anthro notes

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PYGMIES OF THE ITURI: AN ETHNOARCHAEOLOGICAL EXPLORATION

The tall, dark green forest canopy on each side of the dirt road pressed closer and closer together overhead with each passing mile of westward travel. As the emerald-green grasslands of the Zaire-Uganda border country dwindled behind us, I sat high in the back of our Toyota Hilux pickup on a pile of food, gasoline containers, Toyota spare parts, camp supplies, and shovels and hoes that we always carried to dig the pickup out of deep mud. Our destination--the Ituri Forest Project's field station in a remote area of the Ituri Forest inhabited by the Efe Pygmies. The station where Helen Strickland, my wife, and I would live for a year, lies along an almost impenetrable narrow track, one and one-half days journey, more than 120 km, from the eastern forest edge. Here, the villages of the sedentary horiculturists and their wide swaths of cleared and cultivated land are fewer and more widely separated than in the forest margins or on its "main" roads.

Independent hunter-gatherers or serfs?

The various groups of Ituri Forest Pygmies, collectively called Mbuti by their village neighbors (or BaMbuti, meaning Mbuti people) are well-known to anthropologists through studies by English, Japanese, American and German scholars. Although they have been cited as a classic example of tropical forest hunter-gatherers, their economic independence from village agriculturists has been much disputed. In the

1920's and 30's, Paul Schebesta, a German anthropologist, noted in the first comprehensive study of the Mbuti their strong reliance on cultivated foods from the gardens of villagers, to whom the Mbuti were bound in a type of master-serf relationship. He expressed doubt that the Pygmies he saw could have survived without such foods. Perhaps the best known studies, however, are those of the English anthropologist Colin Turnbull, author of The Forest People (1961), who worked with a group of Mbuti net-hunters ca. 110 km southwest of our research area. Turnbull argued that the Mbuti were not dependent on their sedentary horticulturist neighbors for basic staples but could live off the wild foods of the forest for extended periods. Although the Mbuti often chose to participate in a symbiotic relationship with the villagers in which each group provided the other with certain foods (bananas, manioc, game meat) and services (field labor, initiation and funeral rites), Turnbull described Mbuti culture as an independent entity, based on identity with and dependence on the forest.

The Ituri Project

The Efe are one of the least-studied and most isolated Pygmy groups, and the only one hunting almost entirely with bows and arrows rather than with nets. One of the goals of the Ituri Project, which began in 1980, was to document the subsistence practices of the Efe, as part of a broad study of their adaptation to a forest environment. The project co-director, Irven DeVore, had helped, during the 1960's and early 1970's, to direct the Harvard Kalahari Project, an ecologically-oriented study of the !Kung San (Bushmen) of the Kalahari desert in Botswana. The Ituri Project, one of the first comprehensive studies of human ecology, demography, and health and nutrition among tropical forest hunter-gatherers (and horticulturists), was designed to build on and further explore some of the results of the Kalahari study. In particular, the Kalahari project had demonstrated major reliance on vegetable foods, long-birth spacing, low fertility, and a high degree of personal and group mobility among desert hunter-gatherers. These conclusions were further corroborated by other studies of desert hunter-gatherers in Australia. Would these adaptations persist in the more stable environment of the tropical forest? Did the cyclical fluctuation of wet and dry seasons in the forest affect group structure and mobility in the same way as the seasonal changes of the desert? What were the major resource limitations for humans in this environment where most mammals are small and many dwell in the forest canopy? How independent were the Efe of their village horiculturist neighbors, the Lese?

Since 1980, more than a dozen anthropologists and other researchers have come to the Ituri field station to gain a relatively long-term perspective on the cyclical fluctuations in the forest environment and on the ways in which the Efe and the Lese have adapted to this environment.

Researchers have observed a symbiotic relationship between the Efe and the Lese. For instance, two-thirds of the calories the Efe consume come from cultivated foods--bananas, manioc, rice, peanuts, sweet potatoes, and other plants--grown mostly in Lese gardens. Efe women, in return for these foods, assist the Lese in planting, caring for, and harvesting the gardens. Efe men help the Lese by clearing patches of forest for gardens and by providing honey, meat, and other forest products. In exchange, the Lese provide the Efe with such items as metal tools and clothing. Efe sometimes plant small gardens, but their mobile lifestyle, moving to a new camp every two or three weeks, is not compatible with the constant care that gardens require in the tropical forest.

Forest foods make up one-third of the calories in the Efe diet. These foods include wild plants such as yams and the olive-sized fruit of the

Canarium tree, honey, fish, and meat. Several species of duiker (small antelope) and monkey are their primary prey. Less frequently, they hunt animals up to the size of buffalo and elephant. Men, armed with metal-tipped arrows, hunt duiker by a variety of strategies. One method involves a man and dogs working together to flush out game while other men, carefully and quietly positioned, wait for duiker to come within arrow range. On other occasions, a solitary man waits in quiet ambush on a platform built in a tree of ripe fruit. Early in the morning and late in the afternoon duiker will feed on fruit that have dropped to the ground, and if lucky, the hunter will get a shot at the animal.

