

SUBJECT: DEVELOPMENTAL BIOLOGY

TOPIC : HORMONAL REGULATION OF INSECT METAMORPHOSIS.

CLASS : I M.Sc. ZOOLOGY



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HORMONAL REGULATION OF INSECT METAMORPHOSIS.

Introduction:

- ❖ The radical changes which convert a larva into an adult constitute metamorphosis.
- ❖ The life cycle of a typical insect involves four stages, namely egg, larva, pupa and adult.
- ❖ An outstanding feature of insect metamorphosis is ecdysis or moulting.
- ❖ Ecdysis is the periodical shedding of cuticle by the larva and pupa.
- ❖ Metamorphosis is controlled by hormones.

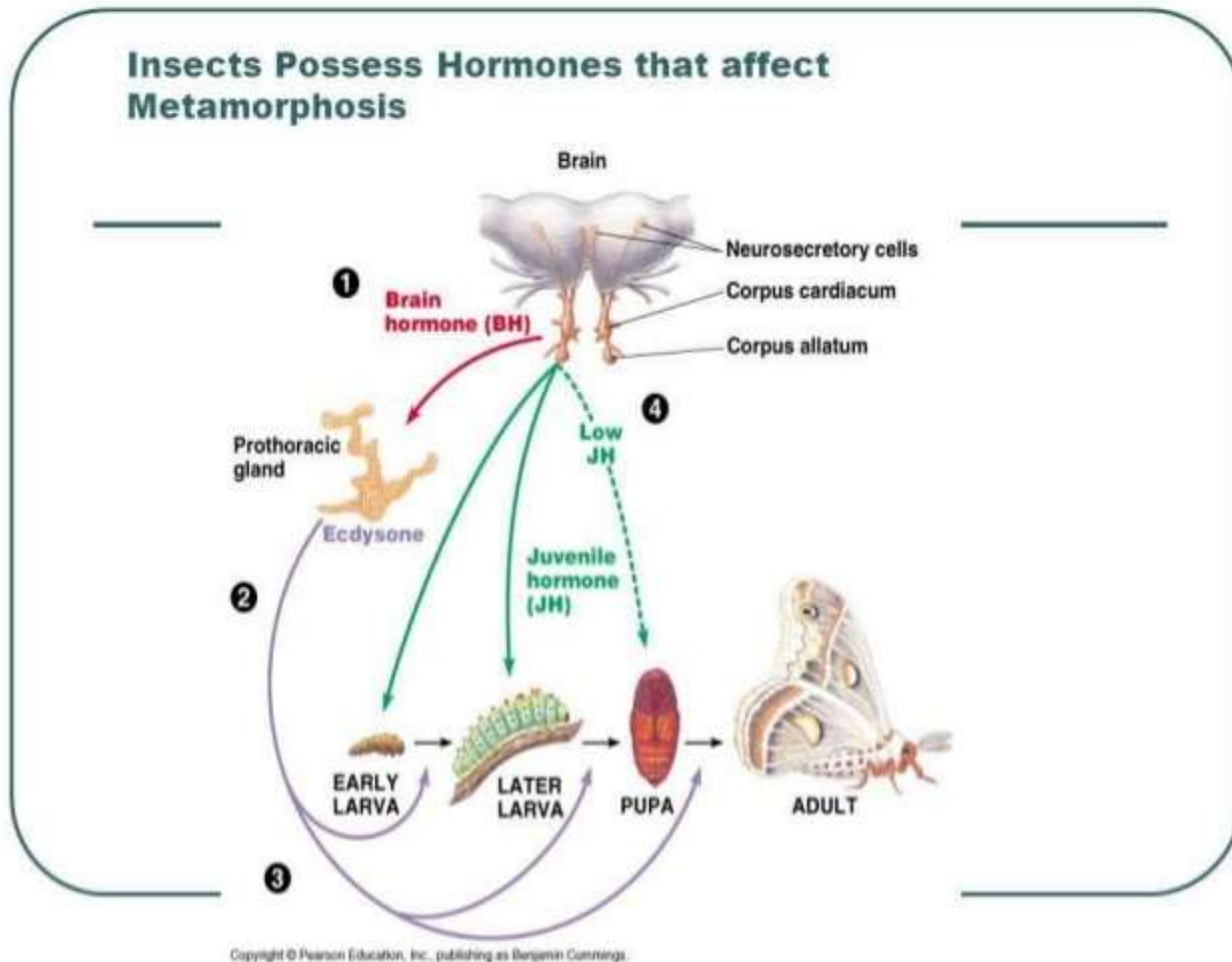


SEQUENCE OF EVENTS OF MOULTING CYCLES AND METAMORPHOSIS IN INSECTS.

