



Exploring Horse Evolution Through Philately: The Case Of Eohippus

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Citation: Devdatta M. Pokharkar, et al. (2022), Exploring Horse Evolution Through Philately: The Case Of *Eohippus*, *Educational Administration: Theory and Practice*, 28(4) 431-438
Doi: 10.53555/kuey.v28i4.8992

ARTICLE INFO

ABSTRACT

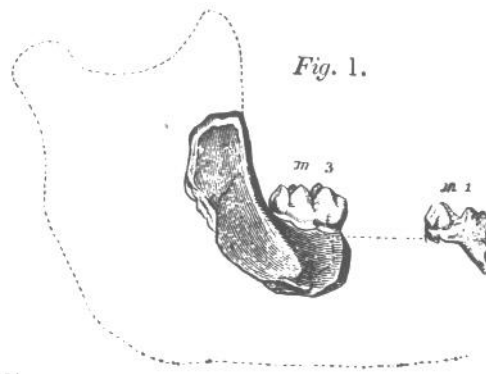
The first fossil of *Eohippus* (*Hyracotherium*), a small ancestral horse from the Eocene epoch (55-58 million years ago), was discovered in 1838 near Herne Bay, England, as a jaw fragment. Sir Richard Owen initially misclassified it as a monkey's jaw but later correctly identified it as belonging to an ungulate and named it *Hyracotherium leporinum*. *Eohippus* was a small, dog-sized forest dweller with physical adaptations for browsing and fast running. Its features included a short face, arched back, small brain, digitigrade limbs with 4 toes on the forelimbs and 3 toes on the hind limbs, and a striped coat for camouflage. Philately (stamp collection) serves as an educational medium to spread awareness about paleontology. Many countries have issued stamps featuring *Eohippus* and its evolutionary journey, highlighting its unique features and historical significance. Examples include the USA, Afghanistan, Saint Vincent & the Grenadines, Comoros, Antigua & Barbuda, North Korea, the Marshall Islands, and the Central African Republic. These stamps depict *Eohippus* in various contexts, such as its habitat, predators like *Diatryma*, and its evolutionary comparison to modern horses. The portrayal of *Eohippus* in philately emphasizes its importance in understanding the evolution of the horse, a species deeply intertwined with human history. This highlights the role of paleophilately in mass education, blending scientific knowledge with cultural appreciation.

Key words: *Eohippus*, Philately, Paleontology, Evolution of horses, Paleo-philately

Introduction:

First fossil material assignable to *Eohippus* (*Hyracotherium*), was recovered in 1838 in the form of a fragment of a jaw-bone with two teeth. It was discovered in the cliffs of Studd Hill near Herne Bay. Sir Richard Owen a great Paleontologist (who coined the term Dinosaur), described this specimen of jaw-bone and mistakenly correlated it with the monkey.

The next year in 1839 a part of skull was found in Kent, England and as with the jaw fragment. Sir Owen identified it as belonging to some sort of ungulate. He named it *Hyracotherium leporinum* (Owen 1841) and shortly thereafter realized that the jaw bone which he had described earlier as monkey jaw and this skull belong to the same type of animal (Simpson 1940, Scott D. Weitzenhoffer, 2008). In his formal description published by the Geological Society in 1841, Owen wrote "Without intending to imply that the present small extinct Pachyderm was more closely allied to the Hyrax than as being a member of the same order, and similar in size, I propose to call the new genus which it unquestionably indicates, *Hyracotherium* with the specific name *leporinum*."



Owen's illustration of the first *Hyracotherium* fossil found (MacFadden 1994).

(Source: Scott D. Weitzenhoffer, 2008)

The skull was intermediate in features between that of the hog and the hyrax. From a very few fragmentary remains, Owen labeled this fossil *Hyracotherium* (which means hyrax-like beast), more closely allied to hyrax as there was no apparent link between this primitive animal and the horse. In 1874, Kovalevsky suggested that this skull of *Hyracotherium* is around 70 million years old and tried to establish a link between *Hyracotherium* to the modern horse.

