

Florida Fossil Horse Newsletter

Volume 1, Number 1, 1st Quarter-March 1992

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Editor's Preface to First Issue

The fossil record of horses in Florida is one of the richest in the world and spans the last 30 million years. The Florida Museum of Natural History (FlaMNH) . has an active research program in the study of fossil horses and we recently have added an exciting new public exhibit that includes fossil horses. The purpose of this newsletter is to communicate news and information to anyone interested in fossil horses and, in so doing, to develop support, enthusiasm, and involvement from our state-wide constituency. Although the central focus of this newsletter is fossil horses from Florida, from time to time we will broaden our horizons to discuss fossil horses from elsewhere. We also may discuss other fossil mammals, particularly as these relate to a better understanding of ancient terrestrial communities and ecosystems in Florida.

The *Florida Fossil Horse Newsletter* is intended to be short (usually 8 pages), published quarterly, informal in style and prose, and to provide for timely announcements and news. In addition to regular feature columns describing research, preparation, additions to our collection, how to identify fossil horses, famous "horseologists," and exhibits here at the FlaMNH, this newsletter will also include editorials, readers' feedback, book and publication reviews (and ordering information), as well as announcements about upcoming talks, digs, meetings, and the like.

This issue is complimentary and was produced on a "shoestring" budget. Accordingly, once the newsletter gets off

and running (so to speak), we hope that the *Florida Fossil Horse Newsletter* will continue through contributions to the Fossil Horse Fund (see below), which is intended to (1) sustain this newsletter and (2) promote and support research, exhibits, and educational activities involving fossil horses here at the FlaMNH.

Although we realize that the production of the newsletter will be centered here in Gainesville, we encourage notes, announcements, inquiries, and the like from our readers. Thanks very much for reading this and we encourage you to support this newsletter if you are inclined to do so. (Bruce J. MacFadden)

(*About the illustration above:* Restoration of an extinct species of *Equus* based on fossil horses collected from the late Pleistocene (about 10,000 to 40,000 years old) from La Brea Tar Pits, California. This illustration is reproduced courtesy of the Los Angeles Natural History Society.)

Introductions: Editorial Staff

Bruce J. MacFadden is Curator of Vertebrate Paleontology and Professor of Geology and Zoology. On the FlaMNH faculty since 1977, Bruce has a B.S. (General Science) from Cornell and M.Phil. and Ph.D (Geology) from Columbia.

Gary Morgan is Collections Manager of Vertebrate Paleontology. At the FlaMNH since 1981, Gary has a B.S. (Zoology) from Miami (Ohio) and M.S. (Geology) from UF.

Russell McCarty is Senior Preparator in Vertebrate Paleontology. On the FlaMNH staff since 1981, Russ has a B.S. (Archaeology) from UF.

Linda Chandler is a freelance editor and artist. A newcomer to Gainesville, she holds a B.S. (Wildlife Biology) from Clemson and M.S. (Herpetology) from the University of Kansas.

Thank You

Volunteers Special thanks are due to **Anita Brown** of Lake City. Single-handedly, Anita integrated several mailing lists into the one that we used for our first mailing. Thanks are due to the volunteers that helped in the newsletter folding and sorting party held just a few days ago. Without their combined hours of help in one evening, we could not have gotten our first issue out to you on schedule.

What's in a Name?

The current name of our newsletter certainly conveys its focus, but we also are considering a slightly "catchier" title to go along with *Florida Fossil Horse Newsletter* and also to be included in a logo. Stay tuned for further developments in upcoming issues.

Contribute Now!

During the month of March, all contributors and sustaining supporters to the **Fossil Horse Fund** will receive a small thank you gift and a special invitation to our first fossil horse dig.

