All Creatures

Los Angeles Zoo Docent Newsletter Summer 2006

The Evolution of ...

On Bird Origins

By Dr. Luis Chiappe

We wish to thank guest writer Dr. Chiappe, Director of the Dinosaur Institute at the Natural History Museum of Los Angeles County, for his contribution to this issue of All Creatures.

In paleontology, it never rains; it pours. Only this seems to account for the unprecedented rate at which fossils of early birds and their most immediate predecessors have been unearthed from Mesozoic-age rocks over the last few years. This wealth of new fossils has settled the century-old controversy about the origin of birds. Today we can safely declare that birds evolved from a group of dinosaurs known as maniraptoran theropods–generally small meat-eating dinosaurs that include *Velociraptor* of "Jurassic Park" fame.

Evidence that birds evolved from the carnivorous predators that ruled the Mesozoic ecosystems is plentiful, and it comes from disparate lines of evidence. Traditionally, the prime source of evidence was the similar shape of the bones of birds and a variety of maniraptorans, but spectacular new discoveries have brought other evidence to the table.

One involves a suite of features from the eggs of these dinosaurs. A host of fossils has shown that not only did maniraptoran dinosaurs resemble birds in the way they laid their eggs, but that these eggs also looked like the eggs of birds. Fossils of animals in brooding or resting postures also show a startling similarity to the behaviors we see among living birds.

Perhaps the most compelling new evidence comes from the discovery of soft tissues associated with the skeletons of these predatory dinosaurs. Many fossils of these creatures are now known to have been covered by plumage. All this evidence has highlighted the fact that many features previously thought to be exclusively avian–from feathers to a wishbone–have now been discovered in the immediate dinosaur predecessor of birds. Even flight is likely to have been an attribute inherited by birds from their dinosaurian forebears!

If the new wealth of fossils has resolved the old controversy over the origin of birds, many other fossils have provided a vivid testimony of the early phases of avian evolution. Hidden in these fossils are clues to how birds perfected their flying abilities and how they evolved warmbloodedness.

As we know it today, the history of birds starts with the spectacular *Archaeopteryx,* a jay-sized creature with toothed jaws, a long, lizard-like tail and flight feathers. *Archaeopteryx* lived 150 million years ago in today's southern Germany. Although *Archaeopteryx* stands alone in the fossil record of birds at the end of the Jurassic period, a few million years later, in Cretaceous rocks ranging from 130 to 115 million years ago, fossils of many different birds have been found. Some of these show that a great diversity of birds with long, bony tails preceded the evolution of birds with the familiar short, bony tail.

Birds of the early Cretaceous blossomed in a range of

On Bird Origins (Continued from page 1)

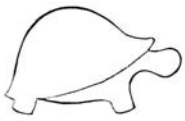
shapes and sizes. The crow-sized, stout-beaked *Confuciusornis* sported enormous claws in its wings, while the contemporaneous *Sapeornis* had very long, narrow wings like those of an albatross. These two birds were much larger than the sparrow-sized *Eoenantiornis* and *Iberomesornis,* which like most early birds had toothed jaws similar to those of *Archaeopteryx.* The different design of skulls, teeth, wings and feet indicates that already at this early phase of their evolutionary history, birds had specialized into a variety of ecological niches. Traces of seed-feeders, sap-eaters, insect-feeders, fish-eaters and meat-eaters have been found. At the same time, a host of novel features in the wings and ribcages suggests that soon after *Archaeopteryx,* birds evolved flying abilities similar to those that amaze us today.

As younger rocks from the Cretaceous period are found, the fossil record includes an increasing number of bird species with even more diverse lifestyles. The *Hesperornithiforms*–large, flightless, foot-propelled divers–made their debut around 100 million years ago. A few million years later, these supreme fish-eaters would be crowned kings of the aquatic birds with the tiny-winged, 4-foot-long *Hesperornis.* The *Hesperornithiforms* swam the warm sea waters of North America from the Gulf of Mexico to the Arctic. On the shores of this shallow sea, over herds of duck-billed dinosaurs, soared the tern-sized *Ichthyornis.* Its large head with sharp teeth was designed to catch fish.

Not all the birds that lived during the Mesozoic, the Age of Large Dinosaurs, may have looked as unfamiliar as *Archaeopteryx, Confuciusornis* and *Hesperornis.* The early representatives of today's lineages of birds can also be traced back to this remote era of our geological past. In several continents, rocks from the last part of the Cretaceous period have started to provide the remains of early shorebirds, ducks and other familiar birds. Their descendants are the true heirs of the magnificent dinosaurs that ruled the Earth tens of millions of years ago.

Thank You, Keri!

The editorial staff of "All Creatures" extends a special thank-you to Keri Dearborn for her five years of service as lead editor of the newsletter. Her passion, expansive mind and professionalism have helped make our newsletter an outstanding publication that truly enhances docents' knowledge, often with a smile.



Illustrator Kirin Daugharty

FLASHBACK TO 1985

TRIVIA QUIZ QUESTION
JUNE 1985 EDITION OF "ALL CREATURES"

To what animals do the following young belong?

a. joey b. cygnet c. fry d. squab e. kid f. gosling g. poulet h. elver

Answer: a) kangaroo, b) swan, c) fish, d) pigeon, e) goat, f) goose, g) turkey, h) eel

'Want to know more about the past of "All Creatures"? Check out Keri's article on page 12!

