* and *Ophicephalus punctatus* gave a greater percentage of mortality for the latter.

INTRODUCTION

Meyer Waarden (1957) in discussing basic principles of electrical fishing has indicated reaction of fish to D. C., A. C., & interruption current. In view of the need for introducing electric fishing in Inland areas with boulders and stumps preliminary experiments were taken up to determine the effect of A. C. current on *Catla catla* and *Ophicephalus punctatus.*

MATERIALS AND METHODS

A generating plant of 220/230 volt, 60 cycle current mounted on a trolly was used for the experiment. The maximum output was 5 K. W. The generator was driven by a 4 cylinder gasolin engine of 12 H. P. The voltage was controlled by a rheostat. Insulated wire was used and for aquarium experiment no special electrode was made but the open terminals were used as electrodes.

In cistern and tank experiments copper wire was used on an iron frame of size 30×15cm.

In an aquarium of 76×38 cm with a depth of 32 cm *Catla catla* was placed in the field between terminals in a hand net for varying periods and results observed.

In a cistern of size 600×150×120 cm, 200 *Catla catla* and 25 *Ophicephalus punct-*

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TABLE I SHOWING EFFECT OF ELECTRIC SHOCK WITH A VOLTAGE OF 30 on *CATLA CATLA*

Water temperature — 78° F
pH — 7.3
Distance between electrodes — 75 cm.

Size in mm	Period of shock in seconds	Voltage	Period of recovery in seconds
100	1	30	No effect
100	2	30	No effect
100	3	30	No effect
125	2	30	2.5
125	3	30	3.5
150	1	30	No effect
150	3	30	4.5
175	1	30	No effect
175	2	30	2.5
200	1	30	2.0
235	1	30	3.0
235	2	30	5.0
235	3	30	7.0

TABLE II SHOWING EFFECT OF ELECTRIC SHOCK WITH A VOLTAGE OF 90 on *CATLA CATLA*

Water temperature — 78° F
pH — 7.3
Distance between electrodes — 75 cm.

Size in mm	Period of shock in seconds	Voltage	Period of recovery in seconds
100	1	90	No effect
100	2	90	No effeci
100	3	90	1.0
125	2	90	No effect
125	3	90	2.0
150	1	80	No effect
150	3	90	6.5
175	1	90	No effect
175	2	90	6.5
200	1	90	6.0
235	1	90	9.0
235	2	90	25.0
235	3	90	44.0

TABLE III SHOWING EFFECT OF ELECTRIC SHOCK WITH A VOLTAGE OF 120 on *CATLA CATLA*

Water temperature — 78° F
pH — 7.3
Distance between electrodes — 75 cm.

Size in mm	Period of shock in seconds	Voltage	Period of recovery in	
			Minutes	Seconds
100	1	120	0	10.0
100	2	120	0	59.0
100	3	120	2	10.0
125	2	120	1	3.0
125	3	120	3	7.0
150	1	120	0	24.0
150	3	120	5	7.0
175	1	120	0	24.0
175	2	120	2	45.0
200	1	120	0	27.0
235	1	120	0	27.0
235	2	120	3	00.0
235	3	120	15	00.0

TABLE IV SHOWING EFFECT OF ELECTRIC SHOCK WITH A WATER TEMPERATURE OF 48° F

Voltage — 30
pH — 7.3
Distance between electrodes — 75 cm.

Size in mm	Period of shock in seconds	Temperature of water in °F	Period of recovery in seconds
100	1	48	No effect
100	2	48	No effect
125	1	48	No effect
125	2	48	No effect
150	1	48	No effect
150	2	48	No effect
175	1	48	No effect
175	2	48	No effect

TABLE V SHOWING EFFECT OF ELECTRIC SHOCK WITH A TEMPERATURE OF 78° F

Voltage — 30
pH — 7.3
Distance between electrodes — 75 cm.

Size in mm	Period of shock in seconds	Temperature of water in °F	Period of recovery in seconds
100	1	73	No effect
100	2	73	No effect
125	1	73	No effect
125	2	73	2.5
150	1	73	No effect
150	2	73	2.5
175	1	73	No effect
175	2	73	2.5

TABLE VI SHOWING EFFECT OF ELECTRIC SHOCK WITH A WATER TEMPERATURE OF 105° F

Voltage — 30
pH — 7.3
Distance between electrodes — 75 cm.

