Letter From the Desk of David Challinor
September 2003

The first time I saw a live hippopotamus was as a child at the Bronx Zoo, where two were submerged in a large outdoor concrete tank. I was only four or five years old and disappointed because so little of them was visible. Eventually, 40 years later, I gloried in watching scores of wild hippos of all sizes enjoying a shallow lake in Tanzania. This month's letter is about hippos, of which there are two genera: the relatively small pigmy hippopotamus (*Choeropsis liberieusis*) and the more common large one (*Hippotamus amphibius*). The National Zoo for many years had both kinds, but now exhibits only a pair of the large ones.

Today, the pigmy hippo is confined to small sites in West Africa, primarily Liberia (hence the species name). Shy, forest-dwelling and usually solitary unlike its larger relative, it was not even described scientifically until 1841; we still know little about its habits in the wild. It does, however, breed readily in zoos and more than a score of young have been born at the National Zoo.

The large hippo was particularly abundant in Egypt about 2,000 BC and caused much crop damage. They were, for this reason, heavily hunted until their extirpation about 1800 BC. However, in ancient Rome starting about 60 BC, they frequently participated in the coliseum's staged wild animal fights. How they traveled from Egypt to Rome we do not know, but it would make a fascinating story. After the fall of Rome, hippos were absent from Europe until 1850 when the Viceroy of Egypt sent some to the London and Paris zoos. Curators soon learned that hippos easily tolerate cold weather. Although many marine mammals, particularly seals, dolphins and whales, have thick layers of blubber to insulate their bodies from cold sea water, fat hippos normally live in shallow warm water. Why then, I wondered, were they so fat? The answer struck me many years later when I realized that hippos don't migrate. The rains where they live can be unreliable and searing draughts are not infrequent. A well-fed hippo's subdermal fat layer (up to 16 cm (6") thick) provides an energy source that enables fat individuals to survive on a minimal diet. Thus hippos, like certain human groups who are subject to periods of starvation, can quickly add fat in times of plenty to protect themselves in times of famine. This survival characteristic is unnecessary in the U.S. today because famine is so rare. The survival advantage of fat deposit in good times is no longer a boon but rather a bane, causing lifelong obesity.

The ability of hippos to store fat for protection against hard times was made clear from a drastic culling of hippos in Uganda in 1958. On the shores of Lake Edward in Uganda's extreme southwest corner, hippo density was so great (two per ha) that night-grazing hippos ate all the shore-side vegetation. The area was so overgrazed that other

grass eaters moved out leaving only hippos, which had to stay near the lake to survive. After considerable high-level discussion, a massive hippo cull was reluctantly begun. Within a year of the operation, vegetation grew faster than it was consumed and other grazers returned. Perhaps an even more valuable result from this culling was the information gained from the detailed necropsies (autopsy on an animal) performed on hundreds of hippos. Scientists discovered that the expected fatty layer was absent from these animals, perhaps indicative of the food stress they endured. Other studies on butchered hippos showed that within the culled hippos, the dressed and skinned carcass was 68% of the live weight, an extraordinarily high figure compared to other wild animals. This hippo meat was readily sold to local villagers. A still unanswered question is whether it would be practical to raise these animals for meat in protein-starved East Africa. Problems in hippo husbandry are huge, but perhaps not insurmountable. Unlike cattle, hippos can't be herded, thereby requiring them to be shot. Carcasses would have to be dressed in the field—a messy task in the best of circumstances. Once butchered, the meat must be rapidly chilled to protect it from spoiling. Despite the lean beef-like flavor of the bulging neck muscles, I do not envision commercial hippo ranching soon, although the current rising bison meat industry in the USA may prove me wrong.