A Message from Maggie Connor

Every day is a special gift from all of you docents that makes my life so rich with friendships. Every day is different and filled with special events, evidence of your many talents and goals. The longer I work with you, the more I am in awe of your varied successful backgrounds and accomplishments. You are a unique group.

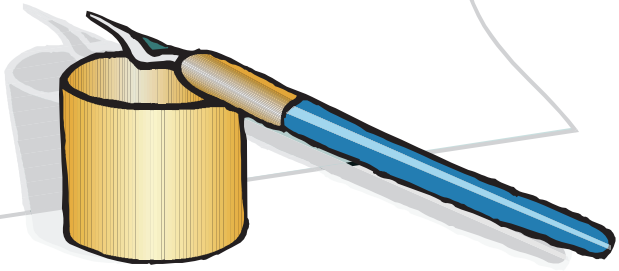
We share many traits such as our enthusiasm, curiosity, love of learning and, most of all, interest in teaching. With everything you do, you pass on knowledge to subsequent generations–perhaps the best gift there is to give.

We have one of the strongest docent programs in the nation, thanks to your hard work and loyal cooperation. To Keri Dearborn, I extend my heartfelt thanks for serving as editor of this fine newsletter for the past five years. And to Kathy Landis, I wish the best of luck as you take over the editorship.

To all our docents, I want you to know that I love you and feel very blessed to share our great Zoo adventure with you.

Most sincerely,

Maggie



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Creature Feature

The Evolution of Docents

By Barbara Adams

With evolution as the theme of this issue of "All Creatures," we highlight three individuals–Raffaella Commitante, Juanita Kempe and Pat Meyer–whose evolution as docents began when they stepped into their first provisional training class. From there, their involvement expanded, each being drawn to specific areas where they felt they could best serve. Their work has certainly made a difference in the Zoo and in the world.

Raffaella Commitante

Raffaella became a docent in 1993. The provisional class opened her eyes to what people who care about animals can do. "From a very young age, I wanted to study primates. Being a docent brought my focus back to where I wanted it to be," she said on a recent visit to Los Angeles after being awarded her Ph.D. from the University of Cambridge in England.

As a docent, Raffaella was involved in a variety of activities. She participated in our "Tamarin Watch" program, served as Sunday COD, lectured student volunteers, co-chaired the provisional training, and completed both the research and keeper training courses. She taught high school while attending evening classes at Cal State Fullerton, where she received her Master's degree in biological anthropology. She thought her future might be working in South America because of her interest in tamarins. That was before she met Dr. Willie Smits, President of the Wanariset Orangutan Reintroduction Center in Borneo, who literally gave her a new direction in life.

She subsequently applied to the University of Cambridge, was accepted, and spent a year there preparing to go into field research. She spent two years in Borneo, living at the Orangutan Reintroduction Center, where 300 orangutans are housed. Research involved collecting orangutan fecal and urine samples at the Center and having them analyzed for levels of the hormone cortisol. She also observed behavior for indications of stress. When stressed, the body produces too much cortisol, which inhibits production of other hormones the body needs. Raffaella is seeking funding to develop a field test kit, similar to a pregnancy test, for checking cortisol levels.

Left: Dr. Raffaella Commitante receives her doctorate in ceremonies at the University of Cambridge, London.

She returned to Cambridge in 2004 to complete her doctoral thesis, "Behavioral Stress and Physiological Stress in Orangutans," and received her Ph.D. in October, 2005. She would like a college-level teaching position, possibly one that would allow her to travel to Borneo again. Her evolution from docent to Dr. Raffaella Commitante began when she became a student in the provisional class in 1993. Her work as a scientist and advocate for animals continues.

Juanita Kempe

As a young girl, Juanita Kempe knew animals quite well. She and her father would spend hours at the "old Zoo" every week. When the new Zoo opened, she became a member.

Juanita graduated as an art major from UCLA, studying costume design, was hired as a dress designer and pattern maker, and later became a partner in the firm. She was determined to take the provisional class, which she had read about in *ZooView,* but working nearly six days a week made it difficult to take the class. Still, she managed to slip out once a week for a few hours, and in 1987 she graduated as a docent. After a successful run in business, she situated herself financially so that she could devote more of her time to her real passions: animals and the Zoo.

Juanita's favorite animals are primates, particularly orangutans. Her interest in them took her to Borneo four times, most recently in January of this year. In 1998 she became involved with the Orangutan Conservancy *(www.orangutan.com)* and today serves as an officer. Her last two trips to Borneo were with the Conservancy, giving her an opportunity to visit almost all of the orangutan sanctuaries there. Borneo is home to approximately 50,000 orangutans. Unfortunately, their habitat is rapidly being destroyed through destruction of the forest for timber and the increasing number of palm oil plantations.

As a docent, even before her involvement with orangutans, Juanita visited Alan Mootnick's Gibbon Conservation Center in Santa Clarita *(www.gibboncenter.org),*

Juanita Kempe plants a tree on the edge of the rainforest in Sabah, Malaysia.

home to the world's second largest gibbon population outside their countries of origin. Having become involved there, she serves as an advisor, attends board meetings and does fund raising.

