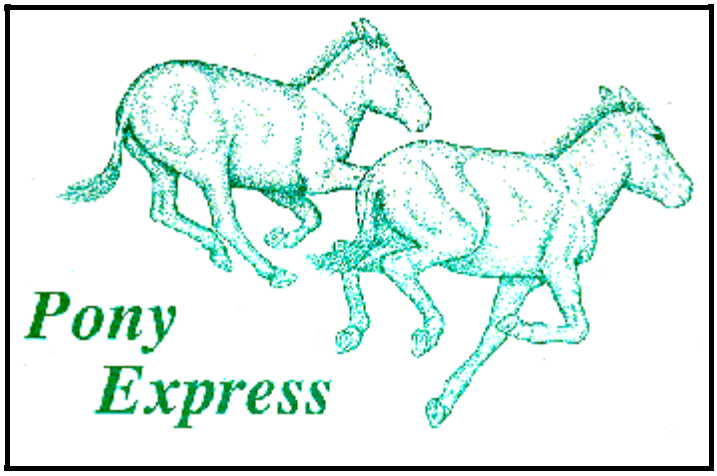

Florida Fossil Horse Newsletter

Volume 2 Number 2 2nd Quarter June 1993

What's Inside?

Jurassic Park in Florida?

Interest in Michael Crichton's best-selling novel has reached a crescendo now that the movie based on the book has appeared this month. Jurassic Park is a captivating science fiction story about cloning dinosaurs in the 20th century from strands of DNA preserved in fossil bones. In light of recent scientific research, however, only half of the story remains fiction.

While it seems unlikely that we will ever be able to reconstruct complete strands of DNA, the genetic raw material of life, or clone dinosaurs back from extinction, recent breakthroughs have shown that in certain circumstances, DNA and other organic matter can preserve in fossils. This kind of extraordinary preservation is found in, for "ample, very cold and dry regions where fossils become "mummified," but other environments that inhibit bacterial decay also can preserve organic matter. These kinds of conditions are found at numerous Pleistocene sites in the world, but few are known to exist from older ages.

A recent discovery from Miocene lake sediments in Idaho shows another possible avenue to success in the search for fossil DNA. In an article published in *Nature* in 1992, scientists extracted DNA from fossil Magnolia leaves and showed that these were of similar biochemical composition to the kinds of DNA found in modern representatives of this genus. Researchers also have been looking for DNA and other organics in fossil invertebrates (such as insects) preserved in amber. With little or no gas exchange occurring after the amber hardens, this fossil resin can preserve organic tissues (including DNA) for millions, or tens of millions, of years. The potential applications of preserved DNA in fossils are extraordinary and represent one of the hottest fields in paleontology today, "paleobiochemistry."

The discovery of DNA has many scientific merits, in particular, to determine interrelationships of different species and higher groups. If DNA or other useful biochemical data can be extracted from fossil horse bones, then we can ask interesting questions that have been poorly resolved so far. For example, the detailed interrelationships of extinct species of *Equus* (and the horse-zebra dichotomy, see page 7), or our phylogenetic hypotheses based on traditional characters of the teeth, skulls, and skeletons can be tested using paleobiochemistry. Florida may be a particularly fertile ground for these investigations because of the kinds of sedimentary conditions in which fossils are preserved. In collaboration with geochemists, a lot project was started recently to search for Fossil DNA in bones. If so, it will open up many new and interesting questions of scientific importance to be answered from specimens collected in our backyards. *(Bruce J MacFadden)*

Editor Takes Sabbatical

As a result of an official sabbatical awarded by UF and fellowships from the National Science Foundation and Fulbright program, Bruce MacFadden will be on leave during the upcoming year. While I am away, I will write the upcoming issues of Pony Express and, back in Gainesville, Linda Chandler will coordinate the editing, production, and mailing. If you have any news or notes, you can send them to me. If you have questions about receiving your issues of *Pony Express* during the next year, you should contact Linda at the permanent address on page 2. My temporary addresses will be as follows:

Effective dates: 20 August 1993 to 31 January 1994 (approx.):
Bruce J MacFadden
Department of Geology & Geophysics
University of Utah
Salt Lake City UT 84112

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APO AA 34032

Feral horses of Cumberland Island, GA. Photo courtesy of Thomas Harrigan.

