Galapagos Sea Safari

"THE NATURALIST, LOOKING AT THE INHABITANTS OF THESE VOLCANIC ISLANDS IN THE PACIFIC, DISTANT SEVERAL HUNDRED MILES FROM THE CONTINENT, FEELS THAT HE IS STANDING ON [SOUTH] AMERICAN LAND. WHY SHOULD THIS BE SO? WHY SHOULD THE SPECIES WHICH ARE SUPPOSED TO HAVE BEEN CREATED IN THE GALAPAGOS ARCHIPELAGO, AND NOWHERE ELSE, BEAR SO PLAINLY THE STAMP OF AFFINITY TO THOSE CREATED IN [SOUTH] AMERICA?"

CHARLES DARWIN, ORIGIN OF SPECIES

For Darwin, as for generations of biologists since, the Galapagos Islands were a natural laboratory for evolution. In the unmistakable similarity of the islands' unique animals and plants to those of the remote South American mainland, Darwin found in 1835 (as ship's naturalist on board the H.M.S. Beagle) key evidence for his principle of descent with modification — the idea that species pass their heritable characteristics to their descendants, in whom these traits may become modified in response to new environmental conditions.

Darwin's second significant insight from the Galapagos visit stemmed from his observation that on each island a species' anatomy was particularly well suited to its preferred diet, and differed from those of its close relatives on neighboring islands with different dietary resources (the varying beak shapes of the Galapagos finches are a frequently cited example). Thus, Darwin was led to hypothesize that closely related species diverge from one another over time by virtue of their special adaptations to local circumstances.

The profound lessons the Galapagos held for Darwin are learned afresh by all of us dedicated to understanding the mechanisms behind the evolution of humankind. In the rich record of fossilized hominid bones and teeth eroded from the earth's geological column we read both the evolutionary history and the adaptations of the long-extinct organisms to which they belonged. From these details we attempt to discern the broad patterns and underlying processes that have shaped who we are, as a species, are today. Our ideas about the evolution of human brain, locomotor behavior, and diet are all ultimately linked to the inspiration Darwin felt on his visit to the Galapagos.

Very few people have the opportunity to walk in Charles Darwin's footsteps in the Galapagos. In June 2004 a select group of IHO and ASU friends will have that chance as they accompany naturalist-writer David Quammen and me on an exclusive 10 day trip to Ecuador's Galapagos archipelago. The IHO Galapagos sea safari includes 7 nights and 8 days aboard the Eclipse, a luxury 48 passenger cruise ship. The weeklong voyage will highlight a different island each day. David and I will lead the IHO/ASU group, and set the unique IHO context for the tour of the islands through specially prepared talks and demonstrations that illustrate the importance of Darwin and the Galapagos to the latest research in human evolutionary studies.

If you would like to receive information about this exciting opportunity, please complete the form on page 6 of the newsletter.
As I write this column, the FedEx driver is picking up a very important package just outside of my office addressed to Oxford University Press. The three-inch thick, roughly three-pound package contains the culmination of almost a decade of work—the corrected page proofs of our comprehensive monograph entitled *The Skull of Australopithecus afarensis* (Kimbel, Rak, and Johanson).

You may recall that during the 1970s fieldwork at Hadar recovered only fragmentary remains of *A. afarensis* skulls. However, our renewed and strategically focused work at the site during the 1990s rewarded us with a male skull in 1992 (described in my March 1996, *National Geographic* magazine article). Our fortune continued, when two years ago, we recovered a remarkably complete female skull with associated lower jaw, face, and brain case. The male skull (A.L. 444-2) came from sediments approximately 3.0 million years in age and the female skull (A.L. 822-1) is thought to be approximately 3.1 million years. These two specimens have added immeasurably to our knowledge of sexual variation in cranial anatomy.

When found these skulls were in 100s of fragments, some of which were deformed due to the processes of fossilization and it has taken an untold number of hours to clean, repair, and reconstruct these two important specimens. In fact, Yoel Rak from Tel Aviv University in Israel spent a considerable amount of time in the IHO lab this summer working with us on a reconstruction of the female skull. Only now can we initiate the laborious process of describing and analyzing the detailed anatomy of this specimen for comparative studies and ultimately publication.

