



**WELCOME**

**CIRCADIAN CYCLE-  
THE SUPREME PILOT:  
An Intensive Analysis**

By

● **Dr. Santa Misra**

**Exploration is really the essence of human spirit**

Nirvana Shatakam ,  
The  
SOUNDS OF ISHA  
by  
AdiSamkaracharya



# The Key Avenue

## Neurobiological Approach to Circadian Cycle

**Bio-  
psychological**

**Psycho-  
Social**

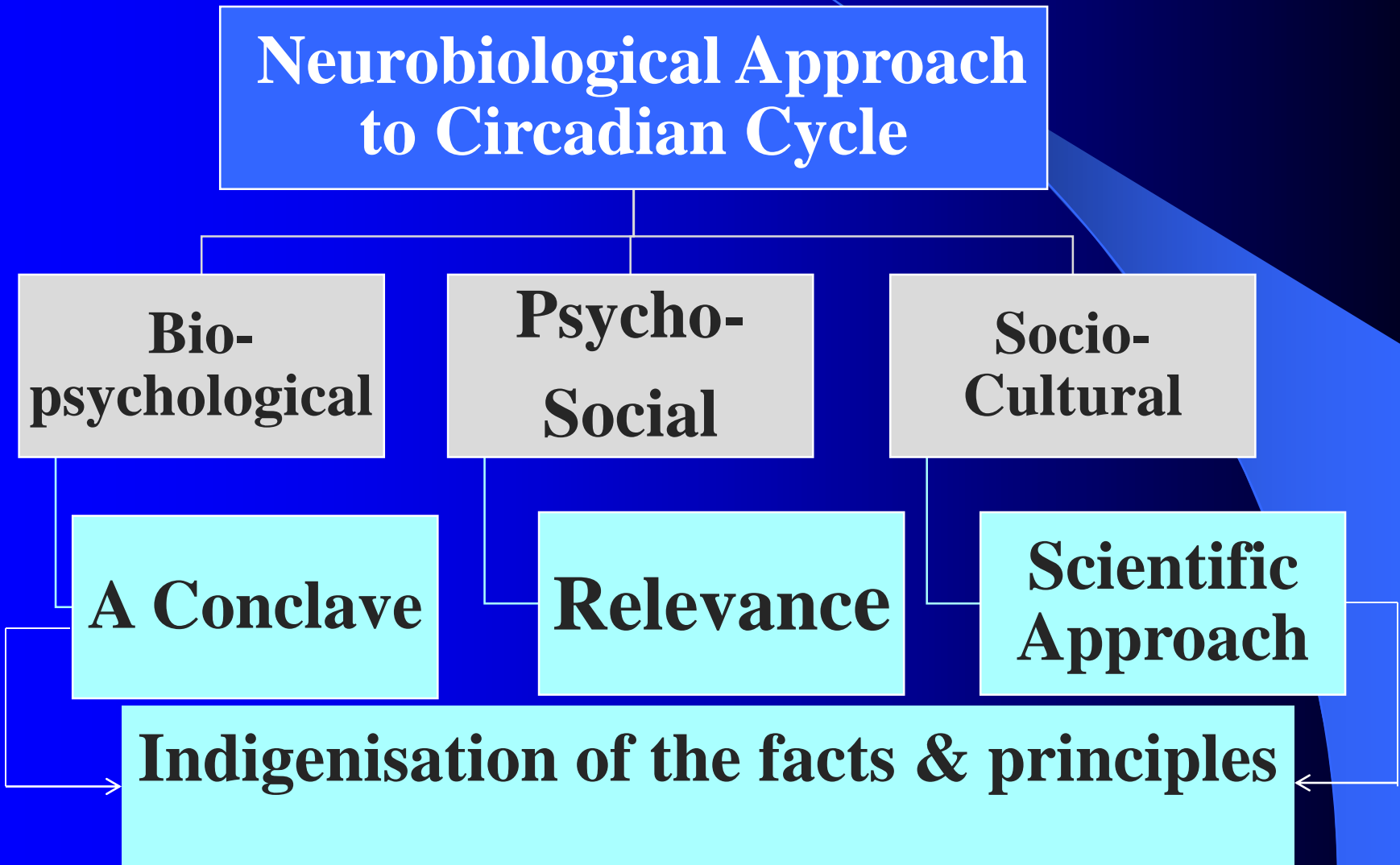
**Socio-  
Cultural**

**A Conclave**

**Relevance**

**Scientific  
Approach**

**Indigenisation of the facts & principles**



# The Behavioral Genesis

- ❖ **Neurobiological**
- ❖ **Bio-psychological**
- ❖ **Psycho-social**
- ❖ **Socio-cultural**

