Cal Performances
music dance theater
UNIVERSITY OF CALIFORNIA, BERKELEY

2011–2012
SEASON

SchoolTime Study Guide

Baltimore Symphony Orchestra

Friday, March 30, 2012 at 11 a.m.
Zellerbach Hall, University of California, Berkeley

Welcome to SchoolTime

On **Friday, March 30 at 11 am**, your class will attend the **Baltimore Symphony Orchestra**'s performance of ***LIFE: A Journey Through Time*** at Cal Performances' Zellerbach Hall.

A multimedia extravaganza, *LIFE: A Journey Through Time* features breathtaking photographs from National Geographic photographer Frans Lanting that have been musically choreographed to an elegant score by renowned composer Philip Glass. Under the baton of Maestro Marin Alsop, the vibrant diversity of our exceptional planet comes to life in the context of an outstanding musical experience. Expect this concert to illuminate the fascinating evolution of Earth and her inhabitants with photos so life-like, you will almost feel the dewdrops and the sandstorms.

Using This Study Guide

You can use this study guide to engage your students and enrich their Cal Performances field trip. Before attending the performance, we encourage you to:

- **Copy** the Student Resource Sheet on pages 2 & 3 for your students to use before the show.
- **Discuss** the information on pages 4-6 About the Performance & Artists.
- **Read** to your students from Featured Composers on page 7, About Orchestras on pages 9-10, A Brief History of the Earth on page 11 and Behind the Lens on page 14.
- **Engage** your students in two or more activities on pages 18-19.
- **Reflect** with you students by asking them guiding questions, found on pages 2, 4, 7, 9 & 11.
- **Immerse** students further into the subject matter and art form by using the Glossary on pages 16-17 and the Additional Resources section on page 20.

At the performance:

Your class can actively participate during the performance by:

- **Observing** how the photographs and musical score work together to tell a story
- **Listening** carefully to the rhythms, melodies and harmonies of the music
- **Thinking** about the history and diversity of life on our planet
- **Marveling** at the skill of the musicians and the photographer
- **Reflecting** on the sounds, sights, and performance skills you experience at the theater.

We look forward to seeing you at *SchoolTime*!

Table of Contents

Chinstrap penguins on iceberg, Pygoscelis antarctica, Antarctica. Copyright Frans Lanting/www.lanting.com

1 Theater Etiquette

Be prepared and arrive early. Ideally you should arrive at the theater 30 to 45 minutes before the show. Allow for travel time and parking, and plan to be in your seats at least 15 minutes before the performance begins.

Be aware and remain quiet. The theater is a "live" space—you can hear the performers easily, but they can also hear you, and you can hear other audience members, too! Even the smallest sounds, like rustling papers and whispering, can be heard throughout the theater, so it's best to stay quiet so that everyone can enjoy the performance without distractions. The international sign for "Quiet Please" is to silently raise your index finger to your lips.

Show appreciation by applauding. Applause is the best way to show your enthusiasm and appreciation. Performers return their appreciation for your attention by bowing to the audience at the end of the show. It is always appropriate to applaud at the end of a performance, and it is customary to continue clapping until the curtain comes down or the house lights come up.

Participate by responding to the action onstage. Sometimes during a performance, you may respond by laughing, crying or sighing. By all means, feel free to do so! Appreciation can be shown in many different ways, depending upon the art form. For instance, an audience attending a string quartet performance will sit very quietly, while the audience at a gospel concert may be inspired to participate by clapping and shouting.

Concentrate to help the performers. These artists use concentration to focus their energy while on stage. If the audience is focused while watching the performance, they feel supported and are able to do their best work. They can feel that you are with them!

Please note: *Backpacks and lunches are not permitted in the theater. Bags will be provided for lobby storage in the event that you bring these with you. There is absolutely no food or drink permitted in the seating areas. Recording devices of any kind, including cameras, cannot be used during performances. Please remember to turn off your cell phone before the performance begins.*





2 Student Resource Sheet

Baltimore Symphony Orchestra

Questions to Think About During the Performance

- What story does *LIFE: A Journey Through Time* tell and how is it told?
- Who is Frans Lanting and what does he do?
- Name at least one achievement of each composer.
- What are the four sections of an orchestra?