Juanita has been doing research at the Zoo for 18 years on drills, mandrills, uakaris, orangutans and chimpanzees. She serves as liaison to the Research Department, conducts primate tours and has worked Zoo Camp. She also has made presentations at AZAD conferences on bushmeat, orangutans and Ape Awareness Day–scheduled this year at the Zoo on November 4. In June, Juanita and Dillu Ashby will visit Africa to attend the International Primatological Society meeting in Uganda, after which they will travel to Rwanda to see mountain gorillas.

Her comments on being a docent: "When I came to the Zoo, I loved animals but didn't realize their desperate need for having protection and a voice. I hope I have made a difference in having a voice for them. Unfortunately, the more we know, the more we know we are not doing enough and want to do more. I'll continue until I drop dead."

Pat Meyer

Docents evolve in many ways. Pat Meyer's interest in animals goes back to her childhood in England, where the family had many pets, including hedgehogs.

Pat loves a challenge and her motto seems to be "anything for adventure." She immigrated to the U.S. from England in 1970 and came to Los Angeles. The chairman of the insurance company where she worked as a secretary recognized her potential and paid for her college education. She attended UCLA Extension four nights a week while working full-time, received her B.A. degree, and was promoted to Director of Human Resources and Administration of the firm. She later earned an M.B.A. from the University of Redlands.

In 1987 Pat married Dr. Albert Meyer, a prominent orthopedic surgeon. She subsequently left the corporate world, and looking for more adventure, joined the docent program and graduated in 1994. That year she wrote an article for "All Creatures" on our wolves, then served as editor from 1995 to 2001. Pat also became a lecturer in her first year as a docent. Subjects she lectures on include domestication, coniferous and deciduous forests, evolution, zoology and mammals (with a focus on monotremes and marsupials).

When asked what her favorite animals are, she replied, "Anything canine." That is evident with the work she has done creating Friends of the Island Fox, Inc., a non-profit corporation devoted to the survival of foxes on our Channel Islands. She formed the non-profit in 2005 at the suggestion of a biologist whom she met while doing research for a lecture on ecological upsets. Current projects include seeking funding for telemetry tracking collars for National Park Service island fox releases and educating the public through lectures, literature and the media. (See *www.islandfox.org* for more information.)

Pat is fascinated by another canid–wolves. "They just grab you," she said. "I got totally wrapped up in their Yellowstone reintroduction in 1995, and visited again in 1996 and 1997." She joined the International Wolf Center *(www.wolf.org)* founded by famous wolf biologist David Mech, and has traveled with him to the Northwest Territories and twice to Yellowstone, most recently this past March. In her ongoing search for adventure, Pat would love to see a maned wolf in the wild. (On October 21, Wolf Awareness Day is scheduled at the Zoo.)

Asked how she feels she has made a difference, Pat responded, "The success of the island fox is still to be shown because it is so new, but I am determined to make that work. For me, teaching the provisionals has had the most effect, because I can see them [becoming] future animal people. The lectures are a huge commitment, but I love the challenge."

Each of these docents has gained our respect and admiration for their work at the Zoo and their outreach mission to make this a better world for animals and humans.

Pat Meyer holds a friend during her 1998 trip to Australia's Lone Pine Koala Sanctuary.

Survival of the Tastiest?

