

## Florida Fossil Horse Newsletter

Volume 4, Number 2, 2nd Half 1995

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### TBFC Excavates Spectacular 25 million-year-old Florida Fossil Horse Skeleton

During the middle of this year, members of the Tampa Bay Fossil Club (TBFC) excavated a truly spectacular 25-million-year-old Miocene three-toed horse from sediments in Pinellas County. This skeleton was discovered by Chris Skillman, an avid collector who was quick to recognize its importance, and was excavated by a team of volunteers, including: Tony Estevez (field leader), Bob Vander Gronden, Steve Jacobson (TBFC President), Terry Sellari, Frank Kocsis, and Sharon Blinebury.

The specimen is exquisite in its preservation and includes some very interesting details not normally found in Florida fossil horses. First and foremost, this specimen consists of an articulated skeleton, in contrast to most specimens from our region that almost always are represented by isolated and generally fragmentary elements. The details of the specimen are extraordinary--the shiny teeth are beautifully preserved, the large canines indicate that this individual was a male, and even the delicate side-toe splints and tiny side-hooves are preserved (see photo).

*Specimen of Miohippus collected by the TBFC. Top: Large canines (arrow) indicate that this individual was a male. Bottom: The two nearly complete limbs flank the complete right and left upper rows of premolars and molars.*

Preliminary comparisons of this fossil indicate that it is referable to *Miohippus*, an extinct genus that is relatively common from the upper part of the Big Badlands and overlying sediments from the High Plains (Nebraska, Wyoming, and South Dakota). These occurrences indicate an age of about 25 million years for the Florida skeleton. *Miohippus* is exceedingly rare east of the Mississippi River. Taken together there are only a handful of specimens pertaining to *Miohippus* from the eastern U.S., the others of which include fragmentary teeth and broken bones.



*Miohippus* is also known (and was first described by the Yale paleontologist O. C. Marsh) from the John Day Fossil beds of Oregon. Determination of exactly which species of *Miohippus* this specimen represents must await detailed anatomical investigations and comparisons with specimens in other museums.

Studies of the ancient biology of the genus *Miohippus* indicate that this fossil horse was tiny, weighed about 80-90 pounds, probably lived in small herds, and was a browser, i.e., it fed on leafy vegetation (as opposed to grass). While it certainly was capable of running, it probably did so at a slower pace and for shorter periods of time than the modern horse *Equus*.

*Tony Estevez (right) and Steve Jacobson (left) excavating the Miohippus horse from a creek-bed in Pinellas County.*

This wonderful specimen was acquired by the TBFC for exhibition and study and it is intended to be donated to the FLMNH. The generosity of the TBFC and recognition of the importance of preserving this unique and extraordinary specimen in the public/scientific domain is greatly appreciated.

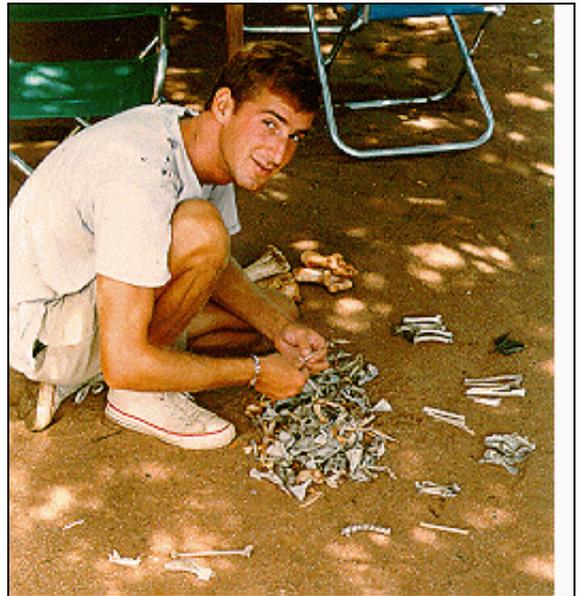
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## **New VP Collections Manager--Marc Frank**