Photograph by Dave Harp

What You'll See

On Friday, March 30, your class will attend Baltimore Symphony Orchestra's *LIFE: A Journey Through Time*. Set to the music of Philip Glass and using hundreds of projected photographs taken by National Geographic photographer Frans Lanting, the performance tells the story of life on earth from its earliest beginnings to the amazing variety of life forms that have come to exist on our planet. The orchestra will also play music by Beethoven and Benjamin Britten.

About the Artists

Baltimore Symphony Orchestra & Conductor Marin Alsop

The Baltimore Symphony Orchestra was founded in 1916. In addition to year-round performances in its home state of Maryland, the orchestra performs regularly at Carnegie Hall and has toured the Soviet Union, Japan and Europe. It is led by Marin Alsop, an award-winning music director and conductor who is the first woman to lead a major American orchestra.

Frans Lanting, Photographer

One of the great nature photographers of our time, Frans Lanting's work appears in books, magazines and exhibitions around the world. He has served as National Geographic's Photographer-in-Residence and, for more than two decades, has documented wildlife from the Amazon to Antarctica to promote understanding about the earth and its natural history.

Composers

Philip Glass (b. 1937)

Through his operas, symphonies, compositions and work with artists like Woody Allen, David Bowie, Paul Simon and many others, American composer Philip Glass has had a lasting impact on music. His operas are performed all over the world and he has written music for theater and Academy Award-winning movies.

Ludwig van Beethoven (1770-1827)

One of the world's most famous composers, Beethoven was born in Germany and became a musical pioneer who widened the scope of forms like the sonata, symphony, concerto and string quartet. Although he began to lose his hearing around the age of 26 and was completely deaf in the last eight years of his life, Beethoven continued to compose and perform until a few months before his death.

Benjamin Britten (1913-1976)

British composer Benjamin Britten was one of the 20th century's leading composers. His operas, which include *The Turn of the Screw* and *Death in Venice*, are admired for their skillful use of English words and orchestral interludes, as well as for their moving drama and rich characters. His best-known orchestral piece is *The Young Person's Guide to the Orchestra*.

About Orchestras

An orchestra is a group of musicians that plays music together under the guidance of a conductor, who organizes the work and directs the musicians as they play. A large orchestra (50 or more) is known as a symphony orchestra. A smaller orchestra is called a chamber orchestra.

A Brief History of Life on Earth

Years Ago	Events
14.5 – 4 billion	Solar System forms; molten Earth forms and begins to cool
3.5 billion	First microbial life forms evolve; oldest fossils from this time
1.5 billion	First multi-cellular organisms
600-500 million	Aquatic life; first vertebrates (having a backbone or spinal column) appear
500 million	All life forms still aquatic; first mass extinction event
430 million	First jawed fishes; first plants and animals on land
400 million	First amphibians; animals on land diversify; second mass extinction event
280 million	Insects diversify; reptiles diversify; third mass extinction event
250 million	First dinosaurs; abundant plant life; fourth mass extinction event
210 million	First mammals; first birds; dinosaurs dominant
140 – 65 million	Early mammals; first modern birds; first modern fishes; fifth mass extinction event; dinosaurs go extinct
58 million	Modern mammals
5 million	Human-like primates
200 thousand	Modern humans appear; sixth mass extinction event begins

Orchestra Sections

Orchestras are divided into four sections, or families, which are based on the kind of instruments played. The string section covers all the stringed instruments like the violins; the woodwind section covers instruments which are blown through and use reeds, like the clarinet; the brass section contains metal wind instruments like trumpets; and the percussion section includes all of the drums and rhythm instruments.

3 About the Performance & Artists

Baltimore Symphony Orchestra

Guiding Questions

- What will you experience at *LIFE: A Journey Through Time*?
- Name three of Marin Alsop's main accomplishments.
- What does Frans Lanting document and why?

Marin Alsop conducting the multimedia performance of Frans Lanting's LIFE; A Journey Through Time. Copyright Frans Lanting/www.lanting.com

About the Performance

At the *SchoolTime* performance on Friday, March 30, the Baltimore Symphony Orchestra led by music director, Marin Alsop, will perform *LIFE: A Journey Through Time.* This is a multi-media experience featuring hundreds of projected nature photographs by National Geographic photographer Frans Lanting, choreographed to a musical score by contemporary American composer Philip Glass, plus music by Benjamin Britten, and Ludwig van Beethoven.