# PRESENTATION AIMS AT

- A conclave
- Relevance
- Scientific approach
- Indigenisation perspective
- To provoke further research

## Analysis includes

- Origin and history of Circadian cycle
- Animals, plants, mammals
- Human beings
- Physiological basis of circadian system
  - Internal oscillations
  - Peripheral oscillations
- Some focus on Maternal circadian cycle

# Circadian Cycle

- The Activity and Arousal Cycle
  - Meaning
  - Definition
  - Importance



# “Circadian Cycle”

**(the biological clock within the organism)**

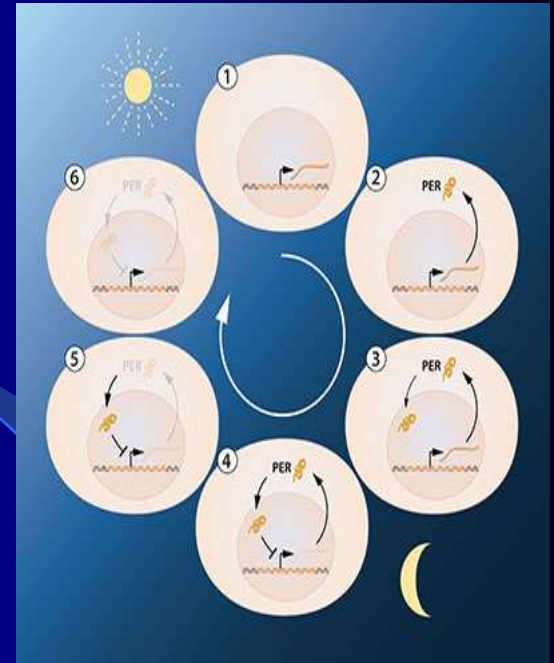
- It is the cyclic changes in bodily processes occurring within a single day based on our conscious awareness
- Circadian rhythms are 24-hour cycles that are part of the body’s internal clock, running in the background to carry out essential functions and processes.
- While the body’s internal clock is naturally aligned with the cycle of day and night, travel, work, or an underlying issue can disrupt the circadian rhythm.