Over the past several years we have dedicated a tremendous amount of attention to the male skull and its publication this winter will mark an important event in IHO’s history. This 242-page volume will put on permanent record a remarkably detailed and insightful description and evaluation of the male skull.

Not everyone understands that the discovery of a fossil specimen is really only the beginning of a very long process that culminates with a detailed publication of the find. The tedious and time-consuming laboratory work doesn’t always get the attention that highly visible fieldwork receives, but it is the work in the lab that results in a lasting contribution to the body of knowledge in paleoanthropology. I believe the skull monograph will occupy a cherished slot on the shelves of the paleoanthropologist’s library. We will let you know when it becomes available and how you can obtain a copy and learn more than you even believed possible about skull anatomy!

Thanks for you continued interest and support of IHO!

Yoel Rak reconstructing a skull

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**RESEARCH ASSOCIATES**

Curtis W. Marean, Ph.D.
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**POSTDOCTORAL RESEARCH ASSOCIATE**

Ana C. Pinto, Ph.D.
"Little Foot" the highlight of the 2003 Field School

A variety of unique circumstances came together to make the 2003 Paleanthropology Field School in South Africa a great success and a personal favorite for me. Dr. Gary Schwartz from the University of Northern Illinois, joined me in the teaching endeavors. He turned out to be what every paleoanthropologist wants in a field colleague: intelligent, competent, ready to help in any area at a moments notice, and, most importantly, funny! Gary kept us all laughing. ASU graduate students Lucas Delezene, Amy Rector (IF0 Fellow), Wilson Switzer, as well as Anthony Kegley (former ASU student now at the University of the Witwatersrand) completed our full time, cohesive staff. The students were also treated to guest staff such as Chris Campisano (Hadar Research Project geologist) and Sandy Copeland (paleobotanist), both from Rutgers University, joined us towards the end of our stay. Dr. Kevin Kuykendall, director of the Makapanstg Area Paleanthropology Project was also a frequent presence at the site, and Dr. Jeff McKee (Ohio State) and Dr. Glenn Conroy (Washington University) dropped by for a few days. Makapanstg excavations were headed by Tafline Crawford, (graduate student, Washington University) who amiably allowed students to learn excavation techniques. She also was a good sport during the scavenger hunt when students took her hat — and her workers.

We were able to include three students from the University of Cape Town this year (Nic Fournie, Wayne Glenny, Rishana Sitheldeen), along with students from ASU (Cate Bird, Emily Goble, Clair Flynn, Liz Alter), Boston University (Jennifer Lyons), University of Texas (Stephanie Carrasco), Cal State (Jeff Handlin), Canada (Colin Bass).

As usual, we visited the hominid sites of Sterkfontein, Swartkrans, Kromdraai, and the new site of Gondolin. Not so usual was the tour we had of the "Little Foot" skeleton in a cavern below the open pit excavation at Sterkfontein! Also known as Stw 573, this skeleton is incredibly complete and still in situ. Professor Ron Clarke (University of the Witwatersrand) graciously allowed all twelve students and the staff to view this extraordinary find. Tom Jones, IF0 board member, said that the field school was worth every penny just to see this hominid fossil!

At the Makapanstg site students learned about African ecology, identified fossil animals, explored cave formation processes, became skilled using global positioning systems, and studied early hominid evolution. To sum up an entire four weeks of hard work, it was fun and exciting. We recovered a maxillary specimen of Gigantohyrax maguirei — one of only two in the world so far! We also found several specimens of extant animals to add to our comparative collection—a klipspringer, a vulture, and a complete bush pig. Cate Bird and Emily Goble actually defleshed the latter over two days—recovered in all its odiferous glory by Wilson Switzer and Nic Fournie. The students are required to do a research project during the last week and I'm pleased to report that all were excellent. The South Africans added a unique dimension to recreation time as all students began to play rugby and cricket. I was forced to buy a cricket bat after the students proved they were serious by making one out of discarded lumber.

We ended our season with a five-day trip to Kruger National Park. Students this year saw an unusual number of cat kills (leopard, cheetah, and lion!) as well as numerous elephants and rhinos. Driving through the park one day, Tom Jones said that he really felt that he had experienced Africa through our field school. That was the best complement I've ever had!