An American paleontologist Othniel C. Marsh during his extensive field work between 1870 to 1873 collected specimens of fossil horse in Nebraska's White River Badlands and Niobrara Valley and from Wyoming that helped him to propose a straight line of ancestry of the horse family. In 1876 Thomas Henry Huxley, a British paleontologist visited Marsh and both concluded that the horse fossil sequence in America is complete and agreed that the evolution of horse is occurred in North America. They also agreed that their fossil evidence was proof that the evolution of horses occurred in a linear pattern, trending toward fewer toes and higher-crowned teeth (MacFadden 1992).

Before the identification of '*Eohippus*' from the early Eocene sediments of Western North America, the prevailing hypothesis about the evolution of the Equids was a linear sequence from *Hyracotherium* through *Palaeotherium*, *Anchitherium*, *Hipparion* and then *Equus* (Gaudry, 1867; Kowalevsky, 1873, Froehlich, 2002).

In 1876, O.C. Marsh described a skeleton as *Eohippus validus*, from meaning 'dawn horse'. (Synonyms : *Hyracotherium angustidens*, *H. a. angustidens*, *H. a. etsagicum*, *H. vasaccense*, *H. v. vasaccense*, *H. cuspidatum*, *H. seekinsi*, *H. loevii*, *Orohippus angustidens*, *Orohippus cuspidatus*, *Orohippus vasaccensis*, *Lophiotherium vasaccense*).

In 1879, O.C. Marsh published the first figure depicting the presumed evolutionary trends in the family Equidae, which included sketches of the forelimbs, hind limbs, and upper and lower molars of the following sequence of genera from *Eohippus* through *Orohippus* - *Mesohippus* - *Miohippus* (*Anchiterium*) - *Protohippus* (*Hipparion*) - *Pliohippus* - *Equus* (MacFadden 1992).

The sequence of horse fossils that Marsh described (and that T.H. Huxley popularized) was a striking example of evolution taking place in a single lineage. Here, one could see the fossil species "*Eohippus*" transformed into an almost totally different-looking (and very familiar) descendent *Equus*, through a series of clear intermediates. Biologists and interested laypeople were justifiably excited. Some years later, the American Museum of Natural History assembled a famous exhibit of these fossil horses, designed to show gradual evolution from "*Eohippus*" (now called *Hyracotherium*) to modern *Equus*. Such exhibits focused attention on the horse family not only as evidence for evolution per se, but also specifically as a model of gradual, straight-line evolution, with *Equus* being the "goal" of equine evolution (Katheleen Hunt, 1995). In short, *Eohippus* was a crucial link in understanding the evolution of powerful and versatile modern horse from a small, forest-dwelling creature.

Distinguishing features of *Eohippus*:

About 55 to 58 million years ago in Eocene of Coenozoic era the first member of the horse family *Eohippus* (Dawn Horse) appeared in North America. It was small dog sized animal weighting about 20 to 35 kg (Macfadden, 1987) 30–60 cm (1–2 feet) high at shoulders, it had short face, with eye sockets in the middle and a short diastema. It was Brachyodont creature - low crowned forty four teeth with 3 incisors, 1 canine, 4 distinct premolars and 3 "grinding" molars in each side of each jaw. Canines were large. The cusps of the molars were slightly connected in low crests. Typical teeth of an omnivorous browser. Legs were flexible and rotatable with all major bones present and unfused. (Katheleen Hunt, 1995) Small brain with especially the cerebral hemispheres was small. The back was arched and flexible. Its limbs were digitigrade. It had 4 toes on the front foot, and 3 toes on the hind foot. The innermost digit of a forelimb, pollex was absent. The hind limb has vestigial remnants of the first and fifth digits. The hind limbs were longer than forelimbs so adapted for fast running. It walked on pads; its feet were like a dog's padded feet, except with small "hooves" on each toe instead of claws. The tail was long. It was forest dweller and browsing

animal. Mainly consumed soft leaves, fruits, nuts and plant shoots. The great science artist Charles Knight of the American Museum of Natural History reconstructed *Eohippus* with a striped coat because it was a browsing horse, the browsing animals have to camouflage them in the play of light and dark on the forest floor. (<https://www.floridamuseum.ufl.edu>)