Size in mm	Period of shock in seconds	Temperature of water in °F	Period of recovery in seconds
100	1	105	3.0
100	2	105	4.0
125	1	105	11.0
125	2	105	11.0
150	1	105	12.5
150	2	105	15.0
175	1	105	15.0
175	5	105	20.0

TABLE VII SHOWING EFFECT OF ELECTRIC SHOCK WITH A WATER pH 7.3 ON *CATLA CATLA*

Water temperature — 78° F
Voltage — 30
Distance between electrodes — 75 cm

Size in mm	Period of shock in seconds	pH	Period of recovery in seconds
100	5	7.3	2.5
125	2	7.3	3.5
150	5	7.3	11.0
175	3	7.3	4.5
235	3	7.3	5.0
235	5	7.3	13.5

TABLE VIII SHOWING EFFECT OF ELECTRIC SHOCK WITH A WATER pH 8.4 ON *CATLA CATLA*

Water temperature — 78° F
Voltage — 30
Distance between electrodes — 75 cm.

Size in mm	Period of shock in seconds	pH	Period of recovery in seconds
100	5	8.4	1.2
125	3	8.4	1.2
150	5	8.4	1.5
175	3	8.4	3.5
235	3	8.4	5.0
235	5	8.4	7.0

TABLE IX SHOWING EFFECT OF ELECTRIC SHOCK ON *CATLA CATLA* WHEN THE DISTANCE BETWEEN ELECTRODES IS 25 cm.

Voltage — 7.3
Water temperature — 78°F

Size in mm	Period of shock in seconds	Distance between electrodes in cm.	Period of recovery in seconds
100	1	25	Died
100	2	25	Died
150	1	25	Died
150	2	25	Died
200	1	25	Died
200	2	25	Died

TABLE X SHOWING EFFECT OF ELECTRIC SHOCK ON *CATLA CATLA* WHEN THE DISTANCE BETWEEN ELECTRODES IS 50 cm.

Voltage — 30
pH — 7.3
Water temperature — 78° F

Size in mm	Period of shock in seconds	Distance between electrodes in cm.	Period of recovery	
			Minutes	Seconds
100	1	50	1	32.0
100	2	50	2	32.0
150	1	50	4	10.0
150	2	50	4	18.0
200	1	40	5	20.0
200	2	50	7	00.0

TABLE XI SHOWING EFFECT OF ELECTRIC SHOCK ON *CATLA CATLA* WHEN THE DISTANCE BETWEEN ELECTRODES IS 75 cm.

pH — 7.3
Voltage — 30
Temperature of water — 78° F

Size in mm	Period of shock in seconds	Distance between electrodes in cm.	Period of recovery in seconds
100	1	75	No effect
100	2	75	No effect
150	1	75	No effect
150	2	75	No effect
200	1	75	No effect
200	2	75	6.5

atus were released and the electrodes were moved along the margin from one end to the other. The apparatus used in the cistern was also used in a tank of 0.5 acres. The electrodes were tied in a boat 90 cm apart and the boat was rowed over the tank. The voltage was 220.

OBSERVATION

Table I to III give the effect of shocks of 30 to 120 volts for a period of 1 to 3 seconds. The electrodes were kept at constant distance of 75 cm, water temperature at 78°F and pH at 7.3.

Figure 1. shows clearly that the smaller fishes were less prone to shock and increasing voltages was more effective.

The effect of variation in temperature between 48°F to 105°F at voltage of 30 and distance between the electrodes being 75 cm., pH 7.3, may be seen in tables IV to VI The diagram in Figure 2 indicates that higher temperature has increased the internity of shock.

Table VII and VIII indicate the effect of pH 7.3 and 8.4 at a temperature of 78°F, distance between electrodes 75cm and voltage of 30, period of shock 3 and 5 sceonds. The diagram in figure 3 shows there was no appreciable difference between the two pH.

Tables IX to XI give the effect of distance between electrodes, being varied between 25 to 75cm, period of shock being 1 and 2 seconds. The diagram in figure 4 shows that the distance between electrodes when increased produced less effect.