I have decided that this was the last year for this particular field school. I am now designing two different field schools, one of which focuses more on paleoecology and will include visiting hominid localities, working with already collected fossils in museums, and understanding mammals in their natural habitats as analogs for the ancient past. Hope to see some of you in the future on one of these field schools.

The Dutch archaeologist, Sander Van der Leeuw has recently been named Chair of ASU's Department of Anthropology. After a distinguished career in Europe, Sander will join us in January 2004. The combination of Sander's broad interests in archaeology and extensive experience as an administrator are certain to be critical as the ASU's Department of Anthropology moves forward to become one of the leading departments in the USA.
The Mossel Bay Archaeology

Research into the African Origins of Modern Human Behavior

Recent discoveries in South Africa have begun to show evidence for an early (around 70,000 years ago) expression of modern human behavior, well before it appears elsewhere in the world. This evidence takes the form of the earliest sophisticated bone tool technology yet discovered, as well as pigment (ochre) with complex engravings that may signify symbolic thought. While these results are intriguing, they stand alone in a small sample of excavated sites. There are very few archaeological sites that date between 300,000 and 40,000 years ago, the time when we anticipate modern humans evolved, and when a stone tool technology called the Middle Stone Age (MSA) is present in Africa. Our mission is clear—we must initiate a long-term commitment to field research in Africa targeting this time interval. Our project, the Mossel Bay Archaeology Project (MAP), is devoted to investigating the origins of modern human behavior through a long-term field project based at Mossel Bay, South Africa. MAP just completed a 10-week (February through early May, 2003) excavation and mapping season at Mossel Bay.

In 1997 MAP discovered a series of caves along the Mossel Bay coastline that we believe to be one of the densest concentrations of archaeological sites dating to the origins of modern humans. Between 1997 and 2000 we surveyed and mapped many of the caves in a 2-kilometer stretch of coastline, and laid the logistical foundations for a long-term archaeological project. In July of 2000 we conducted test excavations at three of the caves and discovered outstanding archaeological materials in two. Between 2000 and 2002 we continued our surveying and mapping, and applied for excavation permits and research funds. Based on these results, we received funding on our first submission to the National Science Foundation (NSF) for funds to excavate Cave 13B over a three year period. Subsequently we received funding from the Hyde Family Foundation, and those funds allowed us to substantially broaden the realm of our investigations, develop several new and novel technologies for excavation, and bring to the site several internationally recognized specialists to assist us with specific analyses.

MAP's 2003 season of excavation involved roughly 25 people from numerous countries and institutions, comprising one of the best and most gifted field teams we have assembled. The core group included 12 excavators and field technicians plus the two excavation directors (Dr. Curtis W. Marean and Dr. Peter Nilssen). Additionally, an outstanding team of specialists visited the site, typically for several weeks, to conduct specific analyses of materials that help us understand the age and formation processes of the site.

MAP is committed to using and developing state of the art excavation approaches. To that end we have pioneered the integration of several new laser-based plotting technologies with special inventory control (bar-coding) and spatial analysis software (GIS), all on-site. Since excavation is the first step in archaeology, the long road begins after excavation is completed and the detailed analysis of the materials takes place. We excavated and plotted in 3 dimensions well over 5000 fossil bones and artifacts. This is a high number and partially results from the new efficiency measures we implemented. We discovered beautifully intact MSA living floors, meeting our goals of identifying and excavating hidden material in the back and front of the cave.

We discovered three, maybe four, hominid fossil remains including two pieces of
pelvis, a molar, and possibly a proximal unfused radius. While this may not seem like much, it is rich by African standards: the entire sample of fossil hominids from this time range in South Africa fits in a shoebox. Several pieces of worked ochre that show clear signs of rubbing, scratching, and carving were also found. While these do not preserve clear symbols, they were clearly used to mark other items, and had been shape-modified for that task. Interestingly, these were on a blood red ochre of extremely high quality that has not been seen before in South Africa.

