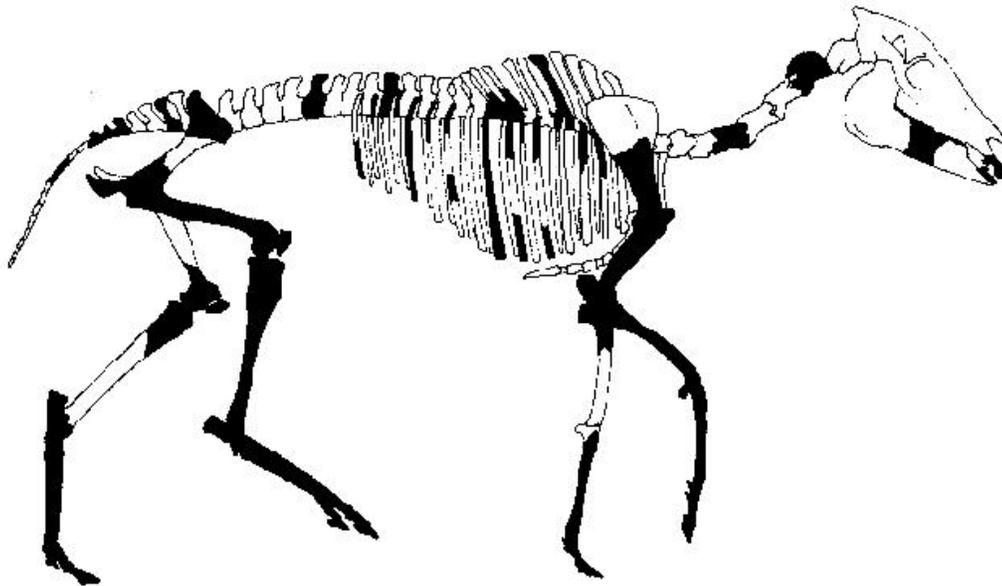


Florida Fossil Horse Newsletter

Volume 1, Number 3, 3rd Quarter--September 1992

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Reconstructed drawing of Archaeohippus showing bones collected (blackened) in May at Thomas Farm

The 1992 Thomas Farm Digs

During two weekends in May, field crews from the FlaMNH along with the help of 18 fossil enthusiasts from around Florida and Louisiana participated in a highly successful dig at the famous middle Miocene (18 million year old) Thomas Farm site in Gilchrist County, Florida.

Each weekend consisted of a full schedule of activities including an orientation/social the first night, followed by two and a half days at the fossil site. The fossil site activities included much digging, afternoon preparation sessions, impromptu lectures and demonstrations, and evening talks. We all camped on-site and the generally cool nights and lack of rain made for unseasonably pleasant conditions.

Not knowing what to expect, most of the participants were initially concerned whether or not they would find any fossils. These fears were quickly alleviated because of the extraordinary richness of the site.

Each person selected a part of the gridded (archaeological style) quarry and started digging. Within only a few minutes fossils were found, and by the end of the weekend everyone had discovered scientifically important specimens.



*Participants during first week
hard at work in the Thomas Farm quarry.*



One of our goals was to recover more specimens of Archaeohippus in order to reconstruct this tiny dwarf horse (see skeleton on p. 1, also *Pony Express* Vol. 1, No. 2). This reconstruction will be the only skeleton of this genus in existence anywhere. Much progress was made during the digs--almost 1,000 cataloguable specimens were added to the collections as a result of these two weekends. In addition to Archaeohippus, this total includes many other important fossils, such as a fabulous skull of the common horse Parahippus, a jaw of the weasel-like Leptarctus, a rhinoceros, several dogs, and extinct bear-dogs, not to mention the many tiny fossil mammals yet to be sorted.

The staff at the FlaMNH and of the Pony Express would like to thank all of the participants of both digs for their enthusiasm and contributions to science through helping us collect these important specimens from Thomas Farm. As a result of the success of these trips we will plan similar digs in the future and will keep you informed as these plans are developed.