Philately of *Eohippus*:

On 8 June 1996 in world philatelic exhibition 'CAPEX 96' (Toronto, Canada) USA issued a series of 4 stamps designed by Davis Meltzer and printed by Mystic stamp company under label "Prehistoric Animals". One of the stamp has image of *Eohippus* with surrounding flora. (Fig.8, Plate :3). The typical morphological features of *Eohippus* such as short face, with eye sockets in the middle and a short diastema, arched back, the long hind limbs adapted for fast running and striped skin coat are well seen in the stamp. On 5th November 1996 Afghanistan published set of 5 postal stamps on 'Evolution of the Horse and today's Horse Breeds'. (Fig.11, Plate: 3) These stamps have depiction of prehistoric horses '*Echippus*' (Eocene), *Miohippus* (Oligocene), *Merychippus* (Miocene), *Pliohippus* (Pliocene), *Equus* (Pleistocene). The word *Eohippus* is misspelled as *Echippus*. In depiction a small dog sized *Eohippus* is compared with modern horse.

In 1999 on the occasion of 'International Philatelic Exhibition Australia 99', Saint Vincent & the Grenadines issued 2 mini-sheets of 12 stamps based on theme "Prehistoric Animals of the world". The sheet No. 1, stamp number 6 has image of Dawn Horse (*Eohippus*) (Fig. 12 Plate: 4) The image shows peculiar features of *Eohippus* such as donkey like face, arched back, short neck, short snout, short legs, long tail and striped skin coat. Comoros in 1999 issued 4 miniature sheets which has picture of *Diatryma* with *Hyracotherium*. (Fig. 13, Plate: 4). *Diatryma* / *Gastornis* was a large flightless predatory bird that lived between the Late Paleocene (55 million years ago) and the Middle Eocene (45 million years ago). It grew up to 2 metres tall and possessed a huge sharp beak and large powerful legs with sharp talons. This predatory bird might have hunted *Eohippus*. (www.sciencephoto.com).

The depiction on stamp shows *Diatryma* chasing *Eohippus*. The *Eohippus* is running in full pace with the help of its long and strong hind limbs.

Antigua & Barbuda in 2005 published a miniature sheet with 4 stamps under the label "Prehistoric Mammals". (Fig.14, Plate: 4), the stamps has pictures of *Eohippus*. Its appearance is deer like with distinguishing features like short forelimbs, long and strong hind limbs, short head, arched back, long tail and striped skin coat.

North Korea in 2006 issued 2 sheets each with 6 stamps in 'Belgica 06 stamp show' under title "*Australopithecus afarensis* and mineral". (Fig.15, Plate:5) On the lower side of first sheet *Eohippus* with *Diatryma* / *Gastornis* is depicted. This large predatory bird has grabbed one *Eohippus* in its huge sharp beak and is chasing the other one.

In 2009 Marshall Islands delivered a series of 5 postal stamps under the series "Prehistoric animals". (Fig.16, Plate: 5). The series includes stamp of picture of two individuals of *Eohippus*. One individual is feeding on grass while another is consuming leaves of shrub, this explains grazing and browsing mode of nourishment of *Eohippus*. In external appearance they are of size of deer and have short head, donkey like face, short forelimbs, long and strong hind limbs, arched back, long tail and striped skin coat.

In 2022 Central African Republic released four stamps under a series 'Les mammifères éteints' i.e. Extinct Mammals. The stamp with depiction of *Hyracotherium leptonium* (*Eohipus*) (Fig.17, Plate :5) specifies its peculiar features - short head, mid positioned eyes, donkey face, curved back, long and strong hind limbs, long tail and skin with stripes.