> "In 1999 when photographing the timeless ritual of horseshoe crabs spawning in the shallow waters of Delaware Bay, I realized that these ancient creatures offer a window into the past. I decided to explore the planet for examples of how time tempers the shape of life on Earth and how the Earth is in turn changed by the life it harbors. LIFE is a vision of the past, a celebration of the present, and a call to action to make sure there's a future for all of us."
>
> **—Frans Lanting**

SchoolTime Program

Frans Lanting's
LIFE: A Journey Through Time

Music by Philip Glass
Performed by the Baltimore Symphony Orchestra
Conducted by Marin Alsop
Concepts and images by Frans Lanting
Arranged for orchestra by Michael Riesman
Visual choreography and technical direction by Alexander V. Nichols
LIFE project editing by Christine Eckstrom
Introduction narrated by Peter Coyote
Produced by Beth Morrison Projects in association with Frans Lanting Productions and Dunvagen Music Publishers

Plus, the Baltimore Symphony Orchestra will perform additional music by

- Benjamin Britten: "Storm" from *Peter Grimes: Four Sea Interludes, IV*
- Ludwig van Beethoven: Symphony No. 6 "Pastoral," Fourth Movement

About the Artists

Baltimore Symphony Orchestra

The Baltimore Symphony Orchestra was founded in 1916. It has been led by notable conductors, including Peter Herman Adler, Sergiu Comissiona, David Zinman and Yuri Temirkanov; Marin Alsop is its twelfth music director. In addition to year-round performances in Maryland, the orchestra performs regularly at Carnegie Hall and has toured the Soviet Union, Japan and Europe.

BSO has recorded Leonard Bernstein's *Mass* (nominated for the 2009 Grammy for Best Classical Album), Dvorák's symphony cycle (currently underway); and John Corigliano's Concerto for Violin and Orchestra, "The Red Violin" with Joshua Bell (co-commissioned by the orchestra in 2003).

In addition to classical and contemporary music, the Baltimore Symphony Orchestra has an active Pops series; is a pioneer in online distribution of its recordings; leads extensive community outreach and education programs; and maintains a devoted nationwide following through national and local broadcasts.

Photograph by David Hoffman

Photograph by Dave Harp

Marin Alsop, *Music Director & Conductor*

Marin Alsop was appointed music director of the Baltimore Symphony Orchestra in 2005 and became its conductor in 2007, making her the first woman to lead a full-time major American orchestra. She is known for energetic, expressive conducting, innovative programming of contemporary music and the support of women composers. Born to professional classical musicians, Alsop began her musical training at age two. Upon hearing one of Leonard Bernstein's Young People's Concerts at age nine she knew she would be a conductor.

Alsop is also Chief Conductor of the São Paulo (Brazil) Symphony Orchestra, Conductor Emeritus of the Bournemouth (UK) Symphony, Conductor Laureate of the Colorado Symphony and Music Director of California's Cabrillo Festival of Contemporary Music, which regularly awards for Adventurous Programming of Contemporary Music. She has also guest-conducted top orchestras worldwide.

Alsop is the first conductor to be honored with a MacArthur "Genius" Fellowship. Her numerous awards include *Gramophone's* "Artist of the Year"; The Royal Philharmonic Society's Conductor's Award; the Classical BRIT Award for Best Female Artist; a European Women of Achievement Award; a fellowship in the American Academy of Arts and Sciences; and an invitation to the World Economic Forum in Davos, Switzerland. Her recording with the London Philharmonic Orchestra and Colin Currie of Jennifer Higdon's *Percussion Concerto* won a 2010 Grammy Award for Best Contemporary Classical Composition.

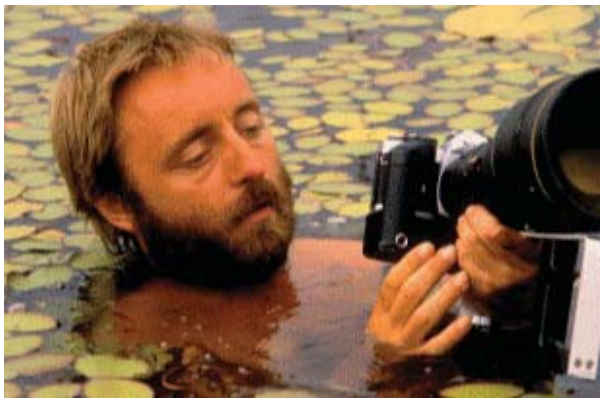
Frans Lanting, *Photographer*

Frans Lanting has been hailed as one of the great nature photographers of our time. His work appears in books, magazines, and exhibitions around the world. For more than two decades he has documented wildlife from the Amazon to Antarctica to promote understanding about the Earth and its natural history through images that convey a passion for nature and a sense of wonder about our living planet.