Participants

*Dan Cordier discusses screenwashing techniques
with field crew members Annette Cannon and Suzanne Jarrell*

1st weekend:

- Bob Chandler, Gainesville
- Daniel Cordier, Gainesville
- Derk Kuyper, Orlando
- Bruce MacFadden, Gainesville
- Russ McCarty, Gainesville
- Bradley McPherson, Shreveport, IA
- Gary Morgan, Gainesville
- Art Poyer, Gainesville
- Paul Shiebold, Longwood
- Barbara Toomey, Sanibel Island
- Reed Toomey, Sanibel Island
- Suzan Watts, Bokeelia
- Shirley Woodruff, Orlando

2nd weekend:

- Michael Addison, Orlando
- Dorothy Bethea, Tampa
- Annette Cannon, Orlando
- Bob Chandler, Gainesville
- Daniel Cordier, Gainesville
- Helen Cozzini, Temple Terrace
- Suzanne Jaffell, Orlando
- Lori Kaminski, Orlando
- Larry Lawson, Winter Park
- Sherri Lawson, Winter Park
- Bruce MacFadden, Gainesville
- Russ McCarty, Gainesville
- Bonnie Mizell, Maitland
- Art Poyer, Gainesville
- Andrew Schuerger, Orlando
- Dan Shaw, Orlando

Prep Talk

Preparation of fossil specimens should be undertaken with a commitment toward producing the best possible result. This result will be dependent on both the skill of the preparator and on the condition of the specimen. If specimens are found free of matrix, such as fossils recovered from a river bottom, of drying, cleaning, gluing, if needed, and hardening the with a consolidant such as Butvar. However, many specimens are found embedded in various kinds of matrix and successful preparation of these specimens is the result of making correct decisions before and during preparation.

One of the first decisions in preparing a fossil is to choose the right tools for the job. Specimens embedded in soft, friable matrices such as sand, clay, shell-beds, and some dust and ash tuffs can be worked out with dental picks, pin-vices, soft brushes, and other hand tools. Specimens found in hard matrices will require different tools. Hand tools such as hammers, chisels, large pin-vices, and brushes will do the job, but mechanical devices such as the Gravermeister, AirScribe, and etching tools can prepare specimens in a fraction of the time. Regardless of the tools used, preparation should proceed carefully and the condition of the specimen must be monitored constantly. As portions of the specimen are exposed, they should be cleaned, glued, and hardened. Specific methods of preparation will be discussed in detail in upcoming issues of Pony Express.

The following short bibliography lists some relevant books for persons interested in preparing fossils:

- *Handbook of Paleontological Techniques*. 1965. Kummel and Raup, eds. W. H. Freeman and Co., San Francisco.
- *Fossils for Amateurs: A handbook for collectors*. 1972. R. P. MacFall. Van Norstrand Reinhold Company, New York.
- *Fossil Animal Remains: Their preparation and conservation*. 1976. A. E. Rixon. Athlone Press, Univ. of London.
- *Handbook of Paleo-Preparation Techniques*. 1989. Converse and McCarty. Florida Paleontological Society, Gainesville.

(Russ McCarty)

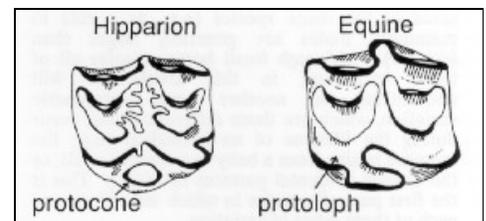
Fossil Horse Spotlight--General features of Bone Valley horses

(This article is written to coincide with the Fall field trip to the Bone Valley mines sponsored by the Florida Paleontological Society. It is intended to help the reader with the basics of identifying the two major groups of horses represented there. Also, see the article on variation below for additional discussion about Florida horse teeth)

The fossil horses from the upper Bone Valley phosphate mines of central Florida represent a large diversity of about six co-existing species that lived about five million years ago during the late Miocene and early Pliocene. The Bone Valley deposits have been a favorite spot for fossil collecting since the mines were developed around the beginning of this century. The two major groups of fossil horses found from this district are the **hipparions** and **equines**. (Some rare, earlier Miocene horses also have been described from the lower units in the Bone Valley sequence, but we will concentrate on the better-known forms from these mines.) Although the particular diagnostic characteristics of the Bone Valley horses are quite complex and it would be impossible to present a complete description here, the following represents some of the basics for identifying Miocene through Pliocene fossil horse teeth from Florida (and elsewhere, too).