Fossil animal remains, including a complete extinct giant buffalo mandible were discovered. Found and excavated were several intact ancient hearths that will provide us with excellent data on ancient domestic activities. Two new caves were discovered, as well as numerous ancient raised beach formations that will assist us in understanding the relation between climatic change and sea level rise on the South African coastline. The relation between climatic change and sea level will provide essential background information on what the environment, climate, and marine ecology was like when the sites were inhabited. This also has clear implications for understanding the impact of global warming on future sea levels and coastal populations. We plan an effort to raise funds for this project in the near future.

Our efforts to educate the local community on the richness of the archaeological heritage in this area involved organized site tours for the local community (over 200 people participated in these tours), and a lecture at the Dias Museum of Mossel Bay. We are collaborating with the mayor of Mossel Bay and planning to integrate archeology into an exhibit space at the Dias Museum. Collaborations continue with the developers who are building a casino, hotel, golf course, and master-planned residential community on the cliffs overlooking our sites.

MAP has defined three research paths that will likely have a time horizon of nearly 20 years: 1) reconnaissance and survey of the entire Mossel Bay region, including the coastal cliffs and interior; 2) test excavations at discovered sites; and 3) intensive excavations at those tested sites that prove to be particularly significant. This research program is broad and optimistic, but necessary, given the chronic lack of understanding in Africa of this critical time period relative to Europe and southwestern Asia. Archaeological projects rarely target goals that require 20 years of research and large communities of scientists because archaeological projects suffer from sporadic and insufficient funding. This creates long breaks in research, hampers the application of cutting-edge technology, and creates a weak infrastructure that undermines consistent research. Our goal is to use a combination of research grants and private funding to overcome this problem, and set in motion uninterrupted research of the highest quality.

The short-term schedule includes a one-month field season in October/November 2004 that will target the conservation of a long section of MSA deposit that is currently endangered from erosion. This site was discovered several years ago, and mapped in April of this year. We believe it to preserve the longest uninterrupted sequence of MSA occupation in South Africa, but is currently highly endangered from water erosion. Another full 10-week season of excavation at Cave 13B is scheduled September through November of 2004. Targeted are the same areas that were exposed this year and with a focus on opening a large horizontal area in the front of the cave to examine domestic activity, as well as a large area in the back to increase our hominin and artifactual/faunal sample. During the intervening periods of non-excavation, several tasks will be ongoing. The local MAP team is monitoring the construction of the master-planned community to assure that nothing of archaeological value is destroyed, and we have the full cooperation of the developers. Our survey of the coastline will be continued, discovering and mapping sites of value. Finally, our analysis of the data collected in all phases, and the dissemination of that analysis through professional and lay publication will be achieved.

Archaeological research in South Africa is central to our quest to unravel the story of the origins of modern humans. Unfortunately, research in Africa has fallen far behind that in Europe and southwestern Asia. This knowledge gap in Africa looms most severe now that the newest evidence makes clear the centrality of the African continent. The Mossel Bay region promises to be a key part of this story due to the rich and relatively unspoiled archaeological record. MAP has a clear and effective strategy for bringing this record to the forefront of the scientific community, and in the process enlightening us all as to the origins of our special species.

Postdoctoral Research Associate Zeray Alemseged has completed his academic contract with IHO and has joined the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany. He will continue his research collaboration with IHO as his professional career progresses.
Dear Friends of IHO:

During this past summer, the IHO Board has been actively involved, working with IHO scientists and staff to develop a new Strategic Plan and budget. Challenged by the University’s draw-down in available funds, the Board has also been planning for a permanent endowment to support IHO’s operations and research. As ASU President Michael Crow has challenged IHO to step up its focus on the “big questions” in human evolution—through what paths and processes did our species evolve to the present and what are the implications for our future—we will work together to implement the Strategic Plan and reinforce the Institute’s pre-eminence in the field of paleoanthropology.

To promote understanding of the science and create new friendships, IHO has sponsored several highly successful trips during recent years. In this Newsletter, you will read about next June’s fabulous cruise to the Galapagos Islands—a world treasure and the ultimate laboratory for the study of evolution. Please consider joining IHO’s Science Director Dr. William Kimbel and renowned science and nature writer, David Quammen, as well as a number of IHO Friends and Board members on what will surely be the experience of a lifetime. Part of the trip cost is a tax-deductible donation to IHO, and will ensure full funding of our research and field work for the coming year.