Monkeys are hunted with poison-tipped arrows, their wooden shaft carved to an extremely fine point. Poison, made from several forest plants, is applied to the tip and dried over the coals of a fire. To hunt monkeys in the forest trees, solitary hunters walk quietly and when within range of the animal shoot several arrows.

Despite the hunting skill of the Efe, we and other researchers find it difficult to imagine that the Efe could live in the forest in the absence of cultivated foods, on which they seem to rely quite heavily. Forest ecologists working elsewhere in the Ituri Forest were not able to identify year-round abundant sources of carbohydrates, comparable to the mongongo nuts and roots collected by the !Kung, among the wild plants gathered by the Efe. If cultivated carbohydrate-rich staples are essential to human existance in the tropical forest, then human occupation of the deep forest may be limited to the last 2000 to 3000 years since the domestication of African food crops.

The Archaeology of Present-Day Efe Life

As archaeologists, Helen's and my role in the project was to document the material remains of Efe life, as the Harvard Kalahari Project had done for the !Kung (Yellen, 1977). My interest in hunter-gatherers came from my work with the material remains of prehistoric hunter-gatherers of the Great Plains; Helen and I had met at an archaeological site in Colorado while excavating bones of bison and mammoth, as well as stone spear tips and other artifacts left at the site by people long gone. The interpretation of these ancient sites, however, required some insight into hunter-gatherer ecology and behavior. Was this the kind of debris normally deposited near or in the family dwelling, or were these the kinds of bones and stone tools normally left at a kill? How much and what parts of the skeleton were usually left behind when a mammoth (or elephant) or other animal was butchered? How many people did a mammoth feed, and how often would one have been killed? What kinds of debris did other food-procurement practices generate? Can group size and organization be reconstructed from ancient debris-patterning? How is domestic space organized and used? By carefully observing the Efe, as they carried out routine activities at their campsites, we hoped to learn how to make sense out of the ancient pieces of bone and stone and other clues at archaeological sites to reconstruct what life was like in the past.

A central question concerns the degree to which hunter-gatherer camp design, activity patterns, and disposal practices are universal among all hunter-gatherer groups or are affected by different environments or cultural rules. Archaeologists had often assumed that tools and bones found together related to a single activity, spatially segregated from other activities. The Kalahari research, however, suggested that hunter-gatherer camps were small, closely spaced circles of ephemeral huts. Since most in-camp activities were conducted around the family hearth in front of the hut, debris from many distinct but spatially overlapping activities tended to be concentrated in a ring surrounding an open public space. Only messy activities were

carried out in "special activity areas" on the outskirts of !Kung camps. Since the size of the debris ring was proportional to the number of huts, it could be used to estimate the number of familes and hence the population of a !Kung camp. If these patterns and others were also true of tropical forest and arctic hunter-gatherers, then perhaps the patterning could be used to understand the hunter-gatherer sites on the Great Plains 11,000 years ago.

The research that Helen and I carried out benefitted considerably from the work of other researchers on our project. Their studies give a detailed picture of Efe subsistence practices and of other aspects of their adaptations to the forest environment. Thus, we had a strong foundation from which to focus on material aspects of Efe life, in particular the spatial organization of their camps. We found that although each campsite is unique in the details of camp layout, all camps conform to a single broad pattern.

The first step in setting up an Efe camp is to clear away smaller trees and undergrowth. The size of these clearings ranges from 40 square meters to about 550 square meters, depending on the camp population. The number of people living at a camp ranges from about three to thirty-five or forty. Each nuclear family inhabits a dome-shaped hut made of a frame of saplings covered with broad leaves. Huts are situated near the perimeter of the camp in an oval layout. Each hut has one or more fires inside, for warmth at night, and a fire outside the hut near the door.

Trash heaps, located beside and behind the huts, are a feature of all camps. Initially composed of cleared brush, the Efe trash heaps continue to grow through the life of the camp as its inhabitants discard food remains, ashes from fires, and worn out or broken implements.

The placement of huts within a camp is strongly influenced by interpersonal relationships and kinship ties. Families that get along particularly well will situate their huts close together, while those that are feuding will place themselves a good distance apart.

The location of day-to-day campsite activities--preparing food, eating, making and repairing implements, socializing, and relaxing--conform to a pattern. Almost all such activities are performed inside of the camp perimeter. For safety reasons, applying poison to arrows is usually done outside of camp. Children's play takes place inside of camp and in some cases in a separate area cleared nearby.

The fireplace situated outside the doorway of each hut serves as the focus for many activities. Women sit beside the fire to prepare and to cook food. Men relax and socialize by the fire, and here they also get ready for the hunt, carving new arrowshafts, sharpening metal arrowheads, or strengthening their bowstave over the

hot coals. During a rainstorm, these activities are conducted inside the hut. Most of the debris generated by these activities eventually ends up on the trash heap.