Hipparions and equines were the two major groups of horses in the New World during the Miocene. Both of these groups were represented in Florida. In general, these two groups can be distinguished by several features of the skull, teeth, and limbs. We will concentrate on the latter two here because fossil horse skulls are virtually non-existent from the Bone Valley.

Although there are many variations in moderate wear stages, the teeth of hipparions characteristically have an isolated protocone (see figure). Hipparions from the Bone Valley include species such as *Nannippus "minor"* (or *aztecus*) and *Connohippation plicatilis*. Although considered a hipparion, Bone Valley *Pseudhipparion* is a special case in which the protocone becomes connected during relatively early wear stages, thereby mimicking this character in the equines. The protocone in equines, e.g., *Dinohippus mexicanus* and *Astrohippus stocki*, is persistently connected to the internal fold on the tooth (the protoloph).

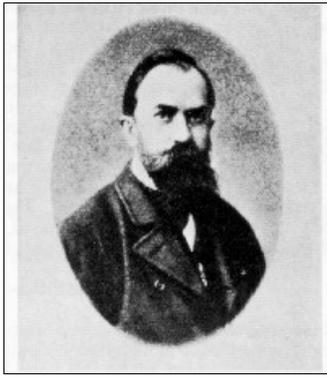


Later members of these two groups in the Bone Valley are further distinguished by their limbs. Hipparions have three toes on each limb (tridactyl), whereas advanced equines are one toed (monodactyl, similar to modern *Equus*). The monodactyl Bone Valley *Dinohippus mexicanus* is regarded by many workers as the closest relative of the genus *Equus*, which first occurred in North America about 3.5 million years ago (also see article on Hagerman below). In contrast, the hipparions, although they persisted into the Pliocene, became extinct in Florida and elsewhere in the world by about two million years ago.

Famous Horseologists--Vladimir Kowalevsky (1842-83) and the Russian Connection

Periodically in the history of science we learn of examples of young paleontologists who make profound contributions to science and then fade from the scene for one reason or another. Such was the case with the promising young Russian paleontologist, Vladimir Kowalevsky. In the 1870s Kowalevsky wrote several very important monographs on fossil mammals, including what some have called the most innovative study of extinct hoofed mammals (ungulates) written during the 19th century. His 1873 paper on *Anchitherium* was an exhaustive description of the remains of this browsing horse based on fossils from the Old World. He also included in that paper some of the most forwardthinking hypotheses about fossil horse evolution and adaptation, some of which still are considered valid today.

Perhaps most interesting, Kowalevsky believed that the rapid increase in crown height (hypsodonty) observed in fossil horses during the Miocene was an adaptive response to beginning to feed on grasses. This perceptive notion has since become well ingrained in the scientific literature as one of the best examples of an animal's adaptive response to feeding upon a new food resource (i.e., the opening up of extensive grasslands). It also is stated in the literature that Kowalevsky thought fossil horses evolved in a straight line from ancestor to



descendant (called orthogenesis), but a careful reading of the original monograph indicates that he was far more perceptive than his contemporaries. In fact, he stated that horse evolution was a far more complex branching pattern, an idea that acceptance by paleontologists in the 20th century.

Unfortunately, after writing several highly influential and now classic papers on fossil horses and other extinct mammals, Kowalevsky was unable to secure a job in paleontology and ultimately chloroformed himself to death.

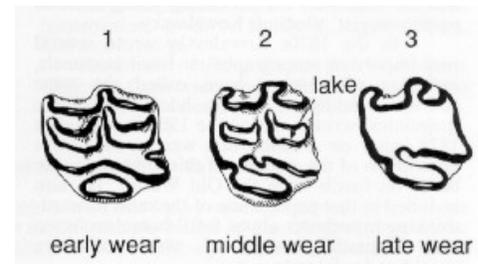
(Next time: William Diller Matthew)

How to identify fossil horses

Variation, or why are horse teeth so difficult to identify?