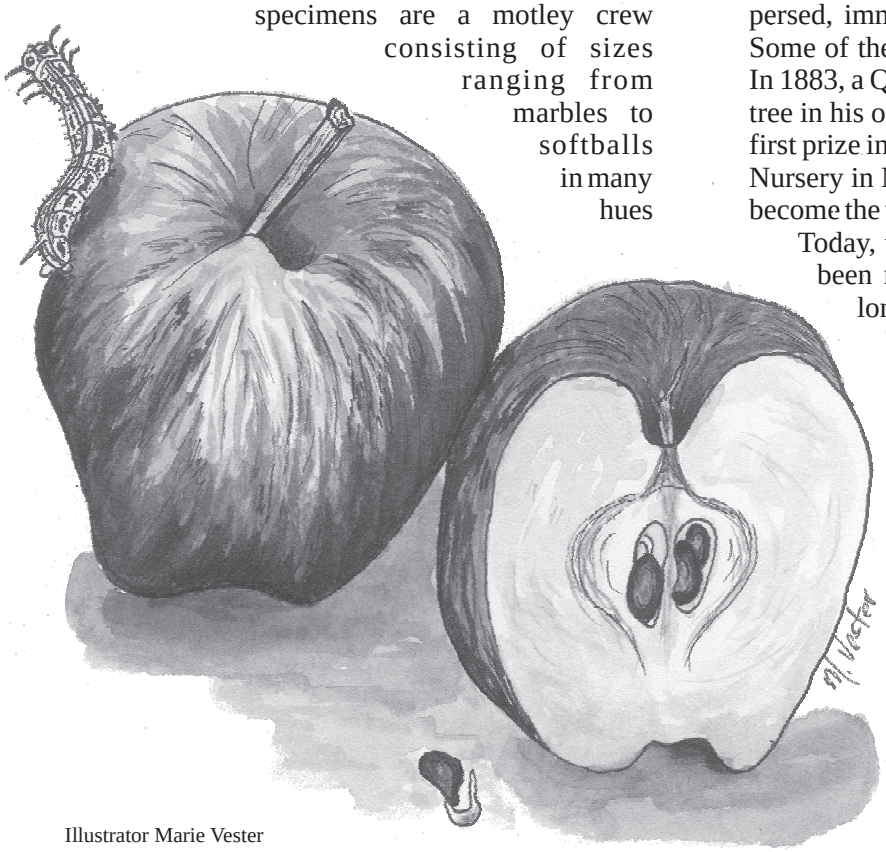
By Evelyn Feinberg

To the observant gardener, plants often seem to have minds and spirits. Some possess the endurance and tenacity of marathon runners. A creeping fig of mine comes to mind. Shortly after it was planted, it covered half the house front. Even though it was brutally hacked to pieces a year ago, it continues to creep insidiously up the wall.

My creeping fig, like many successful plant species, has evolved in ways that promote continued survival. The success of a particular plant in the evolutionary game often depends on its adaptation to a particular environment, its ability to diversify, and the nature of the bonds it forges with animal life, including humans.

In his recent book *The Botany of Desire,* Michael Pollan goes so far as to suggest that plants, because of certain attributes, such as beauty, tastiness and the power to intoxicate, utilize humans as agents of modification and proliferation in order to ensure their survival. An example of this mechanism exists in the life of the apple, that quintessential American fruit. We envision the apple as solid, glossy, usually red and sweet. It wasn't always so.

The ancestors of the domestic apple tree, *Malus domestica,* are thought to have originated in the mountains of Kazakhstan where they still reportedly grow wild, sometimes to heights of 60 feet. The fruits of these wild specimens are a motley crew consisting of sizes ranging from marbles to softballs in many hues including purple. They don't necessarily taste good. Some do, some don't.



Illustrator Marie Vester

Apples that germinate from seed are an unpredictable lot. Each apple possesses five seed chambers containing one or two seeds. These seeds are unlikely to produce replicas of the parent plant. As with humans as well as many other plant species, apples possess the trait of heterozygosity–an extreme variability when reproduced by seed germination. This trait in part accounts for the apple's adaptability to many different climates and terrains. It wasn't until the Chinese discovered how to graft apple stock in the second millennium B.C. that any uniformity in apple reproduction was possible. Later the Romans cultivated apples, and in their conquests took them to other parts of Europe where they acclimatized and developed novel varieties, such as the Lady apple, which still appears in our supermarkets in November.

When the apple immigrated to America with the Puritans, it adapted to the new land and commingled with wild crabapples. During the colonial period and later too, the apple was prized for its sweet taste, but more importantly for its ease in fermentation. In only a few weeks, apples yielded a mildly alcoholic, tasty, cheap drink that was one of the few comforts in a pioneer's life.

In 19th-century America, as their seeds were dispersed, immense numbers of apple varieties flourished. Some of the American classic apples were "discovered." In 1883, a Quaker farmer, Jesse Hiatt, found a rogue apple tree in his orchard which he named the Hawkeye. It won first prize in an apple contest sponsored by Stark Brothers' Nursery in Missouri. This wonderful tasting apple was to become the world's most popular, the "Delicious."

Today, the apples that are grown commercially have been narrowed to a few varieties valued for their long shelf life, good looks and uniformity. Through intense domestication, our modern fruit has lost not just some of its tastiness, but some of its vitality and resistance to disease and pest infestation. In some places, however, the wild apples still disperse their seeds and thereby create new diverse individuals. In Geneva, New York, one can visit the world's largest collection of apples (2,500 different varieties). In this apple "museum," maintained by the Plant Genetic Resources Unit, one can see and taste members of worldwide apple evolution. Perhaps some of these forgotten or new varieties will find their way back to our farms and marketplaces.

Conservation Watch

The Evolution of Conservation

By Steve Braddock

The relationship between humans and nature has rarely been harmonious. But with the rise of agrarian societies and the development of Western civilization, that relationship took a distinctly hostile turn. The wilderness became something to conquer, to tame. The savage beasts living there had to be exterminated to make the environment safe for humans and their livestock. According to the Judeo-Christian ethos, God gave people dominion over the beasts, the fields and the forests, and by God, they were going to take it!

Ironically, the first conservation efforts in this country were made by sport hunters and hunting groups, who realized that if the habitat disappeared, so would the game. The Boone and Crockett Club was founded in 1887 by G. B. Grinnell and Teddy Roosevelt. Another major contribution came from birders. The same G. B. Grinnell founded the American Ornithological Union in 1883 and the first version of the Audubon Society in 1886. He closed it two years later because it grew so quickly it overwhelmed him. In 1896 the Massachusetts Audubon Society was started, followed by many other state and local societies. These were amalgamated into a second National Audubon Society in 1905.

Beginning around 1850, books and magazine articles began to appear, extolling the beauty of nature and wildlife. In 1854 Thoreau published *On Walden Pond,* an unparalleled paean to nature. Artists like John J. Audubon, Albert Bierstad and Thomas Moran, and later photographers like William Henry Jackson, Carleton E. Watkins and A. P. Hill captured the beauty of the wilderness, primarily of the American West, and showed it to the rest of the world in popular books and magazines. Naturalist authors like John Burroughs and John Muir wrote extensively, extolling the wonders of nature and talking about the need to preserve them. Muir, of course, was instrumental in founding the Sierra Club in 1892.