# CIRCADIAN CYCLE: ORIGIN AND HISTORY

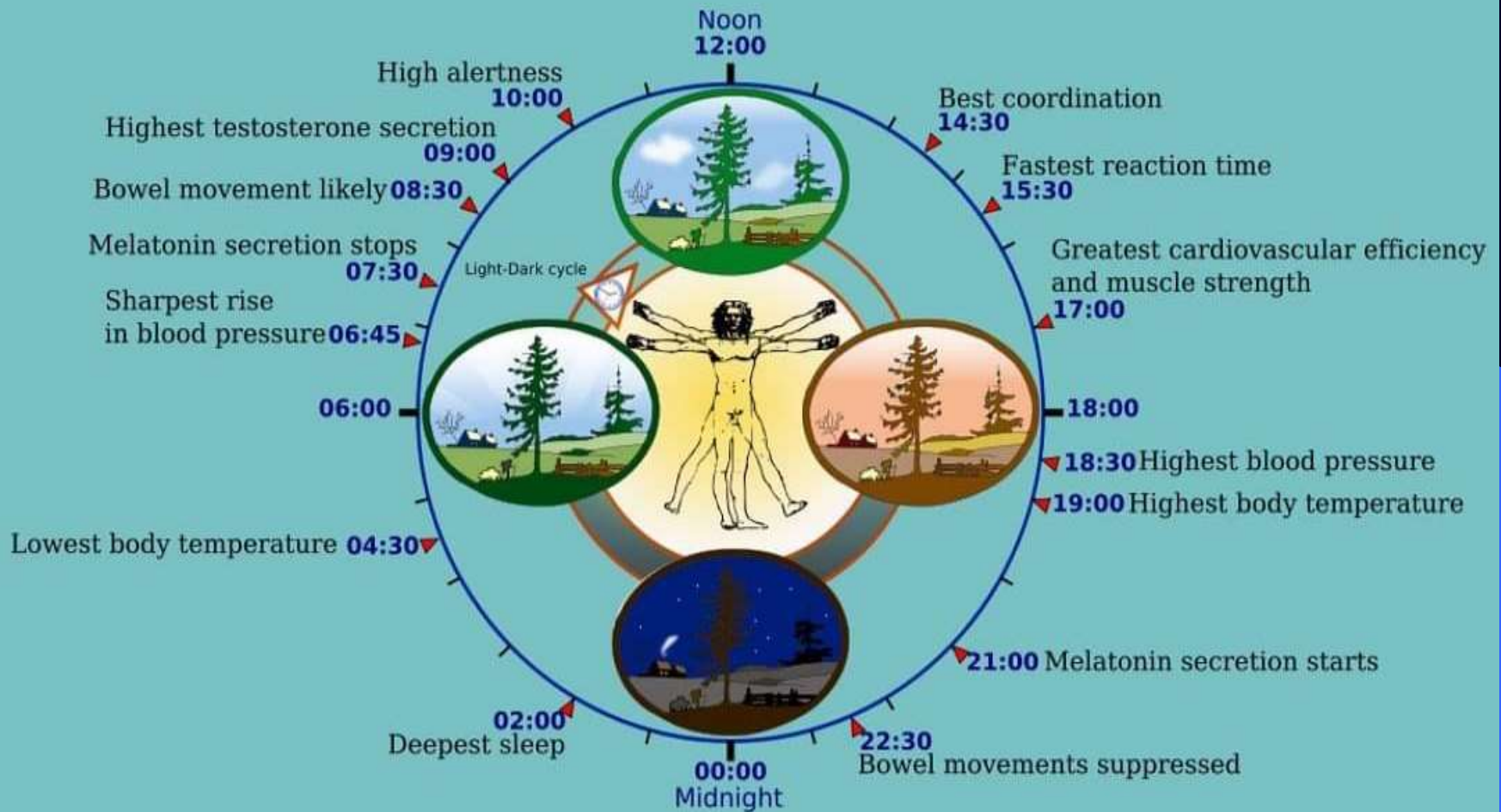
- In 4<sup>th</sup> century BC, when Androstheneas, a ship captain serving under Alexander the Great, described diurnal leaf movements of the tamarind tree (Bretzl, 1903).
- Leonardo Da Vinci's Report:
- The first recorded observation of an endogenous circadian oscillation was by the French scientist Jean-Jacques d'Ortous de Mairan in 1729 on tree.
- In 1896, Patrick and Gilbert observed on sleep -wake cycle.
- The term Circadian was coined when Franz Halberg, a scientist of University of Minnesota, published a paper in 1959 showing blood count varying according to strict rhythm within a day.

- **And finally the Nobel Prize - 2017**
- Jeffrey C. Hall, Michael Rosbash and Michael W. Young
- For their discoveries of molecular mechanisms controlling the circadian rhythm