Efe huts vary considerably in size. Floor area ranges from about 1.3 square meters to 13.6 square meters (the average is 5.1 square meters). To our surprise we discovered that the size of a hut does not correlate with the number of people that live in it. Some large huts had only two or three occupants; conversely, some small huts were the home of five or six people. A partial explanation might be that sleeping arrangements, especially among children, are fairly loose at Efe camps. One night the children may sleep in their parent's hut and the next night in their grandparent's. Even adults sometimes move around. And if one family moves away to another camp, an incoming family might inhabit the empty hut rather than build its own. This loose fit between hut size and number of occupants is distressing archaeologically; it means that archaeologists cannot estimate accurately the population of a camp on the basis of the floor area of individual huts. However, this loose fit might not be characteristic of other hunter-gatherer societies; further studies might be very illuminating.

The makeup of Efe camps is rather fluid. Families and individuals move in and move away during the lifespan of a camp. This flexibility seems to be characteristic of most or all hunter-gatherer societies. Sometimes, during the lifespan of a campsite, one (or more) of the families will abandon their hut and build a new one at the same camp. This behavior could confuse archaeologists into thinking that more families had lived at the camp than was the case, because there would be little archaeological evidence for recognizing that the same family had lived in two huts. Hence, the archaeologist probably would overestimate the number of families that had lived at the camp.

Efe reoccupation of a recently abandoned camp is another fairly common behavior that can lead archaeologists into overestimating camp population. Some families might reinhabit the hut they had previously lived in. Often, however, one or more families will build a new hut and leave their previous one unoccupied. The reason for returning to an abandoned camp goes back, at least in part, to Efe ties with the Lese. Although Efe move from one camp to another rather frequently, they usually do not move very far. Lese villages and gardens are a fixed point on the landscape, where Efe obtain material sustenance and social interaction. As a consequence, Efe rarely move more than a day's journey away from their affiliated village.

We discovered that when the Efe move camp, they sometimes leave behind a wide variety of possessions such as clay pots, glass bottles, baskets, and sharpening stones. They do this, we think, because of the restricted mobility that is characteristic of their settlement pattern. Clay pots, for example, are heavy and breakable compared to their aluminum pots. During the honey season, when they move deeper into the forest, the Efe might leave clay pots behind, knowing that they eventually will return to the vicinity of their previous camp and retrieve their belongings. It seems unlikely that other hunter-gatherer societies that have a more wide-ranging settlement pattern would practice this kind of storage to the same extent as do the Efe.

Comparing the Efe to other hunter-gatherers

The knowledge Helen and I have gained during our year studying the Efe has considerable potential for assisting archeologists in interpreting prehistoric archeological sites, with respect to questions such as the possible size-range of the population that made the site, the length of time the site was occupied, the nature of activities carried out at the site, and

the practice of storing implements. However, we must recognize that the patterns of the Efe cannot be casually generalized as a model for all prehistoric hunter-gatherer societies.

Comparisons with studies among other present-day hunter-gatherers, including the !Kung and various groups in Australia, reveal that although the Efe share many similarities with these peoples, some important differences set them apart. Similarities exist, for example, in the general layout of Efe and !Kung campsites. A !Kung camp consists of a circular arrangement of closely spaced brush huts, each hut the home of a nuclear family. As with the Efe and other Mbuti Pygmy groups, the distance separating huts in a !Kung camp is swayed, in part, by kinship ties and interpersonal relationships. A family fire is situated in front of the hut at a !Kung camp, and a wide variety of domestic tasks are carried out around the fire.

Differences between Efe and !Kung camps emerge in some details of layout and use. Trash heaps are not a feature of all !Kung camps; those occupied for less than two weeks might lack them altogether. !Kung campsites tend to cover a larger area than Efe sites, and the amount of camp space per person is greater among the !Kung. Habitation sites of Western Desert Aborigines in Australia far exceed the Efe and !Kung in both of these attributes. And, when !Kung move out of a camp, they leave behind few or no possessions for future re-use other than nut-cracking stones.

One of the great challenges facing archaeologists today is to explain the similarities and the differences among hunter-gatherer groups. Recent studies have suggested that the much greater size of Australian Aborigine campsites compared to !Kung campsites is related to the freedom from fear of natural predators in Australia. The Kalahari Desert, on the other hand, is home to several dangerous animals including lions, leopards, and hyenas. This explanation probably does not account, however, for the small size of Efe campsites. We never heard Efe express anxiety about predators--in fact, the greatest danger comes from falling branches or trees. More likely, they build compact camps to keep within sight and sound of each other, thus maintaining a physical and emotional cohesiveness in the dense forest.

If we could spend another year in the Ituri, what questions would we address? We would like to explore the way material goods move or are exchanged between the Lese and the Efe and among neighboring Efe bands. Which objects are owned individually and which are treated as communal property? What factors influence the size of huts and of domestic space if not the number of occupants? These and other questions will continue to draw archaeologists such as ourselves to the Ituri, the Kalahari, the Arctic, the Australian deserts, Malaysia, and other areas to study living hunter-gatherers.