The Thomas Farm Dig 1993

This year's Thomas Farm dig was held on the weekend of 16-18 April with 13 participants and the Museum staff including Bruce MacFadden, Daniel Cordier, Arthur Poyer, and Russ McCarty. The weekend included digging in the fossil site, screenwashing for tiny fossil mammals, and evening lectures and discussion sessions. The weather was spectacular, with cool mornings and warm afternoons. In the two days of digging some excellent finds were made and all of the fossils collected are currently being curated at the FlaMNH. When this process is completed, we will have added several hundred new specimens to the collection at the museum. The participants and a sampling of what each one collected is as follows:

Person Name

Sci Name	Material	
Reed Toomey (Sanibel)	***Alligator olseni***	scute
	Chelonia	partial shell
	Parahippus leonensis	astragalus, petrosal, phalanx
Helen Cozzini (Temple Terrace)	***Parahippus***	skull, dentary

	Aves	tarsometatarsus
Julie Burton (Anthony)	***Parahippus***	partial radius, lateral phalanges
	Alligator	scutes
Robyn Miller (Jacksonville Beach)	***Parahippus***	astragalus, calcaneum, patella;
	Archaeohippus	vertebra
	Alligator	scute
Brad Mcpherson (Shreveport, LA)	***Parahippus***	metapodial, patella, calcaneum, isolated teeth
	Alligator	scutes
	Amphicyon(?),	metapodial
	Tomarctus(?)	radius
	Canidae	tibia
Derk Kuyper (Orlando)	***Floridaceras(?)***	middle phalanx
	Archaeohippus	phalanx
Shirley Woodruff (Orlando)	**Aves**	tibiotarsus
	Alligator	isolated teeth
	Parahippus	phalanges, partial metapodials, astragalus
Mike Rinker (Ft Myers Beach)	***Parahippus***	radius, patella, femur, isolated teeth
	Chelonia	shell frag.
	Alligator	scutes
Monica Rinker (Ft Myers Beach)	***Cynodesmus(?)***	pathological metapodial
	Parahippus	partial ulna, isolated upper teeth, mandibular symphysis
	Archaeohippus	lateral phalanx
	Alligator	teeth
	Chelonia	shell frag.
Bill Lee (Baton Rouge, LA)	***Leptarctus***	isolated lower molar
	Chiroptera	dentaries, isolated teeth, limb elements
	Proheteromys floidanus	isolated teeth, limb elements
	Anura	limb elements
Jeffery Yaun (Mayport)	***Archaeohippus***	metapodial
	Parahippus	metapodials, phalanges, carpals and tarsals
	Canidae	metapodial
Mary Ann Freyer (Orlando)	***Parahippus***	phalanges, isolated teeth
	Archaeohippus	phalanges
	Chelonia	shell frag.
Trease Lemond (Panama City)	***Alligator***	scutes, isolated teeth
	Parahippus	calcaneum, lateral phalanges, carpals

The Thomas Farm dig again was a great success and another is planned for next year. Because the consensus was that the two day session was too short, next year we plan a long weekend (3- day) dig. Hopefully, with these digs and the accumulation of fossil horse specimens that result from them, we will draw closer to our goal of preparing a skeleton of Archaeohippus for the new FlaMNH exhibition center. (Bruce MacFadden and Arthur

Poyer)

(Left) Bradley McPherson, from Shreveport LA, holds a cast of a three-toed horse lower hindlimb for comparison with fossils collected during the dig. (Right) Digging in the pit. Photos by Jeff Gage, UF Info.

Remembering the Skinners

by Lelia and Bill Brayfield

(Editor's note: I recently visited the Brayfields at their wonderful lab and w e reminisced about Morris and Marie Skinner [see [Pony Express *vol. 1, No. 1].Their experiences with the Skinners were different from mine, but equally insightful I invited Lelia and Bill to write the article that follows about their times with the Skinners.)*

Morris F. Skinner, mentor and hero to many of us, is remembered as a paleontologist's paleontologist by his former colleagues in the earth sciences. But there are those of us for whom paleontology is just a great hobby. We remember Morris for the very special place he had in his heart for amateurs. He always was ready to help us. He identified our fossils. He sent us hard-to- obtain books and papers. He entertained us with wondrous yarns about his early field trips in the wilds of Nebraska and South Dakota.