# A self-regulating clockwork mechanism



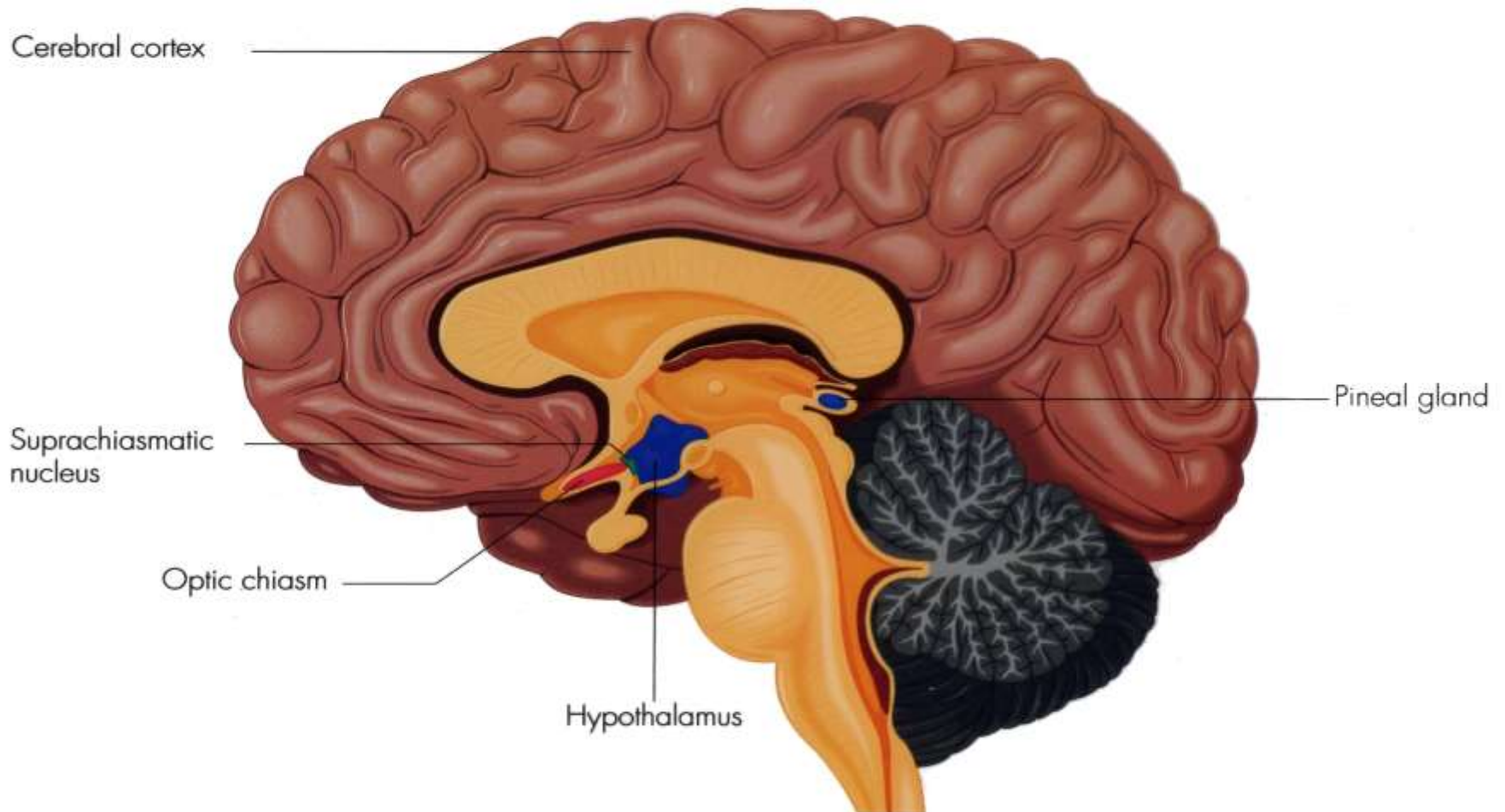
# LEONARDO DA VINCI'S REPORT



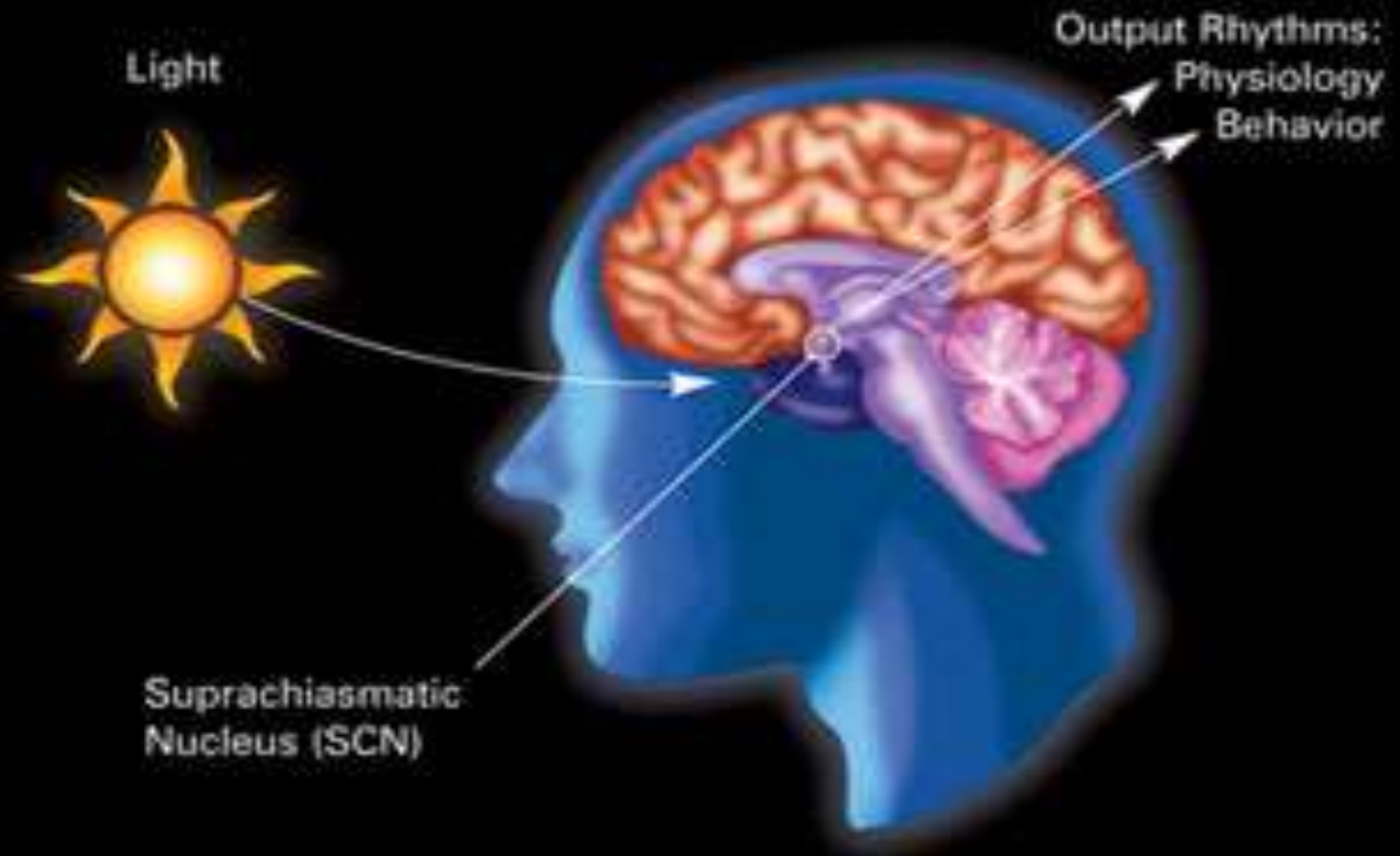
# Biological clock

- ❖ Conscious awareness
- ❖ Generated endogenously
- ❖ Anterior hypothalamic suprachiasmatic nuclei
- ❖ Modulated by exogenous factors
- ❖ melatonin (secreted by the pineal gland) is regulated by the central circadian rhythm generator-the suprachiasmatic nucleus (SCN) of the anterior hypothalamus.

# BRAIN INVOLVEMENT



# BRAIN CORRELATES OF CC





# Effects of Circadian Rhythm

- Biological ( body temperature, blood pressure, heart rate ,etc)
- Psychological (familial advanced sleep – phase system - fasps. Sleep schedules that move ahead by about 4 hours)
- Socio-cultural (social stimuli may affect circadian behavioral programmes by regulating the phase and period of circadian clocks , with environmental interactions i.E. A zeitgeber action)
- Jet lag and shift duties