We are delighted to announce that Marc Frank has joined us as Collection Manager in the Vertebrate Paleontology collection at the FLMNH. Marc is a native of Augusta, Georgia. He did his undergraduate studies at the University of Georgia where he received a BA in Anthropology. He then came to Gainesville where he did an interdisciplinary Master's degree (combining zoology and anthropology) studying zooarchaeology with Dr. Elizabeth Wing. (Zooarchaeology is the study of non-human animal remains found at archaeological sites. With these remains archaeologists can better understand the kinds of animals that were consumed, technologies used, and habitats exploited by ancient peoples.) During his

graduate studies at UF, Marc served as the teaching assistant in the Vertebrate Paleontology course and also worked in the VP collection during 1990-1991 doing extensive curation of fossil mammals, mostly from the Aucilla River. Between 1992 and mid-1995, when he joined us at the FLMNH, Marc gained extensive museum curatorial experience as a Museum Specialist in the Division of Mammals at the Smithsonian Institution in Washington, D. C. At the FLMNH, Marc's current duties as Collection Manager include handling all sorts of inquiries, arranging for visitors and students to use the collection, public outreach, field collecting, overseeing the curation and conservation of the entire VP fossil vertebrate collection, and supervision of collection staff. We welcome Marc to the FLMNH as a member of the VP collections group.

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## The Thomas Farm Fossil Horse Digs--1995

The 1995 Pony Express fossil digs consisted of two sessions held on April 20-23 and May 4-7. The staff for both sessions were: Dr. Bruce MacFadden (leader and cook), Art Poyer ("pit boss"), Bruce Shockey (pit assistant), and Russ McCarty (preparator). Erika Simons joined us in the May session. In addition to excellent digging, wonderful weather, and congenial camaraderie, we were also treated to evening stargazing sessions by raconteur extraordinaire and UF astronomy professor Dr. Howard Cohen.

The Thomas Farm fossil locality was discovered quite by accident in the late 1920s by Florida archaeologists who were doing routine county resource surveys. It was soon realized that this 20 million-year old locality was one of the richest sites dating from before the Ice Age (Pleistocene) in the entire U.S. Since the late 1940s, the Thomas Farm site has been excavated primarily by UF paleontologists and their assistants. The Pony Express has sponsored Spring Digs at Thomas Farm since 1992.

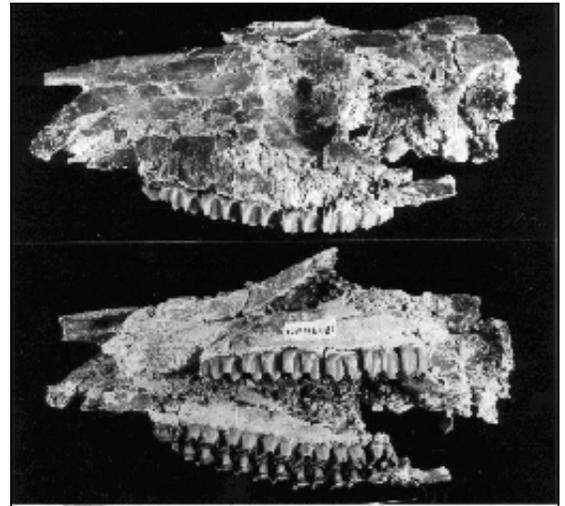
Although we have had excellent success in years past with collecting new and exciting fossils at Thomas Farm, it is safe to say that this year's overall productivity, in terms of both the quantity and quality of fossils, is the best so far. A total of about 15 horse jaws, 2 skulls (including the extraordinarily rare dwarf horse *Archaeohippus*, see photos), several rare extinct camels, and small deer-like mammals made this dig a truly rewarding experience from a paleontological point of view.