Our first contact with Morris was in 1968 when we sent him 18 fossil horse teeth to identify. He sent the teeth back with the identifications and a letter telling us of Roy and Helen Burgess who lived in Venice, near our home in Osprey. Morris told us they were fellow amateurs and he suggested that we make their acquaintance. We did so and for the next 25 years they were our constant fossil-hunting companions.

We first met Morris and his wife Marie in the fall of 1969 when they were visiting the Burgesses. We liked them immediately. They were comfortably at home among our group of enthusiastic, chattering amateurs. In the following years they were to help us in many ways whenever their busy schedule allowed.

That first night we planned a trip up the Creighton Waterway in our 8' x 4' flat bottom boat named the Fossil Liza. We built that plywood boat to navigate the many drainage canals the General Development Corp. was digging in Northport during the 1960s and '70s. There were no roads into the areas bordering the waterways, so we followed the draglines in our boat. During that period, and with the help of the Fossil Liza, we collected over 20,000 fossil specimens.

On the following morning I ferried--two at a time-- the Skinners and the Burgesses to the spot on the Creighton where we earlier had found a number of small horse teeth that Morris had identified as *Hipparion minor*. Morris and Marie were aboard when I pulled the Fossil Liza up to the bank. As Marie stepped out of the boat, disaster struck. The boat moved away from the bank and Marie began to fall. Morris jumped to catch her and capsized the boat, dumping the three of us into the canal. We clambered out of the water, laughing and unhurt. My laughter was hollow, however, for I had wanted this trip to show off the skill of Florida's amateur paleontologists. Instead, I had allowed this most embarrassing accident to victimize our idol and his wife.

True to their nature, the Skinners always recalled that dunking with good humor. Marie wrote telling us that

Morris had given her a new compact and bought himself a new camera to replace those lost in the water. Happily, the rest of the fossil hunt was a success. We found a number of *Hipparion* and *Equus* teeth which Morris examined with interest and much discussion.

Also during that hunt, Morris introduced us to another branch of paleontology that was to occupy a major place in our life. Up to the time of his visit, we were oblivious to the thousands of fossil shells littering the canal spoil piles. Vertebrate fossils were all we were interested in. It changed forever that day when Morris came up to me with a shell in his hand. "Look," he said, this is a rare Pliocene echinoderm called *Rhyncholampas*." "We're not much interested in shells," I told him. "We've been trying to learn all we can about vertebrate animals. "Then you're only learning half the story," he told me. We took the urchin home for study and it was to become the first invertebrate specimen in our collection, which has grown to over four thousand specimens. In 1986 it became the first specimen illustrated in our book on identifying fossil shells.

There were more happy hunting days with them over the years, and each trip was a learning experience for us. On one occasion Morris told us of some unscrupulous people who were making counterfeit lance points and selling them to the public as genuine Indian points. To illustrate his story Morris picked up a chunk of what we call chert and With a piece of fossilized deer antler he began to chip away flakes of that chert until he had made an excellent replica of a spearpoint.

On another occasion, after we had just found an alligator coprolite, he explained what a coprolite is: "This fossil excrement frequently is found in association with the animals that made it, and a study of this fossil dung may provide valuable information pertaining to the food habits of these animals." And, as was his habit, he needed a graphic example to illustrate his point. He picked up a nearby piece of dried, modern raccoon dung, crushed it in his hand, and poked through it with his finger. "There," he told an engrossed Lelia, "are the scales and bones of the fish this raccoon has eaten."

Although Morris was a serious scientist, he also had a fun side that often surfaced without warning. On all our fossil hunts with the Burgesses we carried a lunch of sandwiches and dessert prepared by Lelia and Helen. Roy brought along a thermos of Manhattan cocktails. None of us ever drank Manhattans at any other time. They were a ritual to insure our continued good luck, which began when we found a skull and a mandible of an Imperial Mammoth. We had our jug of Manhattans with us as we took Morris on a trip to the Manchester Canal. In our hurry to unload at this productive site, one of us dropped the jug of Manhattans, shattering the glass insert bottle. We were distraught. No ritual--no good luck. "No problem," Morris announced. He picked up the thermos, unscrewed the lid, took out a big white handkerchief and strained the Manhattans into our glasses. He raised his glass and said: "To the Mammoth."