Variation is a characteristic of all life and demonstrates that no two individuals are exactly the same in their features and attributes. Variation can result from several sources. **Taxonomic** variations are those differences that allow us to distinguish different groups or species (e.g., the dental patterns of different species of fossil horses). **Geographic** variation might result in differences between populations of the same species from different regions (e.g., different hair color in the same species of squirrel from different areas). **Sexual** variation (also called dimorphism) are those differences between the sexes of the same species (e.g., as a rule in mammals, males are generally larger than females). Although fossil horses display all of these variations, in this article we will concentrate on another type, **ontogenetic** variation, which are those differences that occur during the lifetime of an individual (e.g., the increase in size from a baby to a mature adult, or the change in dental patterns of teeth.) This is the first part of a series in which we will discuss each of these types of variation. In keeping with the general theme of this issue on Bone Valley horses, we will use the species *Pseudhipparion simpsoni* to illustrate some ontogenetic changes that occur in the dentition throughout the lifetime of an individual.

During early wear stages, the upper teeth of Bone Valley *Pseudhipparion* exhibit a dental pattern with clearly defined enamel folds and an isolated protocone (see figure here; also see article above on Bone Valley horses). Specimens like this one represent animals that died as juveniles. In middle wear stages the dental pattern changes and the protocone becomes connected to the protoflop and the enamel lakes become smaller. In late wear stages, represented by those individuals that died in old age, the dental pattern simplifies and the enamel lakes are lost in most cases. Thus the stage of wear, which represents the time at which an individual died, has a profound impact on the dental pattern. Earlier workers were less aware of ontogenetic changes that occurred in fossil horse teeth. As a result, different species sometimes were named for different ontogenetic stages. These were recognized later as pertaining to the same species.



In summary, ontogenetic variation can cause problems in identifying fossil horse teeth because the dental pattern can change even within the same species depending upon the age at which the animal died. We are lucky, however, because few fossil horses change as much as do specimens of Bone Valley *Pseudhipparion*. We nevertheless must take ontogenetic variation into account when identifying fossil horse teeth—it is just one reason why individual horse teeth are difficult to identify for both the amateur and professional, too!

(Next time: Sexual variation in fossil horses)

Fossil Horse Localities--Hagerman National Monument, Idaho

For those of you planning a trip out west, consider placing Hagerman National Monument, located in southwestern Idaho, on your list of places to visit. This recently established monument is managed by the National Park Service and encompasses a beautiful, serene area bordering the Snake River. From a paleontological perspective, the attraction of Hagerman is the Horse quarries, which have been worked by paleontologists since the 1930s. In addition to the other Pliocene (about 3.5 million year old) fossil mammals recovered from there, Hagerman is most notable for spectacular skeletons of early *Equus*, referred to *E. simplicidens*, now the Idaho state fossil. Research has shown that this species is closely related to African zebras.

Although the famous Horse quarries are currently covered up, you can go out to the site and imagine, as I did, what it was like to collect more than one hundred complete fossil horse skeletons in the 100-degree heat of the Idaho summer. Mounted skeletons of the Hagerman *Equus* are on exhibit in museums around the country, including the American Museum of Natural History in New York, the Smithsonian, and the Los Angeles County Museum.

A visitors' center is planned for the Hagerman National Monument and a staff paleontologist will be on site soon. Although the town of Hagerman is small, there is a good motel there, as well as a winery (with good local wines), and a small, but interesting local historical museum with an *Equus* skeleton on exhibit.

For further information contact the *Hagerman Fossil Beds National Monument, P. O. Box 570, Hagerman ID 83332, Phone (208) 837-4793.*

Readers' Forum

Dear Ms. Chandler,

I greatly enjoyed the first issue of the Newsletter and look forward to receiving future issues. McCarty's informative article on the fragility of fossil skulls was of particular interest, as it is evident that horses have changed some since then. The box-headed mare who eats my

salary in oats each month has a head about as fragile as an oak stump with a mouth to match.