Organizations like the Sierra Club, the Adirondack Club, the Audubon Society and many similar citizen-based groups brought conservation awareness to the general public. Many ordinary people became involved in conservation efforts for the first time. Today these same groups, as well as newer groups like the Nature Conservancy and organizations dedicated to specific issues like the International Snow Leopard Trust, continue to fight to save the environment.

In 1872 an act of Congress established Yellowstone Park as the first national park in the world. Sequoia National Park was established in 1890, and since then parks have been established by various governments around the world.

The vast increase in international commerce during the first half of the 20th century greatly increased pressure on threatened animals, plants and habitats. In response the IUPN (International Union for the Preservation of Nature) was founded in France in 1948. The IUPN became the International Union for the Conservation of Nature and Natural Resources (IUCN) in 1956. Since 1990 it has officially been known as the World Conservation Union, but most people still refer to it as the IUCN. The IUCN includes 82 countries, 111 government agencies and 800 non-government agencies and organizations. CITES, the Convention on the International Trade in Endangered Species of Wild Fauna and Flora, was initiated at a meeting of the IUCN in 1963 and went into force in 1975. It includes 169 countries that have voluntarily agreed to control the trading of 30,000 species of endangered plants and animals. The IUCN Red List and the CITES Appendices are the documents that list endangered species and assess the threat level to each.

Over time, humankind's relation with nature is beginning to evolve from domination to appreciation, citizen involvement and finally international cooperation, resulting in some guarded optimism. However, some very vulnerable areas of the world, like much of our rainforests, are still stuck in the dominion stage of conservation evolution. Unfortunately, this dinosaur is not extinct.

The Word Doctor

The Evolution of Evolution, Part 1

By Kilbee Brittain

In a public lecture, a well-known philosopher (said to be Bertrand Russell) described how earth orbits the sun, how our galaxy moves, how everything works. A little old lady got up and said, "What you have told us is rubbish. The world is really a flat plate supported on the back of a giant tortoise." The philosopher smiled and replied, "What is the tortoise standing on?" "You're very clever, young man," the woman replied, "but it's turtles all the way down."

The turtle story is one of many myths about Creation and our place in the universe, in this case a Hindu story in the very rich collection of Indian scriptures. Imaginative stories abound in all ancient cultures. Most of them concern beginnings and endings; the life processes in between are characterized in various ways. An important part of many includes the concept of change, of things having been different–usually better, in a Golden Age–or changing in a progression like steps on a ladder leading to improvement, even perfection, of form and function.

The term "evolution" encompasses so many disciplines that have developed, changed, grown through the thousands of years of human history. Nowadays we often use the word casually, as in "the evolution of action films made for TV" or "the evolution of pizza." The word has been used in English since the early 1600s, initially to describe a biological process, as a flood of scientific inquiry covered the Western world with intellectual ferment, and old ideas based on various belief systems were challenged. The word comes from the Latin *evolvere,* literally "to roll out"; the *vol* part has a very ancient root in Indo-European **wolg,* "to move about," later to become "walk." The word always carries with it the meaning of motion, of change.

Evolution was the top news story of 2005, reports the respected journal *Science.* It has been in the news, often contentiously, becoming a red flag to various groups who wish to impose their particular belief systems on schools, curricula, politics and people's personal world views.

What is it that gets some people so infuriated about the concept of evolution? No one gets upset about little *eohippus* evolving into Secretariat. But talk about some apish, hairy, slouching, grunting, screaming tree-dwelling animal turning into George Washington or Brad Pitt–wow, you'd better watch out! Some people go ballistic.

One docent tells of her tour group watching our chimpanzees, one of whom was indulging in some sort of socially impolite behavior. A woman in the tour said, "I am *not* descended from something like *that!"* Our docent replied, "You're quite right, madame, you're not, but you both have a common ancestor." It's an important point we can all make, if the subject should come up on a tour: No one is saying that humans are descended from chimpanzees. The well-accepted scientific consensus is that both species split off from an ancestor many millions of years ago.

As docents we have a special interest in evolution as evidenced in living and past creatures, great and small, plant and animal. In ancient Greece, the idea of evolving forms was accepted by many brilliant philosophers. Empedocles (495-435 B.C.) wrote that first, plant life appeared, and animals "budded off" from parts of plants. The parts then came together. Some monstrous forms that resulted soon died out, leaving only those whose parts worked in harmony. (Here was a hint of natural selection and survival of the fittest.)

In his *Physics,* Aristotle (384-322 B.C.) commented that Empedocles was the first to suggest that the fittest forms could have arisen by chance and not design. Aristotle wrote about a "chain" of change, from simple sea creatures to fish, land animals and eventually humans. (The combination of Empedocles' ideas of chance and survival of the fittest, combined with Aristotle's idea of gradual evolution from simple to complex forms could have led straight to Darwin's theory!)

Anaxagorus in the fifth century B.C. had written that plants and animals were formed as pre-existing "germs" in the air, then developed in the warmth of the primordial seas.