*Editor's Note: Subsequent issues of the Florida Fossil Horse Newsletter will have regular feature columns and these are indicated in **bold** below.*

News from the Florida Museum of Natural History (FlaMNH)

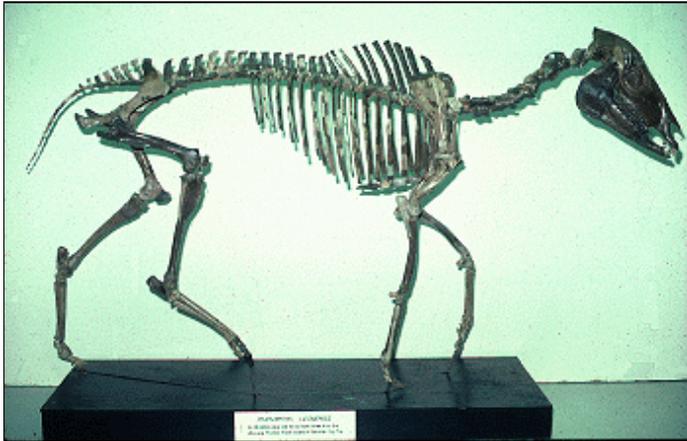
Current Fossil Horse Research

Along with graduate student Bruce Shockey, Bruce MacFadden is currently involved in studies of bone and tooth chemistry of fossil horses and other associated land mammals from several localities throughout the Americas. The

purpose of this project is to interpret ancient diets, because browsers (predominantly eating leaves from trees) have different chemical signals incorporated into their bones and teeth than do grazers (predominantly grass eaters). This project is directed toward testing the century-old hypothesis of the correlation between acquisition of high-crowned (hypsodont) teeth in horses and changeover to more of a grazing mode of feeding. In March the two Bruces will be going to La Paz, Bolivia to study and sample fossil horses and other extinct mammals from the rich sequence of deposits of that country to better understand long-term chemical changes that occurred in these fossils, and in so doing, the evolution of diet and climates of certain lineages of herbivorous mammals. Bruce MacFadden is also currently involved in the production of his book entitled *Fossil Horses*, scheduled to be published during mid 1992 by Cambridge University Press.

Prep Lab Notes

Recent work in the prep lab has included an important fossil specimen of smashed, but complete, skull and mandibles of *Calippus maccartyi*, a new species of small, three-toed, grazing horse discovered at Moss Acres. Horse skulls are fragile and thus are difficult specimens to recover and prepare, and the extreme shrinks-well clay matrix in which the fossils at Moss Acres are found only increases these problems. Ideally, specimens recovered from clay deposits should be removed in plaster jackets and the matrix kept moist until they are prepared. If the jackets dry out, the resulting cracks in the clay will further deteriorate the bone. However, preparators procrastinate and plaster jackets do dry out. If this happens it is best to wet the clay until it expands back to its original configuration. Because horse skulls tend to be thin-walled, they break into many pieces that often lack clearly defined contacts. It is advisable to do as many of the repairs as possible while the specimen is still in the jacket and the positions of the bone fragments can still be determined. Despite these problems, when prepared, the resulting fossil horse specimens are indeed valuable additions to our collection. (Russell McCarty)



New Exhibits--The Fossil Studies Center

The big news here pertaining to fossil horses is that in November the FlaMNH celebrated the opening of the new "Fossil Studies Center" as a major public exhibit. Weekend activities included an evening party in the new exhibit accompanied by short talks from Drs. Jones and MacFadden, curators, and Dr. **Cliff Jeremiah** of Jacksonville. This was followed the next day by an open house in the paleontology collections (invertebrates, vertebrates, and plants). The Fossil Studies Center includes a variety of spectacular highlights, from a reconstruction of a gigantic fossil Great White Shark jaw (donated by Cliff Jeremiah) to many specimens from our collections. Not

surprisingly, the exhibit focuses on Florida, including many of the land-mammal localities known throughout the state. The early Miocene time period is represented by a diorama based on the famous Thomas Farm locality. A skull of the tiny three-toed dwarf horse *Archaeohippus* is on exhibit in that diorama. The centerpiece for this time period is the small three-toed *Parahippus leonensis* from Thomas Farm (see below), which is just 28 inches tall.

Famous 'Horseologists' --Morris F. Skinner (1906-1989)

It is appropriate to start this regular feature column with Morris F. Skinner. For more than a half-century Morris devoted his career to collecting, curating, and studying fossil horses. So far as we know, Morris coined the informal (it is not in dictionaries) term "horseology," whose meaning is obvious, and "horseologist," for someone who studies fossil horses. Morris was born in northcentral Nebraska in 1906 and in his early years developed a love for collecting fossils from the rich sedimentary sequence from that part of his state. He used to spend much free time fossil hunting locally, and his keen eye for finding important specimens was brought to the attention of prominent paleontologists of his day. In 1927 Morris left for college and he enrolled at the University of Nebraska and majored in geology. His practical experience in fossil hunting and formal training at the university was to have an important influence on his -fossil collecting. In later years specimens collected by him or - under his supervision included very precise locality data that made them significantly more important for future study.

