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B.Sc HONS Part-III Paper - VII

TOPIC: Describe the Evolutionary History of Horse.
or
Evolution of Horse

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Q. • Give an account of evolution of Horse.

Ans. Characteristics of the living Horse—

- (i) The body, neck and head are smoothly rounded, to reduce the air resistance during the running.
- (ii) The feet are long and unguligrade i.e. on toed.
- (iii) The humerus and femur are short but the radius and tibia are long. The ulna is fused with radius and the fibula is a splint bone.
- (iv) The neck and head are long (skull is large, having well developed brain case and orbits completely surrounded by bones.)
- (v) The incisors or cropping teeth are long crowned.
- (vi) Canines or tusks are absent ; a long diastema.
- (vii) Reduction of the first premolar.
- (viii) Three premolars and three molars in each half jaw are deep crowned grinding teeth having slightly curved prisms.
- (ix) The size is about 6 feet 4 inches at shoulder and a weight of over 2,400 pounds.
- (x) Brain is considerably large and convoluted and has a high intelligence.

EVOLUTIONARY CHANGES

The following evolutionary changes took place in horse evolution.

- (i) Change from ancient plantigrade foot to unguligrade (single toe).
- (ii) Increase in size.
- (iii) Lengthening of the limbs; reductions of digits from 5 to 1, with a corresponding reduction of ulna (fore arm) and fibula hind leg.
- (iv) Perfection of hoof.
- (v) Elongation of the neck and head.
- (vi) Premolars becoming successively molariform.
- (vii) Changes of premolars and molars teeth from browsing type (with roots, short crowns and surface cusps) to grazing type one roots, tall crowns with many enamel ridges).
- (viii) Widening of incisor teeth.
- (ix) Straightening and stiffening of the back.
- (x) Increase in size and complexity of the brain.

1. Eohippus dawn horse : Its fossils are found from early Eocene beds of North America especially from Bighorn Basin in Northern Wyoming and the Sanjuan Basin in north western New Mexico. It was very small in size (about 12 inches) and few species were about half the size of a shetland poney.

- (i) The back was arched and flexible.
- (ii) The ulna and fibula were stout and separate from radius and tibia respectively.
- (iii) In the front foot there were four (2 -5) each ending a separate small hoof (first toe being completely lost).

(iv) Hind foot had only three functional toes (second to fourth of the original set).

(v) 44 teeth (primitive mammalian dentition).

(vi) Diastema was beginning to appear.

(vii) First premolars, upper and lower were somewhat spaced from second premolars (in later horses it became vestigial and was in contact with the other).

(viii) All premolars were unlike molars.

(ix) Teeth were low crowned, browser.

2. Orohippus : It is from Bridger beds of Middle Eocene from North America and New Mexico.

(i) The last (IV) Premolar was like a molar in form and pattern.

(ii) Fore limb retained four toes and the hind feet had three toes but the tiny vestiges of two toes of hind feet (first and fifth) were lost.

(iii) Browsers.

(iv) A little increase in the size of horse.

3. Epihippus : (i) The last two (III and IV) premolars were molariform.

(ii) Four toes in the fore feet and three toes in the hind feet having not vestiges of the first and the fifth.

(iii) Browsers.

OLIGOCENE HORSES

Oligocene horses were directly derived from Epihippus.

1. Meshippus : Their fossil remains were found in abundance from Big badlands of South Dakota, in rocks of early and middle oligocene.

Its average size was about 24 inches and more larger species of it were also known.

(i) Head was Equus like.

(ii) Neck short and less flexible than the later horses.

(iii) Trunk long and slender and back somewhat more arched behind. (iv) Legs were long and slender.

(v) The part below the elbow and knee was particularly elongated an adaptation for rapid running.

(vi) The feet had three fully functional toes (middle one larger as in Eocene horses).

(vii) The outer toe of the front foot had disappeared (3 toes) and was represented by a small bonynodule.

(viii) Teeth still low crowned adapted for browsing not grazing.

(ix) Three premolars (second to forth) wre molariform.

2. Miohippus : Size larger than the Meshippus. In earlier horses the long cannon bone (metatarsal) of the third of middle toe comes in contact with only a single bone of the ankle bones (ectocuciform), but in Miohippus and in all later horses, the canon bone also come in contact within the outer ankle bone (the cuboid)

MIOCENE HORSES

All were three toed :

1. Anchitherium : Anchitherium arose from Miohippus in early Miocene in North America. They had very simple types of cheek teeth.

These animals soon migrated to the old world (Europe and Asia) and flourished there during the Miocene.

2. Hypohippus : The Anchitherium which remained in America, gave rise to Hypohippus. Hypohippus were similar to Anchitherium but they were large in size. Another off shoot of Hypohippus in America was Megahippus. Larger in size, spoon like lower incisors pointing forward.

3. Archeohippus (Pigmy horses of Miocene): They resemble miniature Miohippus and were much smaller than the other Miocene horse. They are either derived from Miohippus or earliest parahippus.

4. Parahippus : It arose in early Miocene from Miohippus. The neck, teeth became more adapted for grinding like the chewing action of Modern horse, but still they were browsing type (short crowned). Cement is also laid down on the camel of the teeth in the progressive forms of parahippus but is absent in primitive forms. They are the toed.

5. Merychippus : It appeared in middle and upper miocene.

PLIOCENE HORSES

By the end of Miocene, the grazing horses had split into at nearest size fairly distinct lines and most of them retained three toes.

The three toes grazers are :

Hipparion, Neo hipparion and Nannhippus

All these have high crowned grinding teeth a difference from Merychippus. They were closely related and similar to each other. They persisted in the early pliocene and then became extinct.

1. Hipparion : The teeth were usually straight ; retained complete side toes as in Merychippus. It was about 40 inches in size.

2. Neohipparion and Nannhippus : The teeth were curved inward, retained complete side toes as in Merychippus. Neohipparion was of cowpony size and Nannhippus was a pigmy.

Hipparion was great traveller and it migrated immediately after it originated from the new to the old world by way of Beringia and Siberia (land bridge). These flourished all over Asia and Europe.

3. Pliohippus : Arose from Merychippus in the late Miocene. It was the first one-toed horse. The teeth increased in height more than in Merychippus. Presence of a peculiar pit in front of the eye orbit. Shoulder height 40 inches.

4. Equus : Equus arose at the end of pliocene from the pliohippus. The earliest species of Equus in North America have similar teeth than most of the later forms and they have been placed in a separate subgenus Equus (Plesippus). From plesippus more advanced horses. Equus (Equines) also arose in America and migrated from here to the old world. Equus remains occur in pleistocene deposits nearly every where.