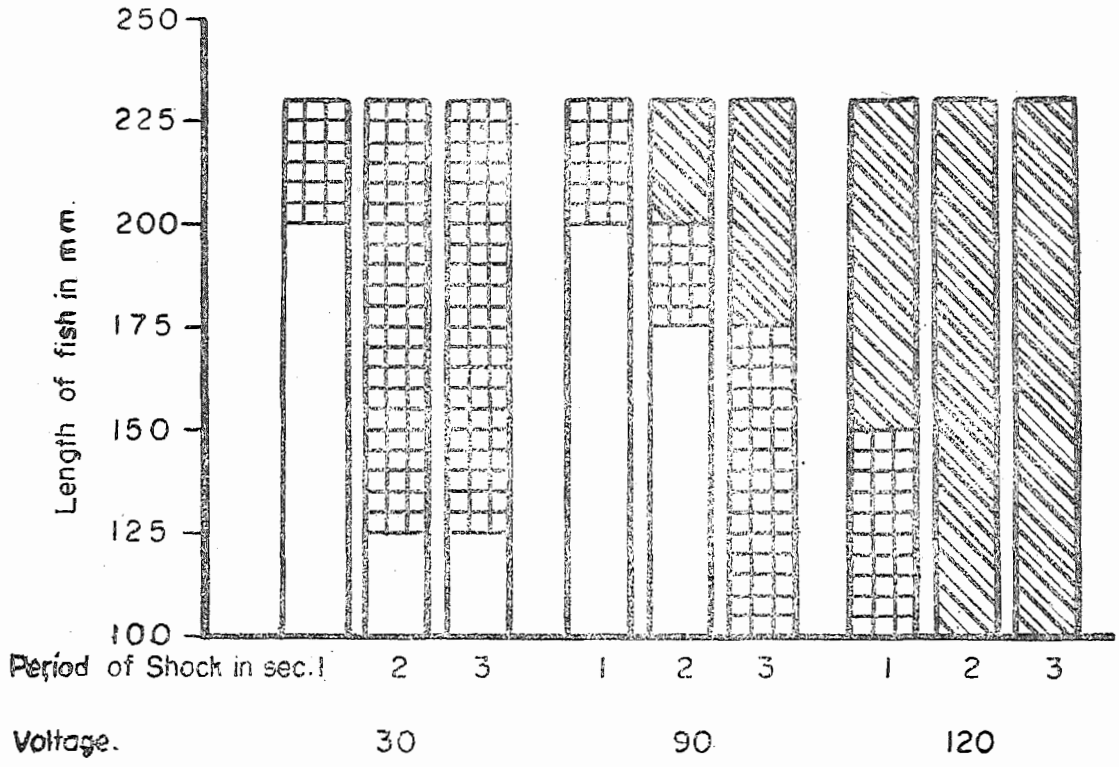
In the cistern out of 225 fishes, 200 were *Catla catla* ranging in size from 162.5 mm to 275 mm, and 25 *Ophicephalus punctatus* of 50 to 125 mm, 120 *Catla catla* and 23 *Ophicephalus punctatus* were found dead, after electric shock which in a farm of about $\frac{1}{4}$ of an acre, the electrodes kept 90 cm apart and operated from a boat did not affect any fish. The voltage used in the tank was 220.

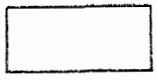
DISCUSSION AND CONCLUSION

The effect of electric current on various fishes has been studied in Germany, U. S. A. and other countries and suitable gear for electric fishing has been evolved for particular type of fishing as well as species of fish. These preliminary studies indicate that by regulating the E. M. F. it may be possible to capture carps. *Catla*

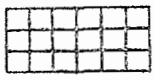
Fig.1.

EFFECT OF ELECTRIC SHOCK ON CATLA CATLA AT DIFFERENT VOLTAGES.

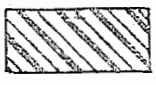




No effect.



Mild shock.



Severe shock.

Fig.2.

EFFECT OF TEMPERATURE ON ELECTRIC SHOCK GIVEN TO CATLA CATLA.