During the 1930s Morris was hired by Childs Frick as a field paleontologist. For the next half-century he made major finds for the Frick Collection. During those years, when not in the field, Morris was based back in New York where he was charged with the responsibility of curating the Frick fossil mammal collection, which at that



time was privately owned, and he had primary responsibility for the fossil horses. In the 1960s the entire Frick Collection and an endowment to support it was donated to the American Museum of Natural History.

Morris rose through the ranks of paleontology in untraditional fashion. Although he published many important papers, many of which demonstrated vast insight into the knowledge of fossil horses, he never formally pursued graduate studies. Nevertheless, in recognition of his accomplishments, in the late 1970s the University of Nebraska honored him by awarding Morris an honorary doctorate and even a chair on the geology faculty. Representative of his own inimitable style, Morris was once asked what he thought of having a chair in the geology department, and he remarked: "I don't know what good it is--can't even find it!" It would be impossible to list all of the contributions to horseology made by Morris. Recently, in recognition of his outstanding contributions to vertebrate paleontology by making scientifically important collections of fossil vertebrates, the Society of Vertebrate Paleontology established the "Morris F. Skinner Prize." Of the many honors bestowed upon Morris, those who knew him would probably say that this was one that he held among the highest regard.

On the personal side, Morris was kind, gregarious, and generous with his time, knowledge, and wisdom. In later years people first meeting Morris might have found him a little aloof or perhaps shy, mostly because he was hard of hearing, but those traits quickly gave way to an open, caring personality. As I mention in an upcoming publication: "Although future generations of paleontologists will not have the privilege of knowing Morris Skinner and his love for fossil horses, his spirit and legacy remain for posterity with the Frick Collection." (Next Time: Joseph Leidy and the Florida connection.)

How to Identify Fossil Horses

Part 1. How many teeth do horses have?

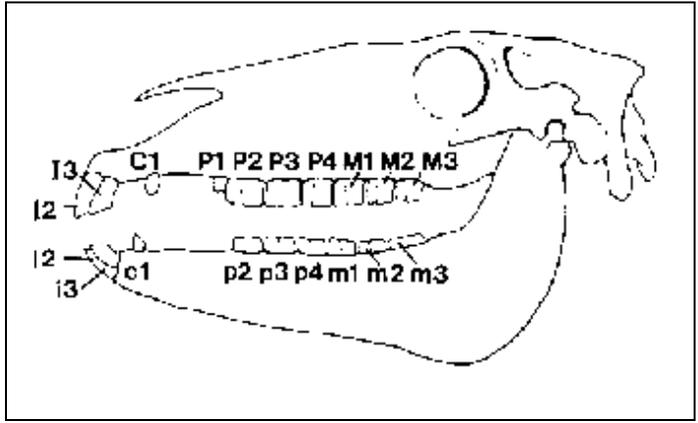
Because they are so durable, horse teeth are commonly found at fossil localities throughout Florida. However, for those of you who have tried to identify fossil horse teeth, you already know that this is a challenging pursuit, but with a little help it is not impossible. In this issue we will start with the basics: how to identify the position of individual teeth within a tooth row of high-crowned horses. Subsequent features in this column will build upon previous discussions.

Other vertebrates, e.g., fish, amphibians, and reptiles, generally have continuous replacement of teeth so that as one is shed or lost, another erupts to take its place. Therefore, the animal continues to erupt teeth throughout its lifetime. Mammals, however, are fundamentally different in this regard; they have a regular number of teeth as well as limited tooth replacement. The advantage of this for the mammals seems to be to insure efficient occlusion between the upper and corresponding lower teeth.

The actual number of teeth varies greatly in different groups of mammals. The primitive number for placental mammals is 44, or 11 on each side, top and bottom. This number, however, is quite varied in advanced groups. The rule in more advanced mammals is for reduction in the number of teeth from the original 44, so that rodents, carnivores, and many herbivores, to name a few groups, all have fewer. In the exception, some groups, such as whales, show polydonty, or an increase in number from the original amount.