Now, whenever Lelia and I think of those sweet days we raise our coffee cups and drink a toast to Morris and Marie.

Famous Horseologists--R. A. "Stirt" Stirton (1901-1966)

In the 1920s, the University of California established a Department of Paleontology when Dr. Matthew (see *Pony Express*, Vol. 1, No. 4) moved from New York to become a professor at Berkeley. One of Matthew's first graduate students was R. A. Stirton, who was himself to become a major student of fossil horses during this century.

"Stirt," as be was known to most of his colleagues, was raised in Kansas and took his undergraduate studies at the University of Kansas where a tradition of natural history had been established. During that time Stirton gained an appreciation for field work and the importance of taking detailed field notes, two characteristics that would be the mark of his work in future years. Stirton then went on to Berkeley where he worked with his mentor, Matthew. Stirton conducted field work in areas rich with fossil horses, e.g., in the Texas panhandle and the San Francisco Bay region. These and other collections led to many

Photo courtesy of Mrs. R. A. Stirton.

important papers on fossil horses from North America. Matthew and Stirton wrote a classic paper on the late Miocene horses of the Texas panhandle in which they recognized the genus Astrohippus as a common one-toed fossil horse in that region. Also in that region and along with a local fossil collector Will Chamberlain, Stirton described the remains of an exquisitely preserved skull of Pliohippus “fossulatus” from Clarendon, Texas. This was one of the best descriptions of the complex structure of the facial pits (preorbital fossae) on the cheek region that since have become of great importance in understanding the systematic interrelationships of fossil horses. Perhaps his best known paper on fossil horses is the 1940 "Phylogeny of North American Equidae," in which he synthesized all then-available literature on fossil horses and produced a detailed phylogenetic tree of this group. The major patterns of the phylogenetic branches of fossil horses published in that paper have been used widely in subsequent discussions on fossil horses, and in its essential form that phylogeny is still valid today.

All of Stirton's former students that I have known have the greatest respect and admiration for Stirt's tutelage and work ethic. During his undergraduate days, Stirt was on the KU wrestling team. Some four decades later, while working in the Miocene La Venta beds of Colombia, a colleague of mine, Mike Woodburne, engaged Stirt in a wrestling match after a hard-day's work in the field. Apparently, Mike threw Stirt on his side and Stirt broke his rib. Mike says to this day that he is "probably the only student in the world who broke his major professor's rib while wrestling and lived to graduate with a Ph.D.!" Never having met Stirton myself, I asked Woodburne what he was like. Mike said that Stirt was a very hard worker (and expected you to work hard), was relaxed and approachable, and was an excellent mentor who was very concerned about the welfare of his students. Mike summarized by saying that he couldn't imagine a better working relationship and graduate student experience than the one he had with Stirt.

Stirt's legacy lives on in his publications on fossil horses from North America. He also is remembered in the name of the genus Stirtonia, a fossil primate from the Miocene of Colombia, and Pseudhipparion stirtoni, a tiny one-toed horse from the Miocene of North America. *(Next time: George Gaylord Simpson)*

Geographic Variation in Fossil Horses

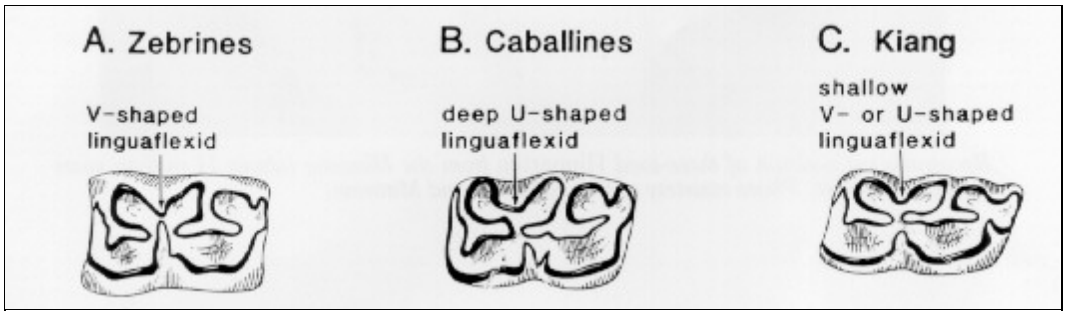
This is the third and final part of a discussion on the sources of variation, with particular regard to fossil horse teeth. In Vol. 1, No. 3, we introduced this subject and recognized three kinds of variation observed in fossils: sexual (also see Vol. 1, No. 4), ontogenetic, and geographic, the latter of which will be presented here.