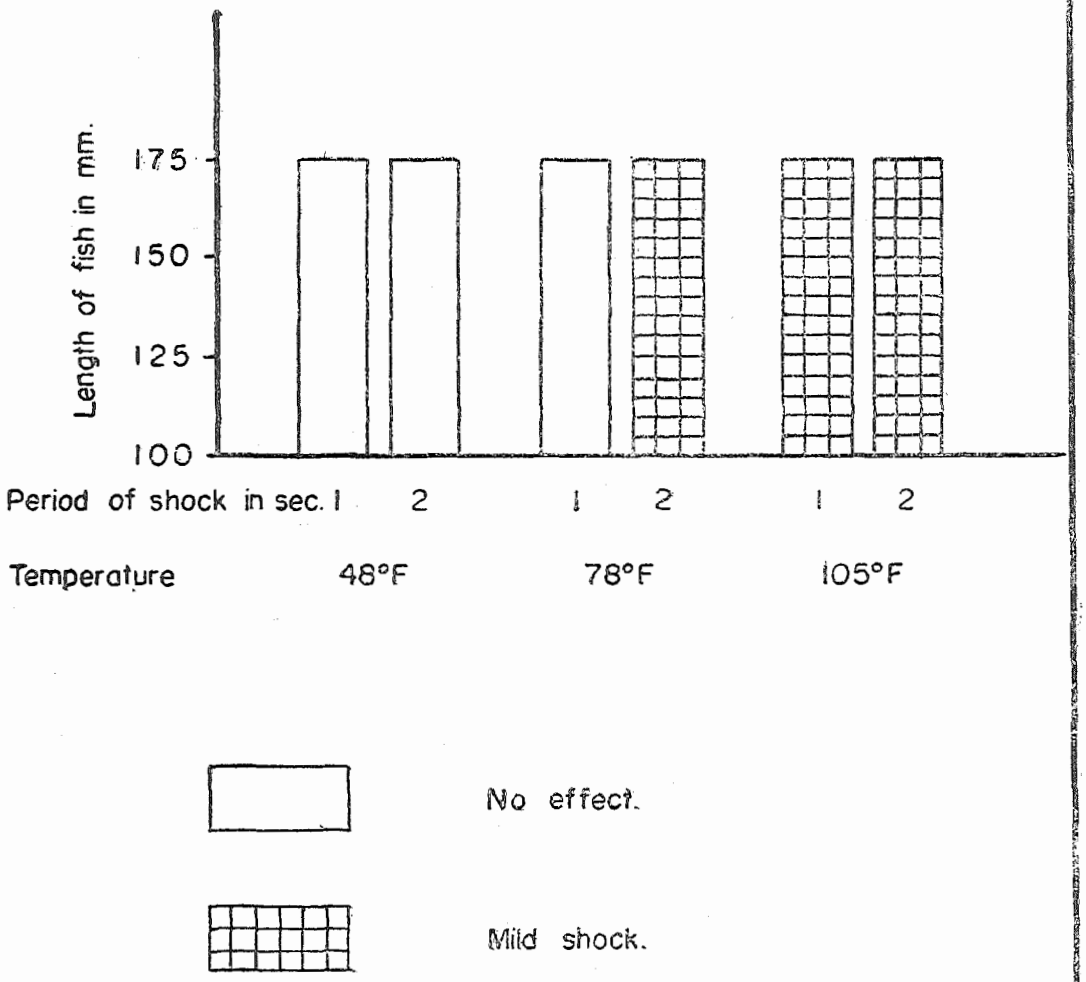
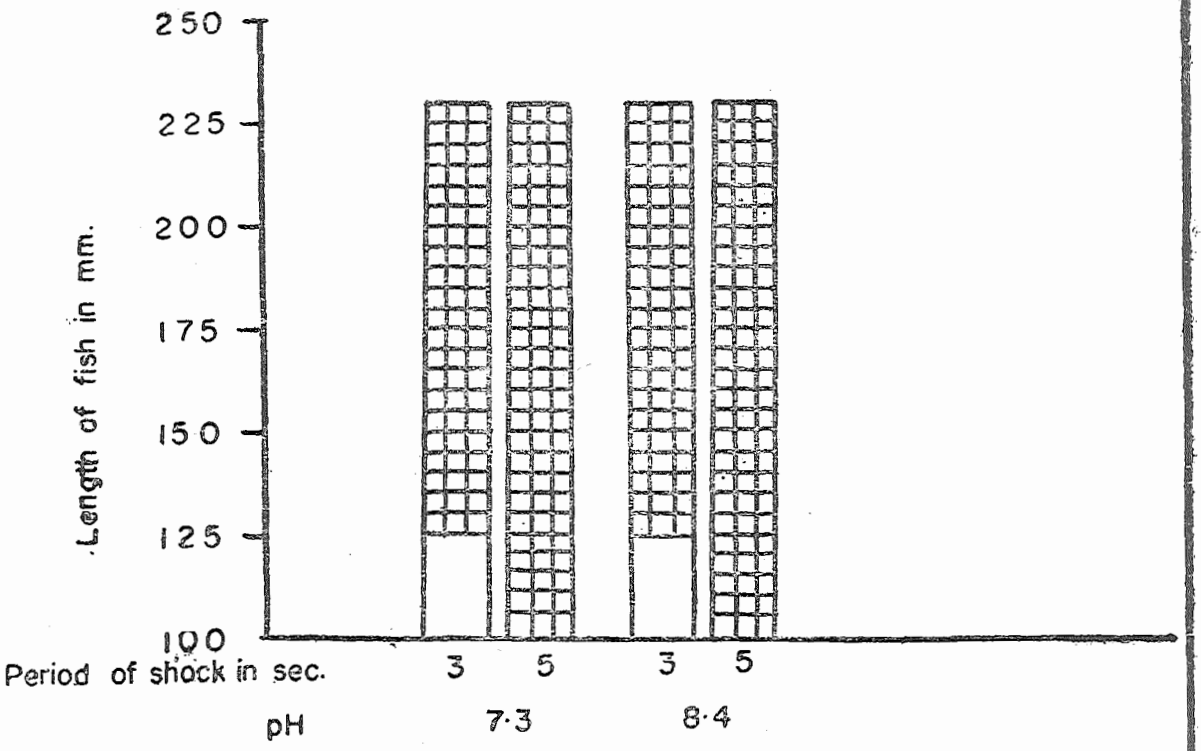