Do you fossil horse fellas have a theory about how this has come about? My own speculation is that as fossil horses got bigger and bigger (in an evolutionary sense), they maybe banged their heads on branches more and got harder headed, or maybe those sabre-toothed tigers had something to do with it

The only item in your Newsletter I take issue with is some of the nomenclature. On page 4 you talk about "Horseologists" and "Horseology." My first point is pronunciation. My pal Eric says it all peculiar like "Horse-ee-ology" but I just say it regular like "horseology." What do you think? My next point is that a Horseologist is obviously someone like me--puts up with the critters in spite of their foolish notions and insatiable appetites for oats and barbed-wire fences. Your colleagues and that famous feller, Mr. Skinner, are obviously Paleohorseologists (pronounced Pail-ee-o-horse-ologists) because they are concerned with little biddy fossil horses that didn't eat oats or have to worry about fences. I hope you and Professor MacFadden will clear this up in your next issue. I always reckoned the only good horse was a dead horse and I prefer mules anyway--they're smarter and eat less. Keep up the good work

Yours Sincerely, Evan B. Michaels, Micanopy

Book Review

A Checklist of the Fossil Vertebrates of Florida, by Richard C. Hulbert, Jr., published by the Florida Paleontological Society (FPS), 1992, pamphlet format, 35 pp.; free to FPS members, \$3.00 to non-members, order from FPS, Florida Museum of Natural History, University of Florida, Gainesville FL 32611

In 1957 Clayton Ray published an invaluable list of all the published fossil vertebrates of Florida. Since then, there have been many new discoveries. Hulbert, a former UF paleo graduate student and now professor at Georgia Southern, has done the monumental job of revising and updating this list. It now includes 45 species of amphibians, 407 reptiles and birds, and 420 mammals (including over 50 species of horses). It also gives the time range (both in million years and geological epoch) for each species.

When published, this checklist is sure to become a much-used and standard reference for anyone interested in Florida paleontology.

Announcements

September 16, 7:30 pm, Robert E. Lee Middle School, 1201 Maury Rd., Orlando. Bruce MacFadden will present a talk on fossil horses to the Florida Fossil Hunters. Contact Dean Sligh at (407) 290-2547.

October 16-18, Florida Paleontological Society, Fall Field Trip and annual meeting in the Bone Valley. Co-sponsored by Mobil mines, this will include social events, lectures, and a field trip to the phosphate mines. Contact Kevin Schindler, FPS, Florida Museum of Natural History, University of Florida, Gainesville, FL 32611, Phone (904) 3 92-1721.

November 7, 6 pm, held at USF Engineering Auditorium, Tampa. Bruce MacFadden will talk on fossil horses and will be available to sign his book entitled "Fossil Horses." Contact Rudi Johnson at (813) 839-2291.

November 18, 7:30 pm, Orlando (same locality as above). Gary Morgan will present a talk on fossil whales to the Florida Fossil Hunters. Contact Dean Sligh at (407) 290-2547.

Pony Express

Florida Fossil Horse Newsletter
Volume 1, Number 3
September 1992

Editorial Staff:

- Bruce J. MacFadden, Editor
- Gary Morgan, Contributing Editor
- Russell McCarty, Contributing Editor
- Art Poyer, Contributing Editor
- Linda Chandler, Managing Editor
- Daniel Cordier, Program/PR Coordinator

Direct all Correspondence to:

Pony Express Managing Editor
Pony Express
Department of Natural Sciences
Florida Museum of Natural History
P.O. Box 117800
Gainesville, FL 32611-7800
Phone: 352-392-1721

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The purpose of this newsletter is to communicate news and information and disseminate knowledge 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 FLMNH that pertain to fossil horses. Contributions to the Fossil Horse Fund are deposited into an account at the University of Florida Foundation, Inc., a tax-exempt entity, and will be used for the purposes stated here.

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Now that a logo and format have developed for *Pony Express*, each Charter Member will receive a special custom three-hole binder with the *Pony Express* logo printed on it. These will be sufficient to hold the first five years of your issues of *Pony Express*. Charter members are defined as those members who subscribe to the *Pony Express* during 1992. If you know someone who is interested in subscribing, but has not yet sent in their contribution, encourage them to do so soon. New members will receive all back issues of Vol. 1 of the newsletter.