Discussion:

The Palaeo-fauna is subject of curiosity for common people. Most of the time, people only knew about the extinct giant Dinosaurs but unaware about other diverse life forms which existed in remote past. Philately is collection of postage stamps which not only concerned with the beauty but it also signifies the information and education of the philatelic products worldwide.

A postage stamp is a printed label used for communication purpose and to show that the postage has been paid. Some people collect them as a hobby as well as investment tool which helps to spread awareness of the philatelic product. Postage stamps are also useful for advertisement purpose and to raise funds for various national activities. Philately also includes collection of first day covers, post cards, etc. (Pokharkar et al.2024) Palaeo-philately is depiction of fossils and Palaeo-fauna on postal stamps. It is a popular medium to provide knowledge about extinct life forms which existed in remote past. These postal stamps are significant for mass education as they are small, cheap, realistic, scientific and easily accessible. India released the first paleontological stamp in 1951, and since then, almost 200 countries have issued over 4,000 stamps related to paleontology. Dinosaurs are the most common subject on these stamps. (Jere H. Lipps et al.2022) Today modern horse is familiar to all of us but we don't have much knowledge about its ancestor and its evolution. The postal stamps with portrait of *Eohippus* (*Hyracotherium*), the first known member of *Equus* family who appeared on earth in Eocene around 55 million years ago and flourished in North America and

Europe give us detail information related to its external features, habit and habitat, mode of nutrition and about its predators also. In prehistoric times, human's primary interaction with horses was as a source of food. However, after domestication, horses proved a valuable companion and asset for humans. Today horse is symbol of strength, loyalty, agility and dignity and that's why Ludovic Orlando says, "Horses are the animal that has changed history"

Conclusion:

The postal stamps issued with depiction of *Eohippus* are practically useful to spread Paleontological awareness and to understand the fascinating history of origin and evolution and adaptation of modern *Equus*.

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Fig:1 A specimen of *Hyracotherium* discovered in the Green River Formation at Fossil Butte National Monument in Wyoming. *Hyracotherium*, often called *Eohippus* ("dawn horse"), is the oldest known member of the horse lineage (Source: www.Britannica.com)



Fig : 2 *Eohippus angustidens* (Formerly *Hyracotherium vasaccensis*) skeleton, National Museum of Natural History, Washington, D.C., USA. (Source: Wikipedia)



Fig: 3 *Eohippus* had 4 toes on the front foot and 3 toes on the hind foot.

(Source : <https://www.floridamuseum.ufl.edu>)

Fig:4 *Eohippus* primitive teeth

Plate 1

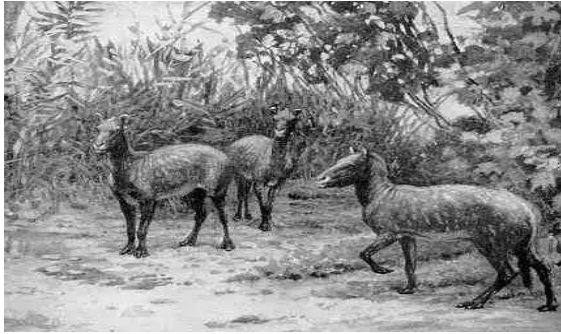


Fig: 5 Charles R. Knight's interpretations of *Eohippus* by Chester Stock (1947)

(Source : <https://laelaps.wordpress.com>)

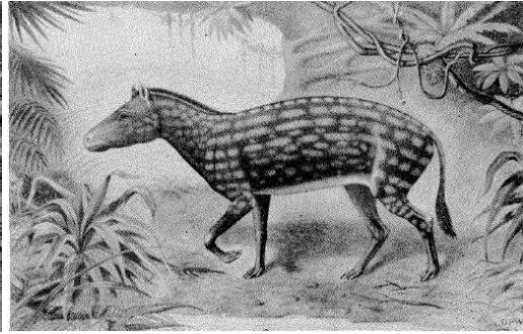


Fig:6 Restoration of *Eohippus* by Chester Stock (1947)



Fig: 7 *Hyracotherium leporinum* by Tuomas Koivurinne (Source: www.deviantart.com)