The following is a preliminary list of the fossils thus far identified and catalogued (compiled by Erika Simons and Art Poyer). It by no means reflects the entire spectrum of fabulous fossil finds of the 1995 field season. Many of the skulls still await preparation.

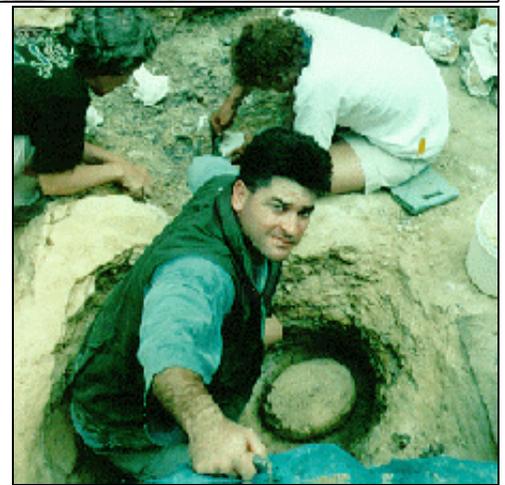
- **Anura**, miscellaneous frogs and toads
- *Bufo* sp., frog
- *Geochelone tedwhitei*, extinct tortoise
- **Emydidae** and *Pseudemys*, extinct turtles
- *Alligator olseni*, alligator
- **Rodentia**, miscellaneous rodents (squirrels, etc.)
- **Carnivora**, miscellaneous kinds of carnivores
- *Amphicyon longiramus*, giant bear-dog
- *Cynodesmus iamonsensis*, dog
- *Tomarctus canavus*, dog
- **Mustelidae**, various weasels and their relatives
- **Ursidae**, true bears
- *Anchitherium clarenci*, large, three-toed browsing horse
- *Archaeohippus blackbergi*, three-toed dwarf horse
- *Parahippus leonensis*, medium-sized, three-toed mixed feeder horse
- **Rhinocerotidae**, various rhinos

- *Floridaceras whitei*, extinct Florida rhino
- *Blastomeryx floridanus*, small deer-like mammal
- *Machaeromeryx gilchristensis*, small deer-like mammal
- *Nothokemas*, larger even-toed ruminant ungulate

Archaeohippus, lateral (side) and palatal (bottom) views of a very well-preserved skull collected by Jeff Yaun during the 1995 Thomas Farm fossil dig. To the left in each view you can see the nasal (nostril opening) region, and at the bottom, views of the premolar and molar teeth. The eye socket, or orbit, is indicated by an arrow. This specimen was excavated from the site using a plaster jacket, prepared in the lab by Russ McCarty, and catalogued and photographed by Erika Simons.



Jeff Yaun, collector of the Archaeohippus skull, with Liz Anderson (top left) and Barbara Toomey (top right). Photo by Donna Blair.



### Session I--APRIL 20-23

Person Name	Sci name	Material
Mary Elizabeth Anderson (Winter Park)	<i>Archaeohippus blackbergi</i>	cheek tooth, vertebra, radius, carpals, tarsals, distal metapodial, sesamoid, phalanges
	<i>Alligator olseni</i>	osteoderms
	<i>Geochelone tedwhitei</i>	costal
	<i>Parahippus leonensis</i>	right mandible w/cheek teeth, teeth, distal radius, patellae, lateral and medial metapodials, proximal sesamoids, carpals, tarsals, phalanges
	Artiodactyla	wrist bone, fibula, patella, phalanges
	<i>Blastomeryx floridanus</i>	left mandible with cheek teeth
	<i>Floridaceras whitei</i>	sesamoid
	Carnivora	phalanx, mustelid calcaneum
	Canidae	left partial mandible
Betsy Carlson	<i>Archaeohippus</i>	mandible, humerus, radius