Christian founding fathers drew on these ideas. Gregory of Nyssa (331-396 A.D.) taught that life forms developed gradually out of primordial chaos. Continuing forward in the Current Era, Augustine of Hippo (353-430) thought germs of life came in two forms, one in plants and animals, the other scattered through the environment, to become active only under the right conditions. His ideas influenced countless theologians, and his work was translated into Arabic in the ninth century, aiding the enormous flowering of Arab science thereafter.

Avicenna, Persian physician and philosopher (980-1037), wrote about how mountains came to be through

upheavals in the crust of the earth and the gradual effects of wind and water. Sixteenth-century Europe used such Arab ideas to further the resumption of evolutionary studies, which had lain dormant for centuries in the West.

While brave, brilliant scientists dared to write scientific treatises that contradicted the increasingly rigid church doctrines, horrific persecutions and punishments were carried out. Giordano Bruno (1548-1600) was burned at the stake for writing that the Earth moves around the sun and that changes in nature were gradual, so Earth had to be older than the biblical chronology said. His work derived from the revolutionary writings of Copernicus (1473-1543), who wrote of the earth being in daily motion around its axis and yearly motion around the sun, and who influenced generations of scientists to this day. Galileo (1564-1642) used Copernican ideas for his own studies, which led to improvements in the telescope and in navigation, as a new age of exploration was coming into full flower. His thanks? He spent the last eight years of his life in jail, sentenced by the Inquisition for explaining and supporting evolving ideas which removed Earth from being the center of the universe. But the tidal wave of opinion was moving toward the sand castles of anthropocentric ideas.

Francis Bacon held that study of nature was as important as study of the Bible. He wrote (1561) about the uses people make of breeding techniques with plants and animals and proposed ways to enable pigs to render the most meat and cows the most milk, in words sounding much like genetic engineering.

Descartes (1596-1626) made the daring suggestion that all could be explained by a few principles. New ways of looking at animals were evolving. Leibniz (1646-1716) analyzed the differences between fossil ammonites and the living nautilus. Attempts at systematic taxonomy were carried out by John Ray (1627-1705), a clergyman who categorized an astounding 18,000 species of plants in three volumes, defining a species as one whose "distinguishing features perpetuate themselves in propagation from seed." He paved the way for Linnaeus.

Linnaeus (1707-1778) wrote the classic *System of Nature* (1735), using the classification system of binomial nomenclature still in use, genus followed by species names. He dismissed the Noah's ark story, and included *Homo sapiens* with animals, challenging critics to point out any part of the human body that differed from an animal's. (No one took up the dare.) He had the odd idea that different species live at various elevations of a high mountain, with polar bears at the frigid peak. He didn't explain how the animals had dispersed all over the world.

In the early 19th century, natural history became an even more enthusiastic scientific pursuit. Evolution was taken as a certainty, a part of the intellectual fabric of the time. While many brilliant intellectuals debated the question of how evolution took place, the name Darwin resonates most with people. His acute insight into what he called "natural selection" as the means of the origins of species remains the foundation of evolutionary thought today, and is the subject of Part 2 of this article in the next issue of "All Creatures."

THEORY OR HYPOTHESIS?

If someone says to you, as they have to me, "Evolution is just a theory," take them aside and explain to them what the word means in the scientific sense.

The word "theory" is from the Greek *theória,* meaning a looking at, a contemplation or mental viewing. There are several slightly varying meanings, all of which center on an idea with considerable evidence in support of a formulated and explained general principle.

The meaning most relevant to the story of evolution is that a theory is a formulation of *observed* phenomena that have been **noted** and **verified.**

An hypothesis, which many people mix up with a theory, is a thought presented with "an inadequacy of evidence."

OUR BOTANICAL BOUNTY

The Re-Creation of Paradise

By Kate Gaman

Illustrator Kate Gaman

Early 16th-century scene of Garden of Eden as a flowery mead (J. P. Bergomensis, Suma de todas las cronicas del mundo, 1510)

What would you say if someone asked you to define the term "botanical garden"? You might start with the obvious: The botanical garden has flowers, shrubs and trees. But so does a park. Then you might fall back on science or education: A botanical garden isn't planted just for ornamental purposes. The plants have labels. People study them. It's meant to show unusual plants from around the world, a sort of green zoo. And, indeed, all of these descriptions are valid. Today the botanical garden educates and provides for research and experimentation with plants, although for most patrons, it's a lovely and tranquil place to visit. But you might be surprised to learn the original purpose and goal behind the establishment of our modern botanical gardens. The purpose was no less than the re-creation of the original Garden of Eden.

Many of the earliest botanical gardens of Europe were founded in the 16th century, usually in conjunction with universities: Padua, Pisa, Leyden, Montpellier, Oxford and Jardin du Roi in Paris. The 16th century belongs to the Renaissance with its rich stimulation of arts and sciences, of which botany was significant, in part because of its great importance in medicine. Plants were the basis of nearly all pharmaceuticals. Botanists had professorships at medical schools, and the supervision of Jardin du Roi was by the king's physician. The 16th century was also the age of exploration and discovery of new lands and cultures. With these discoveries came new plants, arriving in Europe from Africa, India, the East Indies, Asia and America and causing great excitement.