Additional References:

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TEACHER'S CORNER: BABIES IN TWO CULTURES

The Teacher's Corner features a unit from Generations: A Study Guide, written by Priscilla Rachun Linn. This self-contained study guide (for ninth and tenth grades), with readings and activities, was produced in conjunction with "Generations," a Smithsonian exhibition that looks at the rituals of birth and the enculturation of children the world over. The exhibition inaugurates the Smithsonian's International Gallery in the new Quadrangle Building on the National Mall and will run until March 31,1988.

Generations: The Study Guide contains three units: childcare and socialization, health, and family aspirations for a child's future. Selections from the guide's unit on childcare and socialization are reproduced here. Anyone interested in obtaining a free copy of the guide can write to: Evelyn Reese, OESE, A & I 1153, Smithsonian Institution, Washington, DC 20560. The exhibition catalog, Generations: A Universal Family Album, edited by A. R. Cohn and L. A. Leach, contains photographs and essays and is published by Pantheon Books and SITES, 1987, ($18.95 paper).

Reading I: Introduction

In 1950, American anthropologist Laurence Wylie, with his wife and children, aged three and five, went to live in the French village of Peyrane in southern France. Here people own small, prosperous farms, bathed in sun much of the year, and grow a wide variety of fruits and vegetables. Babies are much loved, but a mother with work in the fields may have to leave childcare to another family member or someone in the village. Wylie did not realize before he left for France that the way he had brought up his children in America would come under so much criticism.

As you read the following passage, note how babies are expected to change as they grow older--from being indulged and "shown" off by their families to becoming cooperative and obedient children.

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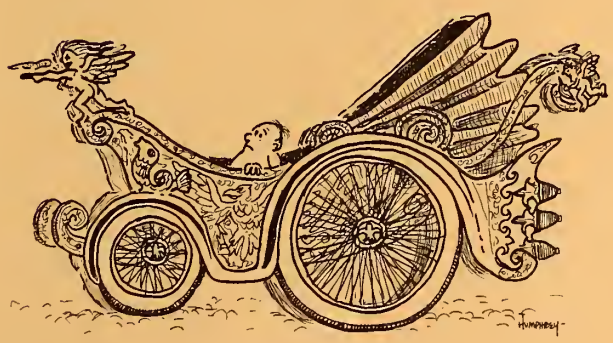
"Time for Babies in Peyrane"
[pronounced Pay - Ran]

For the babies of Peyrane, no attempt is made to adhere rigorously to a schedule. Generally they eat and sleep when they like. If they cry, they are cleaned and offered food. If they continue to cry [when surrounded by a group of people]...then someone tries to pacify them by cuddling them. They may be picked up, held, walked to the accompaniment of singing, or cradled... kissed, and talked to constantly.

At home the babies are left to themselves as much as possible except when...being shown off to guests. Their mothers are too busy to pay much attention to them unless...they have a



valid reason for demanding care. When babies are taken out in their carriages ...they are on parade. No matter what may be the dimensions of the family purse, every effort is made to acquire an elegant carriage which will do honor to the family when the baby is pushed through the village.

The villagers greet babies with great shows of affection and cordiality. Infants are taken from their carriages, kissed and cuddled, passed from lap to lap. People poke them gently on the chin or in the stomach and make soft, hissing noises. They tell them in baby talk how beautiful and healthy they are. They jiggle them on their knees or in their arms. The people of Peyrane love babies.

[A mother who works in the field must] find someone to care for the child while she is away. Usually a grandmother or an older sister...will assume this responsibility. Normally the father is not expected to help much in the care of children, even when he is not working. He obviously loves his children and exhibits tenderness for them openly, but it is not his responsibility to care for them. Only in unusual circumstances will he be asked to keep half an eye on his children. However, when a child is old enough to walk, his father may be willing to take him to the cafe to show him off to friends. Here the father is not sharing responsibility for his child, [but] instead displaying feelings of pride...and a sense of companionship.

No matter who cares for a child in Peyrane, the treatment received is sure to be tender and indulgent even by brothers and sisters. Discipline of tiny babies is gentle and usually consists of a scolding delivered with mock harshness in baby talk. Caring for a baby is considered a pleasure rather than a chore by everyone, except the mother on whose shoulders rests the basic responsibility.

Even though children are indulged as babies, one lesson they learn at an early age is that fatigue and physical discomforts are not excuses for failing to accomplish what is expected of them. As soon as children are able to walk steadily, they are expected to walk at all times and never be carried. If a child capable of walking is seen being carried by a parent, people look at him or her with surprise and concern. They assume the child must be hurt or sick.

When we went for a walk and our three-year old boy complained of being tired, I usually picked him up and carried him on my shoulders. If, upon inquiry, people learned that he was not physically disabled, they smiled indulgently and said, "So the little fellow wants to be spoiled!" When I defensively explained that he was simply tired, because I did not like to admit that I spoiled my children, the response was a skeptical "Ah?" Then, so as not to hurt my feelings, "Well, he will soon get used to walking around these hills."