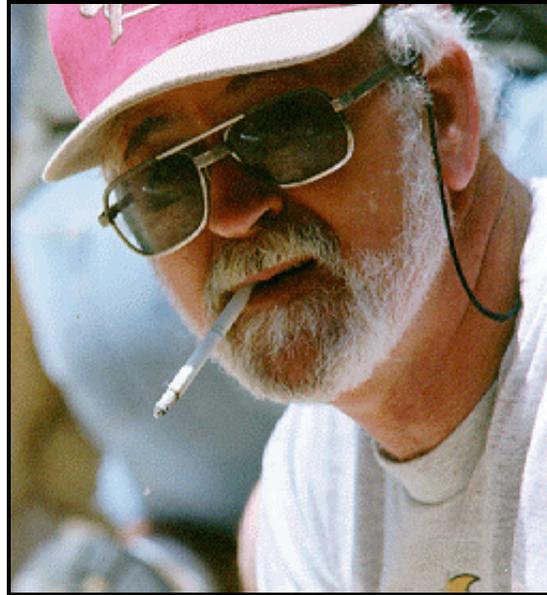
(Gainesville)>	<i>blackbergi</i>	
	<i>Parahippus leonensis</i>	teeth, radius, ulna, tibia, metatarsal, carpals, tarsals, phalanges
	<i>Alligator olseni</i>	articular, teeth, osteoderms, phalanges
	Artiodactyla	phalanges
	<i>Blastomeryx floridanus</i>	astragalus
	Carnivora	canine
<b>Audrey Carter</b> (Winter Garden)	<i>Archaeohippus blackbergi</i>	teeth, metapodials, carpals, tarsals, phalanges
	<i>Alligator olseni</i>	teeth, frontals, osteoderms
	<i>Geochelone tedwhitei</i>	costals, marginals
	<i>Parahippus leonensis</i>	teeth, mandibles, vertebrae, carpals, tarsals, metapodials, phalanges
	<i>Blastomeryx floridanus</i>	cheek tooth
	Artiodactyla	patella, phalanges
	Carnivora	caudal vertebra
<b>Melissa Khoshesperan</b> (Altamonte Springs)	<i>Archaeohippus blackbergi</i>	tibia, tarsal, phalanx
	<i>Alligator olseni</i>	tooth, osteoderm
	<i>Parahippus leonensis</i>	radius, proximal sesamoid, phalanges
	Carnivora	canine
<b>Derk Kuyper</b> (Orlando)	<i>Archaeohippus blackbergi</i>	mandible fragment, teeth, proximal scapula, femur, tibia, carpals, tarsals, phalanges
	<i>Alligator olseni</i>	premaxilla, maxilla, vertebrae, teeth, osteoderm
	<i>Geochelone tedwhitei</i>	neural, marginal
	<i>Pseudemys</i>	costal, marginal
	<i>Parahippus leonensis</i>	teeth, vertebrae, femur, pelvis fragment, tibia, tarsals, metapodials, phalanges
	<i>Blastomeryx floridanus</i>	calcaneum
	Artiodactyla	tibia, phalanx;
	Canidae	radius, tarsal
	Carnivora	tarsal
<b>William Lee</b> (Baton Rouge, LA)	<i>Archaeohippus blackbergi</i>	incisor, metacarpal, phalanx;
	<i>Alligator olseni</i>	squamosal, tooth
	Reptilia	phalanx