During the Eocene, about 58 million years ago, primitive horses such as *Hyracotherium* had a "normal" complement of 44 teeth. As with other mammals, the teeth are differentiated into **tooth families**. Thus, in the permanent dentition there are 3 **incisors**, 1 **canine**, 4 **premolars**, and 3 **molars** on each side, top and bottom. Paleontologists give these abbreviations, namely, **I, C, P,** and **M** for the upper teeth and **i, c, p,** and **m** for the lowers. Thus, a Ri3 is the third lower incisor on the right side of the jaw. A LM1 is the first upper molar on the left side of the skull. (Note: in many older publications you will see superscripts and subscripts to denote upper and lower teeth, e.g., LP⁴ is a left fourth upper premolar, whereas a LM₂ is a left second lower molar. However, more recent publications are favoring the use of upper and lower case to denote, respectively, upper and lower teeth.) By the Miocene, about 20-25 million years ago, horses had lost or greatly reduced the PI (wolf tooth) and pl so that

the functioning dental formula became 3-1-3-3, and this number has basically been fixed since then. Like many other mammals, in horses there are two sets of incisors, canines, and premolars, namely deciduous ("baby" or "milk," dp2 is a deciduous second lower premolar) and permanent. The molars, on the other hand, only consist of a single set of teeth, and these usually begin to erupt as the deciduous premolars are being shed. Unless the teeth are in a jaw or skull, where you can compare each tooth's development and relative wear, it is difficult to tell whether an isolated tooth is deciduous or permanent. In some mammals the deciduous teeth may be of a slightly different color, possibly resulting from different pigmentation or secondary alteration during fossilization. Generally, if you have several isolated specimens of the same fossil horse species, a keen eye can detect the difference between the deciduous versus permanent premolars. The deciduous premolars are usually longer in the anterior (front) to posterior (back) length and have shorter crowns with better-developed roots than the corresponding permanent premolars.



(Next time: The horse skeleton and anatomical positions.)

Horse Talk: Terminology

(Editor's Note: Like every profession or avocation, in paleontology there is a vocabulary that allows us to communicate. In this regular feature column we will, bit by bit, introduce the reader to the varied terminology used in paleontology in general, and the study of fossil horses in particular.)

Part 1. Classification: The Linnean Hierarchy

The foundation of natural history, including paleontology, is the need to categorize and interrelate organisms. In modern science the roots of this procedure trace back to the Swedish naturalist Linnaeus (1707-1778). He proposed a hierarchical scheme to place animals into groups, a procedure which is termed **classification**. Thus the modern, domesticated horse is allocated to the following groups in the so-called Linnean hierarchy:

Phylum Chordata

Subphylum Vertebrata (including fishes, amphibians, reptiles, birds, and mammals)

Class Mammalia (with all other mammals)

Order Perissodactyla (with other "oddtoed" ungulates, including tapirs, rhinoceroses, and some extinct groups)

Family Equidae (including all fossil and living horses, zebras, asses, and their relatives)

Genus *Equus* L. * 1758

Species *caballus*

**Note:* It is customary to add the author's name to the genus or species being described as well as the date that it was described. For example, *Hipparion* Cristol 1832, was formally proposed by the French paleontologist de Cristol in 1832. Linnaeus named so many genera that his name is simply added as "L." (as for *Equus*, which he named in 1758) and that abbreviation is universally recognized by naturalists.

Why are some scientific names italicized?

The essence of the Linnean hierarchy is the "binomen," or the genus and species pair, e.g., *Equus caballus*. In order to recognize this as a formal binomial name, systematists all over the world, regardless of the language that they are writing in, use the formal proposed name, and to si'ni /that it is formal, it is italicized. Only the genus-species pair is italicized, higher categories above this within the Linnean hierarchy, e.g., Class Mammalia, are not.

(Next time: How are scientific names created?)

Book Review

(Editor's Note. In each issue we will include a brief review of at least one book or other publication that is of

relevance to fossil horses and ordering information also will be provided for the reader.)