By the time children are four years old, they are no longer infants treated indulgently by everyone. The transformation is gradual and apparently rather painless. As tiny infants children are expected to have no control over themselves. As soon as they seem able to understand what their parents are saying to them, they are expected to try to do what is asked of them. Parents are patient and tolerant. If children show that they are trying to learn and cooperate, they will be encouraged and not punished. Once children have achieved control over one aspect of their behavior, however, they are no longer indulged in that respect.

Older children accept a new child who comes into the family. They no longer insist on being the center of everyone's attention but join with others in the family in caring for and indulging their younger sister or brother. The basic training has been accomplished.

Edited from Village in the Vaucluse by Laurence Wylie (Harvard University Press, 1961).

Questions

1. In Peyrane, how does the attention a crying baby receives at home with a busy mother compare with the attention he or she will get from villagers when taken out in a carriage? Why do parents in Peyrane make sure that they have fancy carriages for their baby?

2. What is the main difference between the duties of the father as the parent of a small child and those of the mother?

3. Why do you think that anthropologist Laurence Wylie did not want the people of Peyrane to believe he spoiled his children? Why did the villagers think his son was being spoiled? Do you agree with the villagers?

Reading II: Introduction

Some people might predict that the great amount of attention showered on the babies of an island village called Lesu would result in spoiled and self-centered children. Not so, said Hortense Powdermake who in 1933 was the first woman to live alone as an ethnologist in that part of the South Seas known as Melanesia. On the island of New Ireland where Lesu is located, men spent time fishing and repairing gardens and houses while women tended the gardens of taro, a staple food in their diet. Even though chores had to be done, babies captured the love and affection of the whole community.

Before you read the following passage, find on a map the island of New Ireland, where Lesu is situated. What are the island's climate and possible sources of food and shelter? Consider what it is about Lesu that makes it relatively easy for adults to devote so much of their time to babies.

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"The Babies of Lesu"
[pronounced Lay-soo]

During the first two weeks of a infant's life in Lesu, the mother's work in the garden usually is done by her mother and mother's sister if they are not too old, or by a grown-up daughter is she has one. Babies may be born, live, or die, but work in the gardens must go on all the time.

Two weeks after giving birth the mother...resumes her work in the garden, nursing the child before she goes and immediately upon return. The infant's maternal grandmother stays at home to look after the newborn.

According to the people of Lesu, babies must be tended adequately. A mother who does not come and nurse her crying infant, if she is within hearing distance, is most unusual.

The young infant is an object of deep affection, not only to [family members] but...[to] all members of the clan and of the small village. During the first few months, maternal grandmothers look after infants exclusively while mothers are away in the gardens. ...As soon as children are able to toddle about a bit their care is divided among other members of the family [most frequently the father]. A man plays with his child for hours at a time, talking pure foolishness to the baby. One father, holding an infant who could not yet walk, was telling the baby that by and by she would dance well, go into the bush, and eat fruit from the trees. These references to the infant's future were made laughingly and affectionately.

The whole village regards the youngest infant as their pet and plaything. Whenever a group of people get together...the child is tossed about from one to another, patted, jumped up and down, and kissed. Or the group may croon one of the dance songs,

for lullabies are the songs that accompany ritual dances. The music and words are handed down from generation to generation, and infants hear them from [all family members].

Although infants are fussed over by the whole community, they are remarkably unspoiled. A child cries when hungry and wants to nurse, but most of the time babies are smiling and cheerful, apparently thoroughly enjoying the fuss being made over them.

When I arrived in Lesu, the youngest infant was six months old... [and] was the center of interest in the community. Every new gesture was reported and commented on. When the baby recognized me for the first time, it was news to the community. Before I left she was just beginning to walk, and this was an event of great importance and much discussed. She had not yet started to talk but was beginning to make a few sounds, which the fond parents (like many parents the world over) insisted were intelligible words. It was reported that she spoke my name, although I never heard her utter anything even faintly resembling it.

Edited from Life in Lesu: The Study of a Melanesian Society in New Ireland by Hortense Powdermaker (reprinted in 1971. New York: W. W. Norton and Co., Inc.)

Questions

1. Who in Lesu takes care of newborns after mothers return to their work in the gardens? Once babies begin to walk, who takes care of them?

2. Describe at least three different ways adults in Lesu entertain babies.

3. How does Hortense Powdermaker reveal that she does not seem as excited about young babies as the people of Lesu?

Childcare Interview Activity

[See the Study Guide for the more expanded version.]* You may wish to interview your parent or other relative, a neighbor, or a family friend to learn about your own culture's childcare practices.

Some recommended interview questions:

1. Who took care of your baby from birth to one year of age? What most influenced your childcare arrangements?

2. What role did the father play in caring for the infant?

3. Who played with your baby? How did you or others entertain your baby? What do you think your baby learned from being entertained (eg. parts of the body, household objects)?