	Anura	limb bone
	<i>Parahippus leonensis</i>	lunar, sesamoid, phalanx;
	<i>Machaeromeryx gilchristensis</i>	calcaneum, astragalus
	?Rodentia	unfused femur
	Carnivora	premolar, phalanx
	Ursidae	atlas
<b>Robert Mueller</b> (Gainesville)	<i>Archaeohippus blackbergi</i>	teeth, mandible with cheek teeth, carpals, tarsals, medial metacarpal, phalanges
	<i>Alligator olseni</i>	articular, radius, osteoderms
	<i>Geochelone tedwhitei</i>	costals, shell element
	<i>Parahippus leonensis</i>	maxilla with cheek teeth, teeth, radius, scapula, femur, carpals, tarsals, phalanges
	cf. <i>Anchitherium clarenci</i>	occipital condyle
	Artiodactyla	proximal scapula, tarsal
	Mustelidae	incisor
<b>Jewel Pozefsky</b> (Altamonte Springs)	<i>Archaeohippus blackbergi</i>	teeth, sesamoids, patella, metapodials, phalanges
	<i>Alligator olseni</i>	osteoderms, phalanges
	<i>Pseudemys</i> sp.	marginal;
	<i>Bufo</i> sp.	ilium
	<i>Parahippus leonensis</i>	teeth, scapula, carpals, tarsals, metapodials, phalanges
	<i>Blastomeryx floridanus</i>	calcaneum
	Artiodactyla	astragalus, phalanges
	Carnivora	metacarpal, metapodial
<b>Scott Stuart</b> (Orlando)	<i>Archaeohippus blackbergi</i>	humerus, ectocuneiform, first lateral phalanx
	<i>Alligator olseni</i>	osteoderms
	<i>Pseudemys</i> sp.	neural
	<i>Parahippus leonensis</i>	proximal scapula, medial metacarpal, lateral metapodials, tarsals, medial phalanges, vertebra
	cf. Artiodactyla	proximal scapula
	Canidae	fifth proximal metatarsal
	Carnivora	distal metapodial
<b>Barbara Toomey</b> (Sanibel)	<i>Archaeohippus blackbergi</i>	mandible fragment, teeth, humeri, tibia, patella, ulna, radius, carpals, tarsals, metapodials, phalanges
	<i>Alligator olseni</i>	teeth, osteoderms, vertebra, femur, phalanges

	<i>Geochelone tedwhitei</i>	costal
	<i>Pseudemys</i> sp.	costals, marginals, plastron fragments
	<i>Bufo</i> sp.	ilium
	<i>Parahippus leonensis</i>	teeth, vertebra, distal tibia, patella, carpals, tarsals, sesamoids, phalanges
	Rhinocerotidae	ectocuneiform, third metacarpal, innominate
	Artiodactyla	distal tibia, phalanges
	cf. <i>Cynodesmus iamonensis</i>	right mandible with molars
	<i>Amphicyon longiramus</i>	tooth, phalanx
	Mustelidae	proximal femur
<b>Reed Toomey</b> (Sanibel)	<i>Parahippus leonensis</i>	2 right mandibles with teeth, isolated teeth, tibia, calcaneum, metapodials, phalanges, vertebrae
	cf. <i>Tomarctus canavus</i>	right mandible with premolars and molars
	Canidae	patella
	Ursidae	incisor;
	<i>Amphicyon longiramus</i>	phalanx
<b>Rita Warren</b> (Miami)	<i>Archaeohippus blackbergi</i>	phalanges
	<i>Parahippus leonensis</i>	teeth, skull fragment, metapodial, tarsal, phalanges
	<i>Blastomeryx floridanus</i>	astragalus
	Artiodactyla	phalanx
	Carnivora	skull fragment, phalanx
<b>Jeff Yaun</b> (Mayport)	<i>Archaeohippus blackbergi</i>	skull with complete cheek dentition, teeth, humerus, carpals, tarsals, metapodials, phalanges
	<i>Alligator olseni</i>	teeth, osteoderms, skull bones
	<i>Geochelone tedwhitei</i>	costals, marginals
	<i>Parahippus leonensis</i>	skull with complete cheek dentition, maxilla frag., mandible with complete cheek dentition, teeth, proximal radius, proximal ulna, right innominate, sacrum, patella, carpals, tarsals, metapodials, phalanges
	cf. <i>Floridaceras whitei</i>	patella
	cf. <i>Nothokemas</i>	premolar
	Artiodactyla	radius, carpals, phalanx
	Mustelidae	calcaneum
	Carnivora	axis, premaxilla