Hippos are well adapted to an aquatic life. They can close their nostrils when submerged, and adults can stay below the surface for up to six minutes; however, most dives last only two to four minutes. Although aquatic, they cannot compare with other marine mammals in swimming ability. They prefer relatively shallow water less than 2 m deep, and when submerged they walk on the bottom or dog paddle. Not withstanding their relatively inefficient swimming style (compared to seals and otters), hippos brave the oceans. When I was in Dar-Es-Salaam in 1970, there was a beach resort south of the city where a hippo from a nearby river mouth regularly swam in the ocean before returning to its river home. Several times hippos have swum to both Mafia Island and Zanzibar—17 and 20 miles respectively off the Tanzanian coast. Such a swim can scarcely compare with the hundreds of miles of ocean navigated by the large salt-water crocodile (C*rocodylus porosus*)—one of which reached Cocos Island in the Indian Ocean, a journey of almost 700 miles. Nonetheless, one can imagine the reactions of bathers on a resort beach in Zanzibar when a hippo emerged through the surf and walked onto the beach.

Hippos have acquired some amazing adaptations to fit their semi-aquatic life. For example, they have highly specialized skin. During the heat of the day they are almost always completely submerged with only their ears, eyes, and nostrils protruding above the surface. However, during the dry season, their ponds often become too shallow to cover them. Then specialized subcutaneous glands exude reddish, high salt content mucus. With this covering, the animal appears to be bleeding all over! It seems this thin mucus layer functions as a natural "sun block" for the exposed animal. When a hippo

does have ready access to water, as in a zoo, its skin glistens, probably from secretions of the same glands that produce the red mucus. Such shiny coats indicate good health.

Not only does a hippo's skin have built-in sunburn protection, but it is also one of the toughest of all animal hides. Male hippos especially need this protection, for they use their two-foot long lower canines as weapons to assert dominance over challenging males. Fights among bulls are commonplace as they are often confined to relatively small ponds. Around the neck and shoulders, areas most vulnerable to stabbing, their skin can be almost 4.5 cm (2 ") thick. Tanning such hide takes literally years. However, when freshly cut and stretched over a frame, hippo skin hardens to produce a warrior's shield as resistant to spears and pangas (machete-sized knives) as steel.

Hippo teeth, like those of the one-horned Asian rhinoceros, are the male's primary offensive weapon when asserting dominance. The rhino's teeth are kept sharpened by the action of the upper canine against the lower one while chewing, but the hippo's long canines grow continuously just like an elephant's upper incisors (tusks). Hippo teeth do wear down although Grzimek, the famous German zoologist, discovered that a coat of hard yellow dental enamel, which can be dissolved by acid, protected these large teeth. The ivory underneath does not turn yellow with time as do elephant or walrus tusks. This quality made treated hippo teeth a major source for human false teeth until chemists developed equivalent synthetics.

One final scatological characteristic of hippos—an aspect hard to avoid in the study of almost any animal—is its defecation style. The virtually hairless hippo has stout bristles on each side of its laterally flattened 6" tail. By dint of some elegant musculature, a hippo can spin its tail while defecating. The effect mimics that of a tractor-towed manure spreader. On land this characteristic may serve to mark territory; in water to speed dissolution of excreta. The fertilizing effect of this hippo habit in ponds results in a significant increase in the herbivorous fish population. As any zookeeper will tell you, this hippo habit is one of the off-putting detractions of working with these animals.

Hippos breed in the water, a logical site considering their weight, and they give birth and nurse in the water. Despite the lack of circular muscles found in whale mammary glands that force milk into the suckling baby, hippo nurslings actually have to suck under water and then come to the surface to breathe between swallows.

Not withstanding their ungainly appearance, hippos are remarkably agile on land and easily ascend steep riverbanks at night to graze. They can also trot rapidly—about as fast as a man can run. Years ago, in Walt Disney's animated film *Fantasia,* Disney cartoon characters pranced around to the music of various classical composers. One ballet piece, I remember, had hippos in tutus pirouetting agilely. The idea was to

"buffoon" the animal, but in those days neither Disney, nor indeed most mammalogists, understood how sprightly hippos can be. We are more knowledgeable about them today, so the next time you see one in the flesh, you can marvel along with me at what fascinating animals they are.

David Challinor
Phone: 202-673-4705
Fax: 202-673-4686
E-mail: ChallinorD@aol.com