Mammal Evolution: An Illustrated Guide. 1986. New York: Facts On File Publications, 259 pp., ISBN 0-8160-1194-X, \$40, can be ordered through your local bookstore or directly from Facts On File Publications, 460 Park Avenue S, New York NY 10016, toll-free 1-800-322-8755.

This is a fine book written by a world-renowned vertebrate paleontologist and expert on fossil mammals, R. J. G. Savage, and has beautiful illustrations (many in color) by M. R. Long, a lecturer in graphic design specializing in natural history. *Mammal Evolution* is organized into 13 chapters and written and presented in an inviting style. The reconstructions of fossil mammals in this book are scientifically accurate, extraordinarily well done, and really bring these extinct creatures back to life. The text is written so that it appeals to both the amateur and professional scientist.

Of relevance to us, *Mammal Evolution* has a section on horse evolution (in the chapter entitled "Hoofed Herbivores") and beautiful reconstructions of the Eocene "dawn-horse" *Hyracotherium*, Oligocene *Mesohippus*, Miocene browsing *Anchitherium* and *Parahippus*, and the Miocene grazers *Merychippus* and *Pliohippus*. With the exception of *Hyracotherium*, fossils of the other genera have been found in Florida. In addition, there is a reconstruction of *Palaeotherium*, an extinct relative of the horse, known only from the Old World.

The cost of books these days is high, but considering the scientific accuracy and beautiful illustrations, *Mammal Evolution* is definitely worth the price. Also check for sale prices at your local book store.

Recent Acquisitions and Donations of Fossil Horses

The FlaMNH has significantly increased its collection of fossil horses over the past year, both through field activities and by donations. Between April and June of 1991, the **vertebrate paleontology staff** conducted excavations at the late Miocene (7 million year old) **Moss Acres Racetrack Site** in Marion County. Although the discovery of three skulls and a pair of lower jaws of the shovel-tusked gomphothere *Amebelodon britti* grabbed most of the headlines, we did find quite a few nice three-toed horse fossils at Moss Acres as well. Some of the nicer specimens included a perfectly articulated hind limb (from the femur down to the tiny side hooves) of one of the larger three-toed horses--probably *Cormohipparion*, a skull and mandibles of the small horse *Calippus maccartyi*, several skulls of juvenile horses, and a mandible of *Nannippus* that appears to have been eaten by an alligator.

Rick Carter of Lakeland and **Jim Ranson** of Tampa have both made major donations of **Bone Valley** horses within the past year. Thanks to Rick's efforts, the FlaMNH acquired a nice sample of teeth, as well as several mandibles and maxillae, of early Pliocene (Hemphillian) horses from the Gardiner Mine site ("Bird Dog Quarry") that was excavated in 1989 and 1990. Rick also contributed a series of about 100 rare middle Miocene horse teeth from throughout the Bone Valley area. Jim Ranson donated more than 100 teeth and numerous postcranial elements of horses from several important Bone Valley sites. Jim's discovery of an astragalus of a primitive browsing horse (*Hypohippus* or *Megahippus*) was a particularly unusual find.

Eric and Craig Taylor of Lake City have made extensive donations of rare middle Miocene fossil horses from **Occidental Mine** in northern Florida. At least one of the horses discovered by them is a new record for Florida and probably represents true *Pliohippus*, a onetoed grazer. By now the 10 species of horses they have collected from this area is one of the richest horse faunas in Florida.

These new samples of rare middle Miocene horses are very important because they will help paleontologists to better understand horse evolution in Florida during the time period between the well-known faunas from the early Miocene Thomas Farm site and the late Miocene Love Bone Bed and Moss Acres sites. (Gary S. Morgan)

(Editor's Note. Space limitations prevent us from being able to highlight every fossil horse specimen donated to the museum. It is our intention to describe or acknowledge more donations in each of our upcoming issues.)

Announcements

Fossil horse talks and related activities.

On Saturday, March 28, the Florida Paleontological Society Spring Meeting will be held at the Silver River

Education and Environmental Center, within the beautiful Ocala National Forest. In addition to other activities, Gary Morgan will be available to identify fossil horses (and other fossils, of course) and Bruce MacFadden will present a talk on fossil horses 'm the afternoon. Registration fee is \$7 for FPS members and \$10 for non-members. For further information contact: Susan Pendergraft, 17 Jeff Road, Largo, Florida 34644 (813-595-2661). Deadline for applications is March 21.