Person Name	Sci name	Material
<b>William Killingsworth</b> (Leeds, AL)	<i>Archaeohippus blackbergi</i>	tarsal, phalanx;
	<i>Alligator olseni</i>	femur, osteoderm
	<i>Geochelone tedwhitei</i>	marginals
	<i>Pseudemys</i> sp.	costals, marginal
	<i>Parahippus leonensis</i>	teeth, vertebrae, scapula, innominate, carpals, tarsals, metapodials, phalanges
	Rhinocerotidae	left upper P1
	Artiodactyla	patella
	Canidae	fibula;
	Carnivora	metapodial
<b>Derk Kuyper</b> (Orlando)	<i>Archaeohippus blackbergi</i>	carpals, tarsals, metatarsals
	<i>Alligator olseni</i>	vertebra, osteoderm, distal tibia
	<i>Geochelone tedwhitei</i>	costal, hypoplastron
	Emydidae	vertebra
	<i>Parahippus leonensis</i>	teeth, carpals, tarsals, metapodials, phalanges, vertebrae, patella
	Artiodactyla	teeth, astragalus, phalanges
	Canidae	axis, vertebra
	cf. Canidae	patella
	Carnivora	caudal vertebra, phalanges
<b>Wandi Savage</b> (Apopka)	<i>Alligator olseni</i>	osteoderm
	<i>Parahippus leonensis</i>	carpal, tarsal, phalanx
	Mustelidae	radius
	Mammalia	patella
<b>Judy Thompson</b> (Leeds, AL)	<i>Archaeohippus blackbergi</i>	incisor, distal radius, carpal, tarsal, lateral metapodials, phalanges
	<i>Alligator olseni</i> :	tooth, osteoderms
	<i>Geochelone tedwhitei</i>	neural
	<i>Pseudemys</i> sp.	epiplastron, tibia
	Anura	vertebra
	<i>Parahippus leonensis</i>	incisor, tarsal, metapodial, sesamoids, phalanges
<b>Marcia Wright</b> (Winter Park)-	<i>Archaeohippus blackbergi</i>	tooth, radius, vertebrae, carpals, metapodials
	<i>Alligator olseni</i>	tarsal, osteoderms
	<i>Geochelone tedwhitei</i>	marginals, osteoderm
	<i>Parahippus</i>	tooth, vertebrae, radius, patella, femur, carpals, tarsals,

	<i>leonensis</i>	metapodials, phalanges
	Artiodactyla	tooth, patella
	Canidae	radius
	Carnivora	radius, premaxilla, phalanx



Left (top): Reed Toomey. Left (bottom): Audrey Carter (bottom left), Bruce Shockey (top), and Jewel Pozefsky (right). Right: Bill Lee, expert screenwasher and raconteur extraordinaire.

## "Local Boy Makes Good" --J. Daniel Bryant

We are pleased to report that J. Daniel "Danny" Bryant, a Florida native, recently received his Ph. D. in paleontology from the Department of Geological Sciences at Columbia University in New York City. His doctoral dissertation involved a study of oxygen in fossil horse teeth to understand ancient climates in the Miocene of North America. Danny spent most of his youth in Lakeland where he early on acquired a love of collecting fossils from the phosphate mines in central Florida. Danny then went on to UF where he received his B. S. in 1988 and M. S. in 1990, both in Geology while also working extensively at the FLMNH. For his Master's thesis Danny worked as one of MacFadden's students and collected Miocene mammals from the relatively poorly known clay mines in the Florida Panhandle and determined the age of these fossil localities using both paleomagnetic and Strontium dating techniques. During his field work, Danny was greatly aided by the help of a local collector, Jim Morris of Bainbridge, GA (In-kind donations).

After receiving his Ph. D. this past summer, Danny began a postdoctoral appointment as a research scientist in the Department of Geological and Geophysical Sciences at Princeton University. We wish Danny the best of luck with his career!