We thank you all for your continued support of IHO,
Janet and Ed Sands

Co-Chairmen, IHO Board of Directors

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IHO TRAVEL

Visit DARWIN’S GALAPAGOS aboard private charter 48-passenger ECLIPSE with Dr. William Kimbel and David Quammen as special lecturers. JUNE 10-20, 2004 For information call Luxury Adventures, Andrea Davis, 858-726-8635.

An ARCHAEO-TOURISM trip along the garden route is being planned for SOUTH AFRICA and will focus on the ORIGINS OF MODERN HUMANS. Dr. Curtis Marean will be involved in the informative excursion.

Yes, I’m interested in receiving information about the June 10-20 2004 IHO trip to the Galapagos Islands.

Name: ________________________________

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City________________________ State_____ Zip__________

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Return to: LUXURY ADVENTURES
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Attn: Andrea Davis/ IHO Galapagos Tour
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ihos@luxadventures.com
CAITLIN SCHREIN

Caitlin Schrein is a third year IHO graduate student. She is originally from New Jersey and attended Columbia University, where she received a B.A. in Environmental Biology. Upon entering the Anthropology program at ASU, Caitlin was awarded an Institute of Human Origins Fellowship. Her primary interests are in early hominin and Miocene ape evolution. Her Masters work, which she will be completing this year, concerns dental metric variation in the Miocene ape *Ozanapotheus macedomensis*. Currently, she is a fellow in the National Science Foundation’s GK-12 “Down to Earth Science Program” and works in a sixth grade science classroom at a Title 1 public school, where she integrates inquiry based, hands-on lessons into the students’ curriculum. Caitlin introduces her field of research to the students and teaches them about bones and how skeletons function. This past summer, she spent one month at a field site in France with researchers from New York City and the Université Claude Bernard Lyon, France. The site, Sénèze, dates to part of the Villaranchian time interval (2.2–1.5 Ma). Caitlin and some of the other researchers were hoping to find fossils from *Paradolichohippus avernensis*, a monkey that Caitlin studied as an undergraduate. She enjoyed this field experience tremendously and looks forward to working in the field throughout her career. Caitlin will continue as an IHO fellow next year as she begins her doctoral work.

ELIZABETH HARMON

As a graduate student affiliated with IHO Elizabeth Harmon participated in the Hadar Research Project. Her fieldwork experiences provided her with once-in-a-lifetime opportunities, and they have played a major role in shaping her research interests. With the help of her advisor, Bill Kimbel, and committee members, Kaye Reed, Charlie Lockwood and Don Johanson, she devised a project to study the femur, or thighbone, of *Australopithecus afarensis*. Fossils are generally rare, but Hadar field seasons over the last decade have increased the number of femur specimens, including an almost complete femur found in 2000. The sample of femora, particularly of the upper portion, is numerous enough to understand the shape and size of this bone in *A. afarensis*, and to compare it to other australopithecines and modern humans. The upper femur is part of the hip joint, and is important in walking and running. Her study will help us understand a little more about the evolution of walking from an ancestor that didn’t walk upright. A National Science Foundation Doctoral Dissertation Improvement Grant is funding her trip to museums in Europe and Africa to measure fossil femora and the femora of skeletal apes and humans for comparison. A generous fellowship from the American Association of University Women is providing support for the analysis and writing phase of this project.

Elizabeth spent the last year working with Kay Behrensmeyer of the Smithsonian Institution to learn more about the fossils from Hadar’s “First Family” Locality (A.L. 333) found in the 1970s. They have been trying to determine from among the over 200 fossils (from heads and skeletons) how many individuals might have died there, and the range of ages and sizes of these individuals. The question of how they died, and whether they died at one time or accumulated over a long period is being addressed by examining the surfaces of the fossils themselves, and by careful consideration of the geological context. Dr. Behrensmeyer and Elizabeth presented preliminary findings of this work at the annual Paleoanthropology Society Meetings in Tempe last April.

One of her favorite things about her graduate experience with IHO is that all the exciting work she does can be incorporated into the undergraduate classes she teaches, providing students with a “real life” look at paleoanthropological research. Because of the experiences and training she has gained through IHO, she may be able to lead her own field research project in Ethiopia someday.