4. Who was responsible for disciplining your baby, and what was considered appropriate punishment?

5. What do you think it means to spoil a child and do you think your baby was spoiled?

6. Based upon your interview, how do you think childrearing practices in the United States have changed from a generation or more ago?

*For information about interviewing techniques and further activities involving family folklore, write to Anthro.Notes at address on back page.

Priscilla Rachen Linn
Curator of Collections
"Generations" exhibition

WHAT'S NEW IN HUMAN EXPLORATION

The last few years have witnessed dramatic shifts in the reconstruction of our family history. Just when the basic outline of the story seemed well established, new data appear to contradict some of the well-known scenarios. The new data derive not only from new fossils, but also from new ways of looking at already known fossils and sites, as well as from new analytical techniques from the physical and biological sciences. The latter range from ways of dating fossil sites too old for radiocarbon but too young for potassium-argon determinations, to reconstruction of ancestry through similarity in DNA, to a better understanding of the hyena's contribution to the fossil record. As a result, we must reconsider the definition of "humanness" and adopt a more objective, and distant view of our ancestors.

New Members of the Human Family

Some of the newest members of the human family (Hominidae) have been in the literature longer than any African fossils and, in fact, are not fossils at all. In several recent publications, as well as in a forthcoming Encyclopedia of Human Evolution and Prehistory, Delson and Tattersall have placed the chimpanzee (Pan), gorilla (Gorilla) and orangutan (Pongo) within the human family, rather than in a family of great apes (Pongidae). Other authors (e.g. P. Andrews in Delson, ed., 1985, Ancestors: The Hard Evidence: 14-22) would group humans in a sub-family (Homininae) with African apes but not with the Asian orang. In the most extreme rearrangements of the primate kinship chart, supported by recent DNA studies (Science, 10/16/87, 238: 273-275), chimpanzees are more closely linked to humans than they are to gorillas.

Although those who were troubled by the ape in our ancestry will not welcome the modern African apes to the family reunion, the reclassifications make sense for several reasons. First, a re-examination of comparative skeletal morphology shows that in such features as eyebrows, shape of sinus cavities, orientation of canine teeth, size differences in upper incisor teeth, and the relationship of bones in the roof of the mouth, humans (living and fossil) and the African apes share common features not shared by orangs. Second, studies of similarities in DNA group African apes with humans rather than with orangs, and suggest that the latter may have branched off the family tree up to 10 million years before the split between African apes and humans. Third, the Miocene fossil evidence of Asian and African apes, 18 to 8 million years ago, suggests that Asian apes, similar in some respects to orangs, formed a distinct and diversified lineage in Asia and southeast Europe by 14 million years ago (e.g. SIvapithecus, Ramapithecus). Evidence of a distinct lineage of bipedal humans, however, is not found before 5 million years ago, and then only in Africa.

Those who argue for a closer relationship between humans and African apes have been further stimulated by discoveries of several groups of west African chimpanzees who use stone tools and other implements to crack nuts. Not only do the chimpanzees select stones or wooden clubs of differing hardness, depending on the kinds of nuts they intend to crack that day, but they appear to have a mental map of all the discarded tools in their terrain, so that they can swing by and pick up the nearest tool of the appropriate material on their way to a nut tree (Journal of Human Evolution 13: 415-440 and 15: 77-132).

New Fossils Negate Old Theories

New fossil discoveries from Kenya and Tanzania have also upset previous reconstructions of the human family tree. In 1985 (Nature 316: 788-792), Brown, Harris, Leakey and Walker published a description of the most complete early hominid skeleton ever found: that of a ca. 12 year-old Homo erectus boy, who, although not fully-grown, was already almost 5'6" tall at the very beginning of Homo erectus times, ca. 1.6 million years ago! Since we had imagined that members of this species were short as well as primitive in appearance, the implication that Homo erectus individuals may have attained an adult height of 6 feet is revolutionary. What new food source did Homo erectus exploit in order to sustain this rate of growth for the first time in hominid history? In addition, the pelvis of the boy from Nariokotome on the west side of Lake Turkana is considerably narrower than the male pelvis of today, implying that erectus infants were as underdeveloped or 'altricial' at birth as ours are, since an infant with a full-grown erectus brain would not have fit through the birth canal.

The erectus boy differs dramatically from another new, but more fragmentary adult skeleton from Olduvai Gorge, announced in May, 1987 by Johanson and colleagues (Nature 327: 205-209). Although dated only about 200,000 years earlier than the erectus boy, the Olduvai skeleton, provisionally attributed to a previous human species, Homo habilis, was as short as the "Lucy" fossil (Australopithecus afarensis) of more than a million years earlier (3.0 million years ago) and had comparably long arms. The new fossil seems to confirm the "punctuated equilibrium" model of human evolution: long periods with little change in morphology followed by rapid bursts of dramatic change in size, shape, and lifestyle. Like the erectus boy, however, the Olduvai skeleton raises more questions than it answers. If the first assemblages of chipped stone tools now dated to 2.5 to 2.0 million years represent a new way of making a living in savanna environments, why are the hominids like Lucy who date from before this event so similar to the ones who lived in east Africa at 1.8 million years ago? Have we grouped fossils into "Homo habilis" that don't belong together? Are the fossils we are calling Homo, because of expanded brain cases and a presumed dependence on tools and cultural behavior, in fact not responsible for the tools after all?