*J. Daniel "Danny" Bryant (left) receives his Ph. D. from Columbia University.*



## Bone Spotlight--Sesamoids: Those Forgotten Bones, by Dr. John Hermanson

(Editor's note: Dr. John Hermanson is an Associate Professor of Anatomy in the College of Veterinary Medicine at Cornell University, Ithaca, NY. John has a Ph. D. in Zoology from the University of Florida)

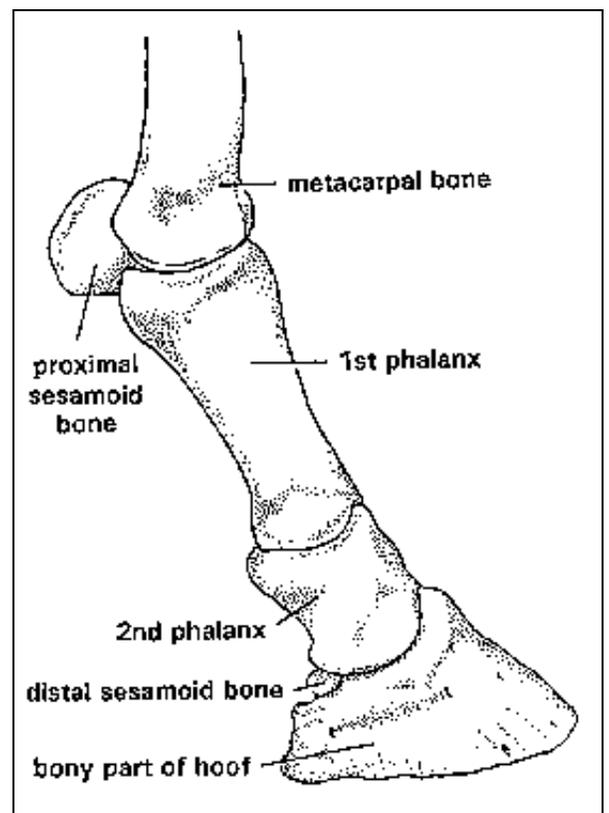
and has collaborated with the Editor on two professional papers dealing with the evolution of upright posture in fossil horses. John is the professor in charge of teaching horse anatomy to each year's new crop of veterinary students. When John is not studying horses, his other research interests include the mechanics of bat flight.)

Sesamoids are small, usually overlooked, accessory bones that frequently fossilize, but are not readily associated with the animals that had them in life (see for example, limb bone with sesamoid bones in illustration). The function of sesamoid bones is not certain, nor is it clear how sesamoids have come to be distributed at various locations of the body in many animals. Clearly, sesamoids are associated with the distribution or redirection of forces within tendons of specific muscles. Of these, the human patella (kneecap) springs most easily to mind. The patella is a bone located within the tendons of the knee extensor muscles. In this location, the patella increases the mechanical advantage (or the force generation) of these muscles in knee movements, an advantage resulting from the displacement of muscle action away from the center of joint rotation.

Horses exhibit a series of fascinating and important sesamoid bones in the limbs and digits. These include the proximal<sup>1</sup> sesamoids (see illustration), which are paired and located at the junction of the wrist and fore-limb toes and ankle and hind-limb toes, and the distal<sup>2</sup> sesamoids which are single and located between the toe bones (phalanges). Several functions are attributed to these sesamoid bones. For example, the proximal sesamoids form a pulley around the fetlock (anatomically equivalent to the knuckle at the base of your middle finger) joint. But these sesamoids are embedded in the tendon of the interosseous muscle (not really a muscle because no real muscle fibers can be detected in the adult "muscle"- but that's another story!). The anatomy of the proximal sesamoids is similar in both the forelimb and hindlimb. As the weight of the individual is applied to the limb, the fetlock joint yields to the weight of the animal and overextends or "sags." The interosseous muscle is the proximal part of a supporting system called the suspensory apparatus, which incorporates the proximal sesamoids and continues distally as a multi-ligamentous structure. The sesamoidean ligaments perform important roles which prevent overextension (collapse) of the digital joints. In life, the weight of the animal causes movement in these joints which causes the suspensory apparatus to stretch to a point of equilibrium, beyond which further collapse of the joints is not possible.