# CR & species' specificness

- Morning people
- Night people
  - Imprinting
  - Critical period

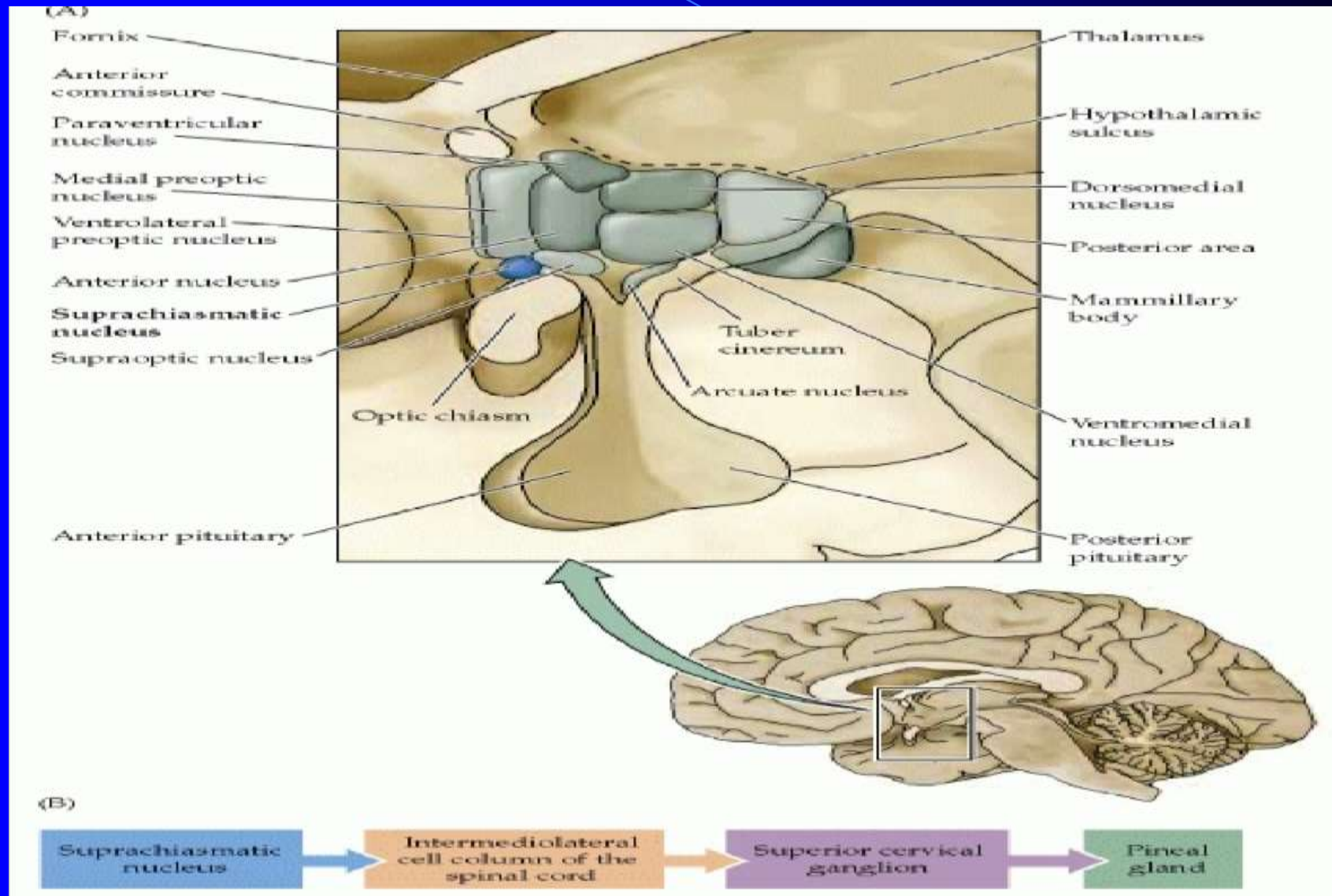
# DIFFERENT CYCLES

- Circadian cycles (24 hours)
- Ultradian cycles (shorter than 24 hours -REM)
- Intradian cycles (longer than 24 -Menstruation)
- Diurnal cycles (25.4 hrs cycle without cyclical cues provided by natural light, occur during the waking day i.e., Russia )
- Circannual Rhythm ( About a year- Hibernation)
- Circaseptan cycle (7-day biological cycle, I.e., CRD, FASD) etc. (Lewy, 1999)

# THE FUNCTION OF THE INTERNAL CLOCK WITHIN THE ORGANISM UPON BEHAVIORAL OUTPUT

- Activity and arousal aspects of behavior
- Animal homeostasis,
- Body metabolism,
- Respiration,
- Heart rate,
- Body temperature,
- Mood,
- Sleep disorder,
- Circadian Rhythm Disorder (CRD)
- Familial Advanced Sleep Disorder (FASD)

# ANATOMICAL UNDERPINNINGS OF CIRCADIAN RHYTHMS



# Automatic pilot

## The clock within the organism

- Generated,
- Controlled,
- Guided, and
- Explained in terms of circadian rhythm
- State of activity and arousal level
- Sleep and wakefulness
- And over all behavioural manifestations

# BLUE BRAIN

- **An Artificial Brain Comes To Life In Switzerland**

The IBM is now developing a virtual brain known as the BLUE BRAIN.