Curiously, the most dramatic shifts in the hominid lineage at the time when stone tools first appeared concern not the presumed ancestors of Homo erectus, but their cousins, the robust australopithecus group. Until the publication of the "black skull" from the west side of Lake Turkana by Walker and colleagues in 1986 (Nature 322:517-522, Discover, September 1986: 87-93, Science 233: 720-21), robust australopithecus individuals, with their "nutcracker" jaws, large grinding molars, gorilla-like crests, and flat faces, were thought to represent a specialized dead-end in human evolution that evolved only after 2 million years ago in response to competition from more "advanced" early humans (Homo habilis) wielding stone tools. The extremely robust "black [manganese-stained] skull", however, is 2.5 million years

old! While not as flat-faced or as large-brained as later forms, the "black skull" had molar teeth and a bony skull crest as large or larger than any of the hyper-robust Austalopithecus boisei forms from east Africa, such as Zinjanthropus from Olduvai. The new skull shares some primitive features with the earlier form, Austalopithecus afarensis (Lucy and the "first family"), but relatively few with its presumed contemporary, A. africanus ("Mrs. Ples.") from south Africa, or with later representatives of the genus Homo. How are all these fossil forms related to one another? Many scholars agree (see Science News 7/4/87 p.7) that the robust australopithecines must now be derived directly from afarensis. But is Homo, who only appears after 2 million years ago, also derived from afarensis, and if so, is africanus a side-branch or an intermediate ancestor? And finally, who made the first stone tools at 2.5 to 2.1 million years ago, at Kada Gona (Ethiopia), Omo (Ethiopia) and Senga (Zaire)? (No stone tools are known from this time range in South Africa or in association with africanus). Was it a robust australopithecus or an undiscovered human ancestor?

The new fossils concur with several re-analyses of the behavioral and physical evidence for early human adaptations. Early humans were not simpler versions of ourselves but a group of animal forms with no living analogue. To live on the east African savannas, they probably had to be able to exploit underground tubers, and small animal prey, but the simple stone tools they made did not change for a million years. While Homo erectus may have had a long period of childhood dependency and learning, considerable controversy exists as to whether Homo habilis and Australopithecus matured in an "ape" or "human" growth pattern (Nature 317:525-527, 323:327-330). Rather than representing "home bases" and a modern pattern of food-sharing and division of labor, the evidence of the earliest archaeological sites is now seen to reflect processing of animal bones by hominids at localities where large carnivores were also active and where no clear evidence of human campsite activities is found (Potts 1984, American Scientist 72: 338-347; Bunn and Kroll 1986, Current Anthropology 27(5): 431-452; Binford 1987, Current Anthropology 28(1):102-105).

The Origin of Modern Humans

About 1 million years ago or slightly earlier, the first humans spread out of Africa via the Middle East into southern and eastern Asia, and, finally, Europe, the northernmost continent. To do so, they had to learn to cope with colder winters and shorter growing seasons in which increased reliance on the meat and fat of large animals would have been essential. Yet many sites that were once thought to demonstrate this reliance, along with the hunting competence of later Homo erectus, have recently been questioned. In a series of 1985-6 articles in Current Anthropology, (26(4):413-442; 27(5):453-475) Binford and colleagues argue that the Chinese site of Zhoukoudian (Choukoutien), "the cave home of Beijing [Peking] man" was also the cave home of two species of hyena, wolf, tiger and bear. While humans also left their stone tools in the cave, the food habits of these carnivores were probably responsible for much of the bone accumulation in the cave, as well as for the damage to the human skulls, formerly interpreted as evidence of cannibalism. In addition, the "ash layers" cited as evidence for human control of fire are probably the remains of huge guano accumulations, some spontaneously ignited and burning over long periods, so that "the 'cave home of Beijing man' may well have been one of the first 'homes' in the temperate zone to have had 'central heating'" (1985: 429). As Binford's conclusions are strongly contested by other scholars, both in the US and abroad, a definitive reconstruction of life in China in Homo erectus times must await further data from Zhoukoudian and other sites.

In Europe, the site of Torralba is interpreted in the Time-Life book on Early Man, as well as in the Smithsonian's Hall of Ice Age Mammals and the Emergence of Man as a place where Homo erectus was thought to have used fire to drive elephants into a bog and slaughter them. Although stone tools indicate some human activity at the site, recent restudy of the evidence for fire, hunting, and butchering of the elephants and other animals suggests that the large mammals could well have died a natural death, since hearths were absent, and previous identifications of stone tool "cutmarks" are now in doubt.