Plate: 2

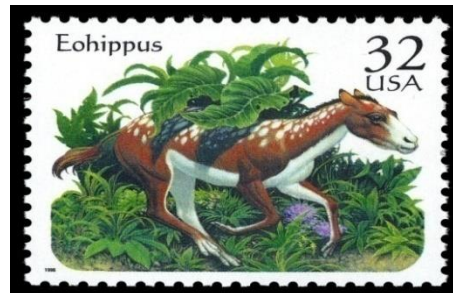


Fig:8 USA *Eohippus* postage stamp (1996)

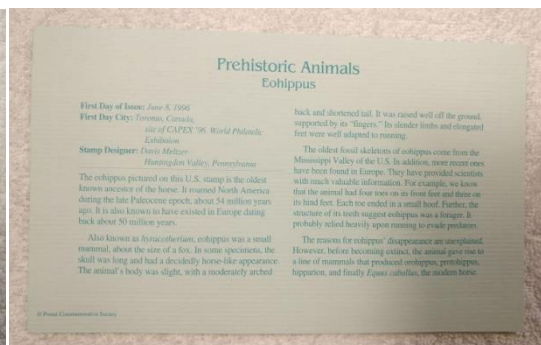


Fig: 9 USA Prehistoric Animals - *Eohippus* - 22kt Gold Replica of Stamp on First Day Cover (1996) (Front side and Back side)

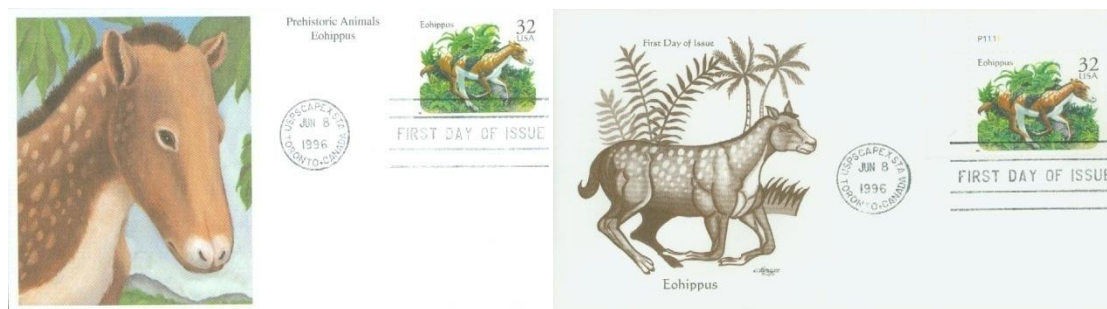


Fig:10 First Day Covers (shows images of reconstructed *Eohippus*) (1996)

First Postage cover shows facial characters while the second one shows overall morphological peculiarities



Fig: 11 Afghanistan *Eohippus* postage stamp (1996)

Plate: 3



Fig: 12 Saint Vincent & the Grenadines (1999)



Fig: 13 Comoros Postage stamp: *Eohippus* with *Diatryma* (1999)

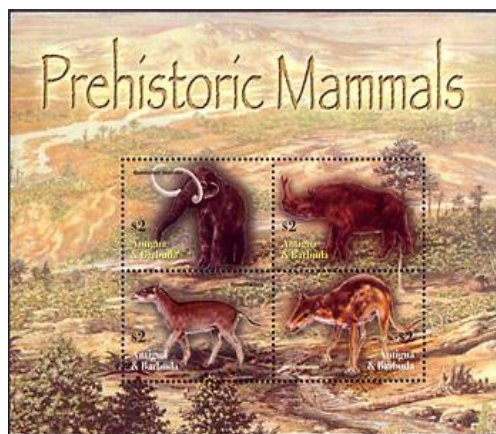


Fig: 14 Antigua & Barbuda (2005)

Plate: 4



Fig:15 North Korea (2006)



Fig: 16 Marshall Islands (2009) Stamp with depiction of *Eohippus* and First day cover



Fig: 17 Central African Republic (2022)

Plate: 5