Populations of a species occupying different portions of the species' total range can have minor differences as a result of genetic variation. Populations are subsets of species (sometimes referred to as **subspecies**) and they can interbreed with other populations within the species. These minor genetic differences within the species can give rise to notable variation in certain characteristics. For example, differences in coat color of some mammals (e. g., squirrels) or songs in birds within the same species are attributable to different, frequently non-overlapping, geographic populations. Another classic observation is the so-called Bergmann's rule, where populations within the same species of mammals and birds are larger in colder regions relative to those in warmer climes.

The recognition of geographic variation in fossil mammals is oftentimes in the eye of the beholder. Some

taxonomists might take minor differences in fossils to indicate geographic variation within presumed paleopopulations of the same species. In contrast, another taxonomist might view these same differences as representing distinct species. Differences in the complexity of enamel folds on fossil horse teeth at similar stages of wear frequently are believed to represent geographic variation in ancient subspecies. An excellent example of this is illustrated by the dental pattern on the lower molars of fossil and modern *Equus*. Zebras and their "extinct, presumed relatives have a "zebrine V-shaped" enamel fold (linguaflexid) in their lower teeth whereas domestic horses, their wild relatives, and extinct, presumed relatives have a "caballine U-shaped" enamel fold (see figure). While the differences in these two dental patterns may be distinct in these forms, in a third group, the hemiones and asses, the linguaflexid is variable. For example, in the kiang, Equus kiang, the linguaflexid is U-shaped in northern populations and V-shaped in southern populations! There is a lesson to be learned here: characters that may be distinct in two different species may intergrade in yet another species as a result of geographic variation. Thus, to know what is geographic- variation in separate paleopopulations versus distinct differences in extinct species is indeed a difficult task.

In summary, one of the major tasks of the paleontologist is to be able to recognize and interpret the different kinds of variation. It is no wonder that identifying fossil horse species can be such a challenge!



Examples of linguaflexid variation in zebrines, caballines, and kiangs.

Book Review

The Third Chimpanzee: The Evolution and Future of the Human Animal, 1992, by Jared Diamond. ISBN 0-06-018307 (cloth $25.00, paperback $12.00), New York, Harper Collins Available at many local bookstores.

In May 1992 1 was visiting the University of Utah when Jared Diamond, the distinguished UCLA professor, gave a series of lectures on human values. Those lectures turned out to be a prelude to his new book, written for the layperson, which is a comprehensive and very readable account on the natural history, anthropology, and future of the human species and our relatives. Diamond synthesizes new research data from a variety of disciplines. One of the most interesting discoveries (in light of our lead article above on *Jurassic Park)* is that biochemical comparisons of higher primates indicate that humans and our closest relative, the chimpanzee, have 98% of our genetic DNA complement in common; the remaining 2% define the genetic characteristics that differentiate these two closely related species. Of equal interest, chimps and humans are more similar genetically than the chimp is to the gorilla. As such, the old idea of two living families of higher primates, the Pongidae, to includes the apes, and the Hominidae, reserved for humans, is an intellectual construct to set ourselves apart from the apes.

In his 20 chapters Diamond covers many aspects in the realm of the human species. He draws heavily on the most current research in the fields of anthropology, biochemistry, paleontology, history, linguistics, and sociology, as well as his long-term field research in New Guinea. There even is a chapter entitled "Horses, Hittites, and History" in which Diamond discusses the importance of domesticated horses in the spread of human culture in the millennia B. C. If you only have time to read a few books in natural history this year, I would recommend strongly that you read this one. It will give you a learned prospective on the origin, development, and

fate of *Homo sapiens*

Pony Express

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The purpose ofthis 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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