Even the European Neandertals, whose large brains qualify them for inclusion in our own species, have been "dehumanized," their ability to speak clearly and plan ahead called into question. In a review article in the 1986 Annual Review of Anthropology (15:193-218), Trinkaus demonstrates that Neandertals were more cold-adapted and much more robustly built than Homo sapiens sapiens, indicating that their ability to find cultural rather than biological solutions to environmental stress was considerably less than that of early modern human (Homo sapiens sapiens). The "early moderns", on the other hand, were more "advanced" in their cultural behavior than we had previously imagined. Not only did they carve images of their world and decorate themselves with beads and pendants, but they also built boats and sailed them to Australia, New Guinea, and New Ireland, where sites, some with painted images, are known from 32,000 years ago (Nature, 8/20/87, 328:666).

Surprisingly, in view of its relatively recent date, the origin of modern humans is one of the most debated topics in palaeoanthropology (Science, 9/11/87, Vol. 237:1292-1295). Where is the birthplace of "Cro-magnon" and other peoples who appear in Europe beginning around 35,000 years ago and whose achievements culminate in the great painted caves of Lascaux and Altamira? Two new lines of evidence lead us back to the place where the human story began. Studies of mitochondrial DNA in modern human groups suggest that all modern humans are descended within the last 200,000 years from an African ancestor. Since mitochondria are present in eggs but not in sperm, only female ancestry is reflected in the pattern. If this ancestral modern woman bred with Neandertal or other males, whose mitochondria are not heritable, this intermixture would not show up in the mitochondrial DNA, although it would be reflected in the more slowly-evolving nuclear DNA. Many scholars, however, including Trinkaus, see the contribution of Neandertals to modern humans as minimal. The physical differences are too great, and the replacement time too short, to envision a slow transformation from one form to the other.

Some anthropologists argue that the molecular clock does not keep good time, or that alternative explanations for why African populations are more diverse genetically than the entire rest of the human species can be developed (Science 10/2/87: 238:24-26). Yet the mitochondrial evidence may well be in agreement with a second source of evidence: that of the fossil record itself. At two sites in South Africa, Border cave and Klasies River Mouth, fossils with chins and small modern teeth have been dated to the end of the last interglacial, about 75,000 years before the first appearance of modern humans in Europe. Skeptics (e.g. Binford, 1984, Faunal Remains from Klasies River Mouth) have questioned the dates or argued that younger, more modern skeletons may have been buried or mixed into older deposits. Recent stratigraphic work at Klasies, however, shows that the modern human fossils there are contemporary with the earliest archaeological levels at the site, levels whose soils and associated molluscs are linked to the warmer climate of the last interglacial. More "archaic" but still large-brained Homo sapiens fossils are known from even earlier deposits at Omo (Ethiopia),

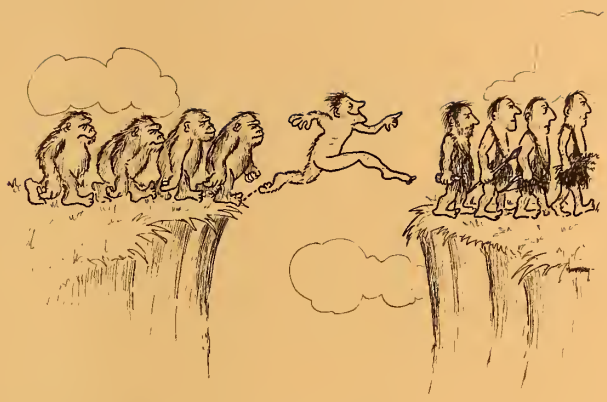
Ndutu, Laetoli, and Eyasi (Tanzania), Florisbad (South Africa) and several other sites. A few scholars point to the existence of transitional populations between archaic and modern humans at several sites in eastern Europe and southeast Asia, but these can also be seen as evidence for the intrusion and interbreeding of new populations. As a result of several converging lines of evidence, an African ancestry for all modern humans appears likely.

General Considerations

All of these new discoveries and interpretations, whether due to new fossils, new analytical techniques, or new ways of looking at old data, reflect changing views of evolution in general, and human evolution in particular. If new evolutionary advances are rare events, followed by long periods of stasis, then dramatic differences between early human groups only 200,000 years apart make sense, as do long periods when both the biology and behavioral adaptations of hominid species were stable. The rapid replacement of Neandertals by modern humans also fits this model.

A second trend in these new scenarios is the progressive refusal to recognize modern human behaviors in our ancestors. Like scholars in the early twentieth century, modern anthropologists are struck by the great gulf that separates us from the primitive past rather than by the few traits which unite everything grouped in the human family (including possibly, the living African apes). Where to draw the line between "human" and "non-human"? The answer may not lie entirely in the fossil record, but in the ways scientists and philosophers think about themselves, their evolutionary past, and the world around them.

Alison S. Brooks



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