# HARDWARE AND SOFTWARE REQUIREMENTS

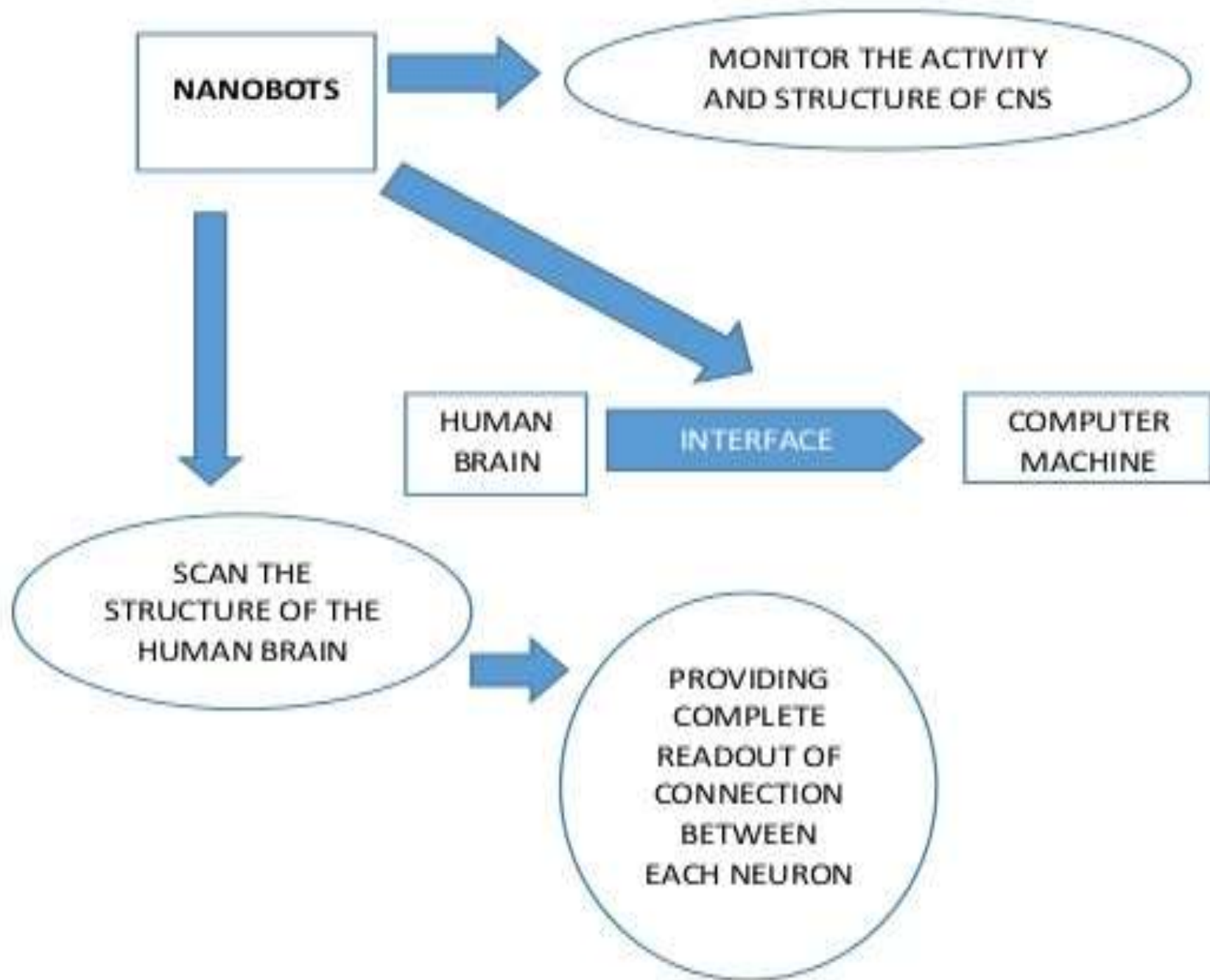
- Super computer



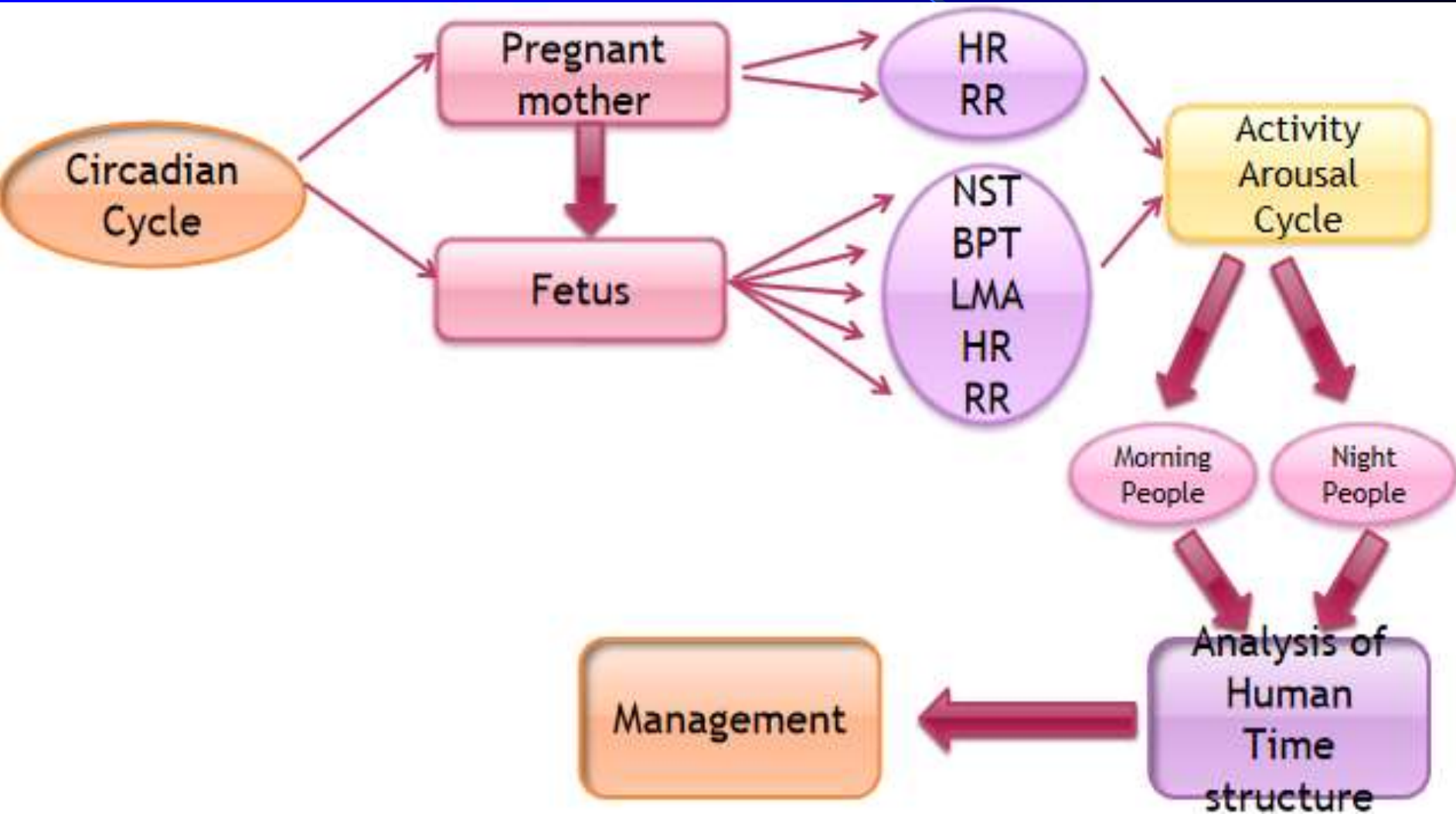
## Nanobots







# ANALYSIS OF HUMAN TIME STRUCTURE



# Conclusion

- Circadian Rhythms have differential effect on our Behaviour
- Circadian cycle occurs due to the effect of Anterior Hypothalamic Suprachiasmatic nucleus ( CSN ) , NPAS 2 ( Neuronal PAS domain protein)
- There is correlation between Maternal and Fetal Activity
- Let us be aware of this Biological clock - The automatic Pilot - in our body

# Continued...

- Hence From the Above discussions I would like to conclude that Circadian cycle is the supreme pilot in our body For our healthy existence
- Focus should be on indigenisation of facts and principles
- As CC influences most of the behavioural manifestations based on mental wave length connectivity

# Implications

- Academic Significance
- Child rearing practices
- Relevance of the Study to the current situation
- Contribution to knowledge
- Probable contributions to the society
- Attempt can be made to build brain-based models capable of predicting observed behaviour.
- To meet overall challenges of behavioural manifestations

Thank  
you