The founders of the botanical gardens believed that at long last they could gather the world's plants together in one garden. It would be, in effect, the re-creation of the actual Garden of Eden. Of course, the study of plants and the accumulation of important data such as medical uses would also occur, but the paramount idea was to re-create Eden. Each individual plant was a separate act of creation, so all the plants together would reveal a complete picture of the Creation, the very nature of God.

In this new garden, scholars could quietly study and contemplate the Creator, removed from the turmoil of the world. Plants were restful and promoted serenity and were free of troublesome sex. (It was a shock to botanists a century later to find that plants did reproduce sexually and had rather active sex lives.) As God had designated plants for medical needs, the entire collection of the world's plants would supply every medical need, a treatment for every illness. It would indeed be a return to paradise.

Turning to the book of Genesis for guidelines, they found very little description of Eden itself and ended by making their own design for the garden in an enclosed square of ground, enclosed because it was known that Eden had boundaries. The four corners of the garden stood for the four continents–Europe, Africa, Asia and America–with a large fountain in the center representing four major rivers of the world. The plants were laid out in beds by families and relationships as understood by botanists at the time and placed in the appropriate corner of the world. The beds were rectangular and narrow with pathways between them so every plant could be seen, touched, smelled and sketched.

There were those who believed that as animals were present in the original Eden, they should also be included in the re-created Eden. For obvious reasons, this proved impractical; nonetheless, some gardens had animals in enclosures adjacent to or associated with the gardens, at least for a while.

It wasn't long before botanists realized that the number of plants in the world far exceeded their expectations and could not be contained in one garden. The hope for a new Eden had to be modified, and the scientific value of the botanical garden became paramount and eclipsed the religious. Our own botanical garden does include animals and, surely, as we walk around it, we can experience, just for a little while, a feeling of being back in paradise.

The Evolution of Zoos

By Pat van Hartesveldt

Since earliest times, animal collections have been part of the shared history of humans and other animals. These collections have always provided evidence of ambivalence in human attitudes. On one hand, we hold nature in awe and reverence; yet at the same time we try to dominate it and prove that we can control its wildness.

On a 4,000-year-old clay tablet from Mesopotamia, anthropologists found brief written references to an animal park that contained lions, although no more seems to be known about it. The wordy Egyptians, on the other hand, left copious written records for future generations. We know the Egyptians believed that humans had a close kinship with nature, and some of the ancients saw themselves as members of a whole family of plants and animals in an eternal cosmic order. Certain animals were regarded as incarnations of gods, and royal families and tribes claimed to be descended from them. Various exotic animals like lions, baboons, bulls, snakes, hippos and crocodiles were holy, and they were protected and kept in private menageries by the pharaohs.

In China 3,000 years ago, the founder of the Chou dynasty built a peaceful, sacred park with deer, antelope, goats, birds and fish in it. It was called the "Garden of Intelligence." About the same time, in ancient Assyria, the famous courtesan Semiramis kept leopards, and her son owned lions, as did King Nebuchadnezzar of Babylon. It is clear that in the ancient world, the ownership of wild animals conferred prestige and power.

The Greeks had a different perspective on animals. Some 2,400 years ago most Greek city-states maintained large zoos, and visits to them were considered an essential part of the education of young scholars. One of those scholars was Aristotle, who grew up to establish his own menagerie, which he maintained and studied carefully, ultimately writing the first zoological encyclopedia. Plutarch made the first written declaration against the mistreatment of animals, chastising the neighboring Romans that "we should not use living creatures like old shoes or pots and pans and throw them away when they are worn out or broken with service."

Ptolemy I built a wonderful zoo in Alexandria, where Egyptian and Greek cultures came together. Just like the great library at Alexandria, the zoo there was the greatest the world had ever known. Written accounts describe a procession honoring the god Dionysius, where all of the animals were displayed. Elephants and ostriches, peacocks and pheasants and parrots, goats, wild asses, hundreds of sheep, thousands of hounds, oxen and oryxes, lions, leopards, cheetahs, camels (both one-hump and two), a "white bear," a giraffe, a snake said to be 45 feet long and a rhinoceros all marched past the stadium in a parade that lasted all day long.

Unfortunately, the day arrived when the Romans came to power. By 200 B.C.E., wild animals were being captured and imported for "games" in the Coliseum. These spectacles included staged hunts, fights between animals and fights between animals and people–including criminals, prisoners of war, gladiators and, of course, Hollywood's favorites, Christian martyrs. Hundreds of thousands of animals (including human ones) were slaughtered during the years of the Roman Empire, to the point where many species were completely eradicated from their native areas. The hippopotamus disappeared from Nubia, the lion from Mesopotamia, the tiger from Persia, the elephant from North Africa.

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In cultures that entertain the idea that everything exists for humans' sake, where it is believed that God gave humans "dominion" over all the other animals, animals have tended to fare badly. These are the same societies that tend to place more value on *certain* human lives, not human life in general. The wealthy and those belonging to favored religious and political groups at any given time are treated well, while the poor, the disenfranchised and those who hold unpopular ideas are treated … like animals.