- ❖ The brain contains groups of glandular cells called neurosecretory cells.
- ❖ These cells secrete a hormone called brain hormone.
- ❖ It stimulates an endocrine gland called prothoracic gland.
- ❖ The prothoracic gland secretes a hormone called ecdysone.
- ❖ The ecdysone induces moulting, growth and differentiation
- ❖ There is another pair of lobe-like endocrine glands called corpora allata.
- ❖ The hormone secreted by the corpora allata is called juvenile hormone.
- ❖ Its action retains the larval characters.



ROLE OF HORMONES IN INSECT METAMORPHOSIS



ECDYSONE AND ITS ROLE IN INSECT MOULTING AND METAMORPHOSIS

- ❖ Ecdysone acts directly upon the specialized epidermal cells and ordinary epidermal cells.
- ❖ Within few hours,
 1. the nucleolus is enlarged,
 2. different species of RNA begin to accumulate in the cytoplasm and
 3. mitochondria enlarge and multiply by subdivision.
 4. By the time, the old cuticle is thrown off, the renewed epidermal growth has been virtually completed.

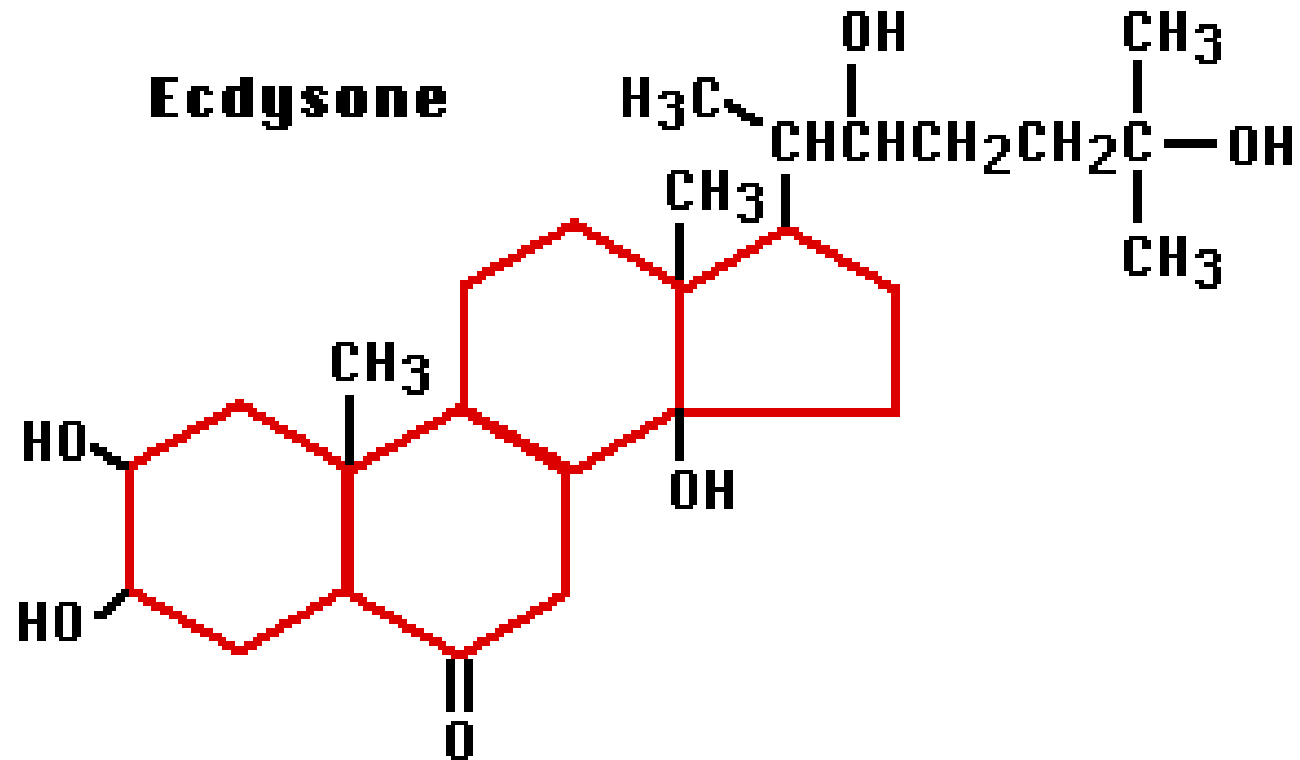


JUVENILE HORMONE AND ITS ROLE IN INSECT MOULTING AND METAMORPHOSIS