Now it's your turn: Readers' Forum

This section is reserved for our readers and will be expanded in future issues. If you or your local fossil club is involved in an activity related to fossil horses, send us a brief note and we will print it here (as space and other contributions allow). **Deadline** for the next *Florida Fossil Horse Newsletter* is 15 April (certainly more ftin than another deadline the same day). Send your contributions to the **Managing Editor**, address below.

Upcoming new feature columns

- Prep Talk
 - Florida Localities
 - Species Spotlight
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Volume 1, Number 1

March 1992

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- Gary Morgan, Contributing Editor
- Russell McCarty, Contributing Editor
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Contributions and Support:

All contributors and supporters receive the Florida Fossil Horse Newsletter and special invitations to talks, digs, and other activities that will promote the research, exhibition, and education about Florida fossil horses. In addition, sustaining supporters, including Friends, Patrons, and Benefactors, will receive special recognition in the newsletter.

Support Categories--1992

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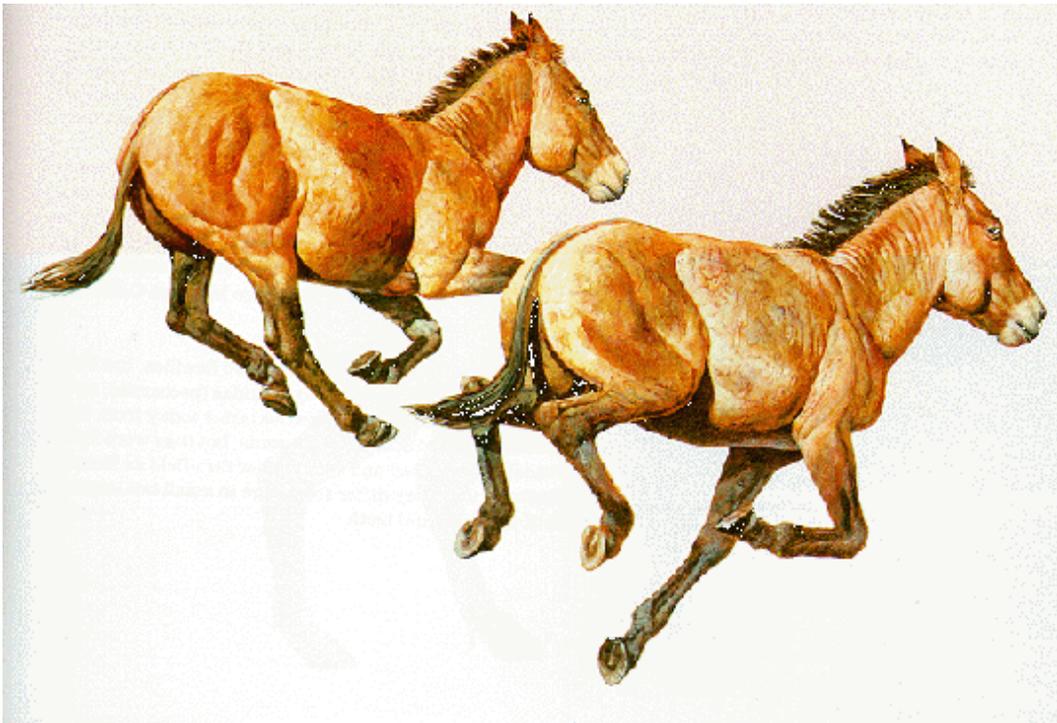
Contributions should be made out to:

Fossil Horse Fund

and sent to Managing Editor, at the address listed above.

Florida Fossil Horse Newsletter. Statement of Purpose:

The purpose of this newsletter is to communicate news and information about fossil horses, particularly in Florida, and to develop a state-wide constituency that will support and enhance the research, exhibition, and educational programs offered at the FlaMNH that pertain to fossil horses. Contributions to the Fossil Horse Fund will be deposited into an account at the University of Florida Foundation, Inc., a tax-exempt entity, and will be used for the purposes stated here.



*The "Western Horse" Equus occidentalis
from Rancho LaBrea stood about 14 1/2 hands
at the shoulder, much like the modern Arabian, but had a stockier build.*