In societies where all human life has been valued, non-human animal life has a much greater chance of being valued as well. Put simply, when people have a sense of their own dignity and worth, they'll be willing to spend their time, energy and money on the welfare of animals; when people are desperately poor and without self-respect or hope, they'll eat the animals–or do a lot worse.

Let's look forward to the day when modern zoos follow the example of Akbar the Great, the Mogul emperor who ruled India from 1556 until his death in 1605. Akbar opened his own zoo to the public and posted a sign at the entrance which said:

Meet your brothers. Take them to your hearts and respect them.

Evolution in Black and White

By Keri Dearborn

When you pick up a new issue of "All Creatures," you see it as it is, a professional publication filled with information, insight, art and, we hope, a sense of humor. You don't see how it has evolved. Such is the error of "intelligent design." The concept assumes an exemplary initial incarnation and denies the innate need for living things to change.

"All Creatures" offers a perfect example of Darwinian evolution, complete with a paper trail. There are beginnings, parallel evolving forms, cataclysmic events and, of course, formats that did not survive natural selection.

In the Beginning

Ideas, like life forms, have a habit of erupting simultaneously in more than one place. In the autumn of 1979, the Thursday docents created a newsletter to keep themselves informed of exhibit changes, continuing education classes and, of course, dress code. Shortly thereafter, new Docent Chair Nancy DuBois spearheaded the creation of the "Docent Gnus-Letter," a two-page monthly publication begun in May 1980 that promised to "keep us all better informed."

Mary Deckert's logo for the 1983 "All Creatures at the L.A. Zoo"

The environment was hospitable and the "Docent Gnus-Letter" thrived. It contained information regarding events, animal updates and upcoming classes, including an American sign language class. As the "Gnus-Letter" flourished, the niche-specific Thursday newsletter could not compete and went extinct.

Evolution, however, seldom follows a straight path. The "Gnus-Letter" was short and informative, but the Wednesday docents craved something more artistic and interactive. CODs Sandy Johnson and Mickey Jones challenged their docents to create a Wednesday publication. The "Inaugural Issue" of "All Creatures at the L.A. Zoo" appeared for Thanksgiving 1983. It featured an anteater logo by Mary Deckert and ten pages of docent profiles, poetry, class updates, trivia, travelogues and an article from *L.A. Magazine* about gorilla keeper Bob Wolf.

"All Creatures" Is Born

For a while the "Gnus-Letter" and its artistic cousin coexisted, but the habitat had limited resources. In February 1985 a hybrid was born: "All Creatures: the Los Angeles Zoo Docent Newsletter." Printed bimonthly, its ten pages contained columns such as "Did You Know?" and "Who Am I?" that addressed animal information with a dash of humor. There were reports from each docent day, event updates and two docent profiles. The first issue profiled Dr. Kilbee Brittain. (Did you know she spent a few years teaching in Manila?)

Challenged to find its niche, the young publication flirted with a "Trivia Quiz," crossword puzzles, behind-the-scenes articles with keepers and "Training Committee News" focusing on the questions most missed on the review test.

In 1987 an influx of new genes shoved the newsletter from quadrupedal wandering to walking upright. Editor Betty Bunn and assistant Kilbee Brittain introduced photographs, book reviews and an animal profile, "Celebrity of the Month"–the forerunner of today's "Creature Feature."

Over time and with additional gene mixing, small mutations occurred. Ten pages grew to 22 and then to 39; bimonthly became quarterly; poetry became Zoo Camp songs; there were even "Letters to Ann Lemurs."

The Cataclysmic Event of 1991

Cumbersome and lacking direction, the newsletter faced an evolutionary moment in 1991 when it collided with asteroidal editors Elizabeth Nelson and Kilbee Brittain. After the dust cleared, the publication emerged as a recognizable ancestor of our current newsletter. The trim eight pages focused on education, research and collection updates. Mary Deckert's gorilla logo debuted, "Word Doctor" appeared, and the precedent was set to print on recycled paper.

Through the 1990s a variety of docent authors and artists contributed to the refinement of the newsletter's successful form. Mary Deckert became the official Art Editor, while "Creature Feature" and "Touring Tidbits" became regular columns in the 12-page journal.

Modern Adaptations

As conservation and botany became topical Zoo issues, Editor Pat Meyer initiated "Animal Advocates," "Botanical Bounty" and "Curious Naturalist" columns. The desire for personal information, which had caused evolutionary splits in the past, was filled by "Docents On Line"–a two-page insert edited by Jim Hurt covering docent news, Zoo events and committee activities with a jaunty air.

Over the past five years, some of my adaptations for "All Creatures" have thrived, while others have perished. "Glad You Asked" provides a forum to answer common questions; "From the Artist's Hand" and "A Closer Look" have showcased our talented artists; while "Conservation Watch" strives to make a difference with each issue. The latest change involves the insert. "Docents Afield," edited by Kim Pendergest, highlights not only what fellow volunteers are doing in the Zoo, but how we are taking our actions and message beyond the Zoo.

"All Creatures" has evolved from mimeograph to computer layout, from an event calendar to addressing themes ranging from winter adaptations to endangered species. Where will Editor Kathy Landis take us? With a mix of new genes and ever-changing environmental factors, anything can happen. "All Creatures" continues to evolve. Isn't change exciting?