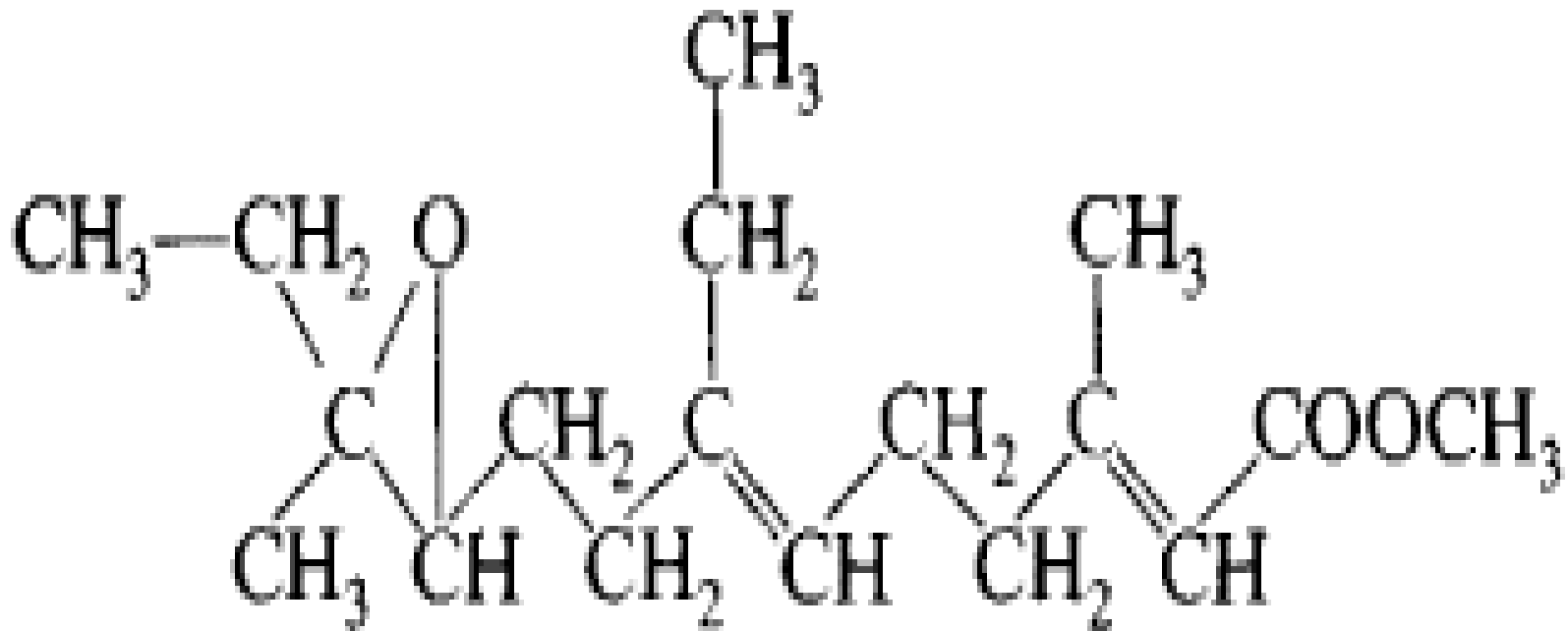
- ❖ The hormone secreted by the endocrine glands corpora allata is called Juvenile hormone.
- ❖ The presence of Juvenile hormone in an immature insect, whether larva or pupa, when the immature insect moults it retains its larval or pupal characters.
- ❖ It does not differentiate into an adult.
- ❖ Withdrawal of Juvenile hormone initiates metamorphosis.
- ❖ The larval form is developed in the presence of a high juvenile hormone concentration.
- ❖ The pupa is developed in the presence of a very low juvenile hormone concentration.
- ❖ The adult is developed when the juvenile hormone is completely absent.



CHEMICAL STRUCTURE OF ECDYSONE



CHEMICAL STRUCTURE OF JUVENILE HORMONE



CONCLUSION

- ❖ Nerve cells are called neurosecretory cells
- ❖ It secretes a hormone called brain hormone.
- ❖ In response to the brain hormone, prothoracic gland secretes a hormone called ecdysone.
- ❖ Ecdysis induces moulting, growth and differentiation.
- ❖ It inhibits the function of corpora allata.
- ❖ Corpora allata secretes juvenile hormone.
- ❖ Its action retains the larval character.



Thank you.