If you've ever looked closely at the limb posture of horses at the end of a long race, you may note a surprising amount of overextension of the fetlock joint, thought to result from exhaustion of the suspensory apparatus and associated supporting muscles. This is a complicated system and one that is often associated in breakdown at the racetrack, either through overextension of the fetlock and resultant poor placement of the proximal sesamoids (leading to fracture of these important bones), or actual tearing of the proximal bony attachments of associated muscles. As we reflect upon fossil horses and a time before veterinary medicine became adept at repair or prophylactic treatment of the equine athlete, how did the earliest single-toed horses prevail without injury to the digit? Perhaps further investigation of these small bones in fossil horses will shed light on this question and the adaptive value of sesamoids in more modern horses like *Equus*.

(Right) Side view of horse front foot showing position of proximal and distal sesamoid bones.



1, 2 Proximal and distal refer to anatomical positions that are respectively, closer to, and away from, the main body. In humans the thumb is distal to the wrist and the kneecap (patella) is proximal to the ankle. Also see Pony Express, vol. 1, no. 2, page 8 for discussion of anatomical positions.

## Reader's Forum

...about the Florida Museum of Natural History site on the World Wide Web: "It looks really good. You are to be commended. Information like the Pony Express newsletter [on the web], just outstanding. I would like to see the ability for greater depth into research articles." (**Jim Radz**, Longwood)

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## In-kind Donations

Thanks go out to:

**Malcolm Stuart** of Orlando, who donated a liquid propane tank and regulator for use at the Thomas Farm fossil site. Malcolm is a teacher in the Orange County School system.



**Jim Morris** of Bainbridge, GA, who donated a set of rare, fossil horse tooth illustrations originally used in scientific publications of Dr. Chester Stock of the California Institute of Technology. Jim (see photo) is a Chief Deputy sheriff in Bainbridge GA and an avid collector of Miocene fossils in the Florida panhandle. He also was instrumental in helping Danny Bryant (see "Local Boy Makes Good") find important fossil localities that were used for Danny's Master's thesis.

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## ANNOUNCEMENTS

### The 1996 Thomas Farm dig

The 5th Annual Thomas Farm fossil dig is scheduled for two weekends in the Spring of 1996. If you have participated before, or you are a newcomer, you are cordially invited to attend this relaxing, rustic, and educational retreat at a famous 20-million-year old fossil site located in rural northern Florida. Your returning of the enclosed form is a non-binding statement of intent so that we can plan for the two sessions. We will contact you in early 1996 so that you may exercise your option to participate and at that time send in a deposit to reserve your place on the dig. Each session is limited to **15** participants.

**Session I.** Thursday evening, April 18, to Sunday (mid-day), April 21, 1996

**Session II.** Thursday evening, April 25, to Sunday (mid-day), April 28, 1996

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## Pony Express--Statement of Purpose:

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.

1st-time Readers:

You can receive future issues of the Pony Express with a one-time new-member fee of \$20 made payable to the Fossil Horse Fund

Contributions and Support:

All supporters and other horse enthusiasts receive Pony Express and invitations to related activities that promote the research, exhibition, and education about Florida fossil horses.

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- **Russell McCarty, Contributing Editor**
- **Linda Chandler, Managing Editor**
- **Daniel Cordier, Program/PR Coordinator**

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New-member fee and other contributions should be made payable to:  
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Pony Express  
Florida Fossil Horse Newsletter  
Volume 4, Number 2  
2nd Half 1995  
ISSN# 1065-285X; Indexed in the Zoological Record

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