Fig. 3.

EFFECT OF pH ON ELECTRIC SHOCK GIVEN TO CATLA CATLA.

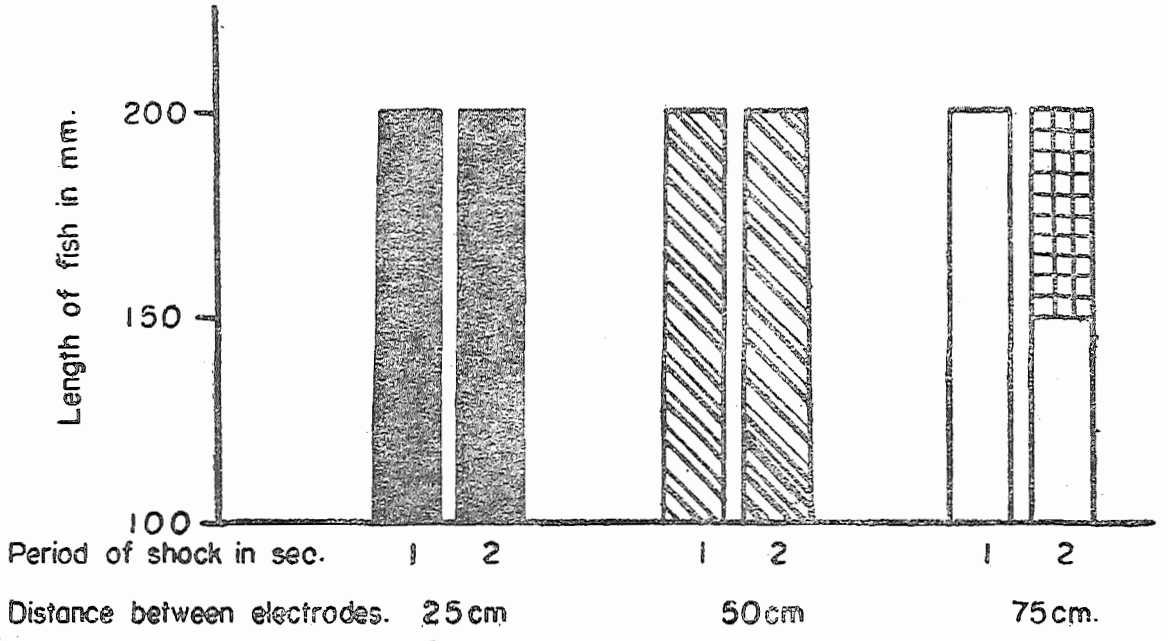


No effect.

Mild shock.

Fig.4.

EFFECT OF DISTANCE BETWEEN ELECTRODES.



No effect

Mild shock.

Severe shock.

Dead.

catla is effectively shocked by A. C. current and the success of the same mainly depends on voltage, distance between electrodes and size of the fish. In the present experiment, all fish used were immature and the effect of electric shock on mature fish has not been studied.

SUMMARY

Effect of electric shocks on *Catla catla* has been studied in aquaria with A. C. current 30 to 120 volt, distance between electrodes 25 to 75 cm, temperature of water 48° F to 105° F, and pH 7.3 to 8.4.

REFERENCE

Meyer Waarden P. F., 1955. Recent development in Electro fishing. F. A. O., *World Fish Abstr*, May/June, p. 21.