1.3 Patterns of Behavior-
(a) Innate Behavior- Kinases/Taxes, Simple reflex, Com
behaviors, Instinct and Motivation
...havior- Habituation, Imprinting, Conditioned reflex, Trial & error

PAPER -> I

CC-13 Sem III

CIRCADIAN RHYTHMS

PAGE NO.:
DATE: / /

Rhythms of various kinds have been in evidence in the biological world. Rhythmic events occurs every where in the enviroment. All the living organisms are subjected to these rhythems and they exert great influence on them. Animals must regulate their activities in concurrence with these cycle in order to avoid adverse conditions and to get enough food and shelter. The daily rhythems (Circadin = Circa = about + dian = a day) from the basic feature of animals.

Erwin Banning (1936) Proposed an in built nearly automatic rhythm which repeats itself at about 24 hours interval. These interval clocks or circadian rhythems are the internal mechanism that Provoid a means of measuring length of time to the living beings.

It has been a subject of interest whether Periodicity is an animal is determined by external environmental stimuli (Exogens) or controlled through Physiological factors within the animal itself (Endogenous). Both exogenous and endogenous stimuli are important. It is the intricate interaction between the two together.

Experiments have shown that many animals maintained their biorhythms even when the relevant external stimuli were either removed artificially or when organisms were displaced from their habitat and placed in conditions of constant light, intensity temperature, Pressure, humidity and Chemical composition they continued to exhibit nearly the same rhythms of behaviour they showed in their natural habitat. Animals posses internal clock that controls the rhythms in behaviour and kept it going with the help of internal stimuli while external

environmental stimuli (zeitgebers/ entrainers) serve only to set and reset this clock Periodically.

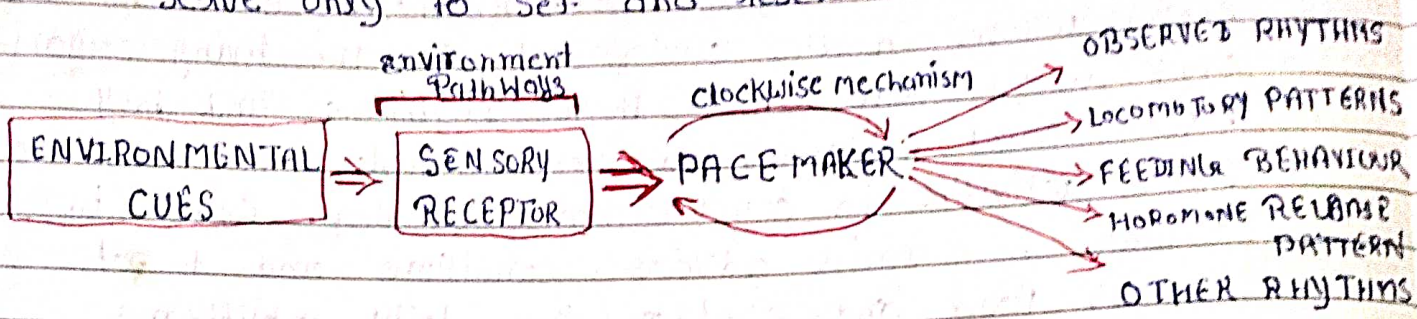

FIG:- A Master clock may act as a pacemaker to regulate the many other mechanisms that control the circadian rhythms of an individuals.

MECHANISMS FOR TIMING BEHAVIOUR APPROPRIATELY :-

TWO competing theories :-

1. Animals change their Priorities in response to a timing mechanism with its own built in cyding schedule that is independent of cues from the animals surroundings.

ii). Animal adjust the relationships beth control elements in their nervous system strictly on the basis of information gathered by mechanisms that monitor a changing environment, can be taken into account

EXPLORING CIRCARDIAN MECHANISMS :-

To study the mechanisms investigators have employed two main tactics.

(1.) To infer something about the Properties of the system by examining how it reacts to various environmental manipulating usually involving changes in light and dark regimes.

2. To disconnect various Parts of the nervous system surgically.

The search for the location and operating rules of the master clock in vertebrates has revealed a patterns of cyclical control roughly similar to that found in many invertebrates. The rule of hypothalamus in mammals make it a logical place to investigate. The supra chiasmatic nucleus (SCN) in the kind of structure that could conceivably secure information about day and night usable to entrain a master biological clock.

Using techniques designed to detect the presence of specific proteins, Benjamein Rusak et. al. have detected precisely light response at biochemical level. The Period as Per gene regulates the circardian rhythms in Drosophila. some evidence suggests that in mammals too the activity of a single gene (clock) is essential for normal circardian rhythms.

How this gene operates within SCN cells has not been established. However, one working hypothesis is that mammals are like fruit flies when it comes to circardian rhythms.

In response to a circardian cycle of SCN messages, the Pineal secretes a hormone melotonin in a rhythmic fashion imposing a corresponding rhythms on many elements of the animals Physiology & behaviour.

Remarkable Progress has been made in recent in understanding how specific genes in Pineal cells participate in the control of the glands activity (FOULKES, DUVAL, CORSI 1996) / stehle, foulkes, molina, Simmonne and corsi 1993).

In briefs, chemical signal from SCN neurons activate a specific gene (CREM)

in Pineal cells, a gene whose Protein Product (ICER) in Presumbly involved in same way in melatonin manufacture self regulating negative feed back in the CREM may also be Present in SCN. The CREM inhibition in dependent on Photo Periods.

CONCLUSION :-

In some mammals the SCN contains central pacemaker that sends signals to pineal gland. The Pineal cyclically changes in its Production of melatonin with adjustments for Shift in Photo Period length, integrating the environment independent and environment dependent elements that regulates daily changes in behaviour.

But it is intriguing in the case of naked mole rats lacking any observed circardian rhythms.