Lanting's work has been commissioned frequently by National Geographic, where he served as a Photographer-in-Residence. In 2006, Lanting launched The LIFE Project, as a book, an exhibition, an interactive website, and a multimedia orchestral performance with music by Philip Glass. The multimedia production of LIFE premiered in Santa Cruz, California, in 2006 and is currently touring North America and Europe.

Lanting's books have received awards and acclaim, "No one turns animals into art more completely than Frans Lanting," writes *The New Yorker*. His books include *LIFE: A Journey Through Time* (2006), *Jungles* (2000), *Penguin* (1999), *Living Planet* (1999), *Eye to Eye* (1997), *Bonobo* (1997), *Okavango: Africa's Last Eden* (1993), *Forgotten Edens* (1993), and *Madagascar, A World Out of Time* (1990).

Lanting has received top honors from World Press Photo, the title of BBC Wildlife Photographer of the Year, and the Sierra Club's Ansel Adams Award. He has been honored as a Fellow of the Royal Geographic Society in London and is a recipient of Sweden's Lennart Nilsson Award. In 2001 H.R.H. Prince Bernhard inducted him as a Knight in the Royal Order of the Golden Ark, the Netherlands' highest conservation honor.



4 Featured Composers

Philip Glass, Ludwig van Beethoven, Benjamin Britten

Guiding Questions

- Which musical genres has Philip Glass explored in his compositions?
- Why is Beethoven considered an innovative composer?
- What are some unique qualities of Britten's operas?

Philip Glass (b. 1937)

Through his operas, symphonies, compositions for his own ensemble, and his wide-ranging collaborations with artists ranging from Twyla Tharp to Allen Ginsberg, Woody Allen to David Bowie, Philip Glass has had an extraordinary and unprecedented impact upon the musical and intellectual life of his times.

The operas—*Einstein on the Beach*, *Satyagraha*, *Akhnaten*, and *The Voyage*, among many others—play throughout the world's leading houses. (*Einstein on the Beach* will be performed at Cal Performances in the 2012-13 season).

Glass has written music for experimental theater and for Academy Award-winning motion pictures such as *The Hours* and Martin Scorsese's *Kundun*, while *Koyaanisqatsi*, his initial filmic landscape with Godfrey Reggio and the Philip Glass Ensemble, may have been the most radical and influential mating of sound and vision since *Fantasia*.

Glass was born in 1937 and grew up in Baltimore. He studied at the University of Chicago, the Juilliard School, and in Aspen with Darius Milhaud. He moved to Europe and studied with the legendary Nadia Boulanger, who also taught Aaron Copland, Virgil Thomson and Quincy Jones, and he also worked closely with sitar virtuoso Ravi Shankar. He returned to New York in 1967 and formed the Philip Glass Ensemble—seven musicians playing keyboards and a variety of woodwinds, amplified and fed through a mixer. In the past 25 years, Glass has composed more than twenty operas, large and small; eight symphonies; two piano concertos; concertos for violin, piano, timpani, saxophone quartet, and orchestra; soundtracks to films ranging from new scores for the stylized classics of Jean Cocteau to Errol Morris's documentary about former defense secretary Robert McNamara; string quartets; and works for solo piano and organ. He has collaborated with Paul Simon, Linda Ronstadt, and Yo-Yo Ma, among many others. Glass presents lectures, workshops, and solo keyboard performances around the world, and performs regularly with the Philip Glass Ensemble.

Photograph by Robert Mapplethorpe

Ludwig van Beethoven (1770-1827)

Born in Cologne, Germany to a musical family, Beethoven was a precociously gifted pianist and violist. After nine years as a court musician in Bonn, he moved to Vienna to study with Joseph Haydn and remained there for the rest of his life. He was soon well known as both a virtuoso and a composer, and he became the first important composer to earn a successful living while forsaking employment in the church or court.

Beethoven uniquely straddled the Classical and Romantic eras. Rooted in the traditions of Haydn and Mozart, his art also encompassed the new spirit of humanism expressed in the works of German Romantic writers as well as in the ideals of the French Revolution, with its passionate concern for the freedom and dignity of the individual.

His astonishing Third Symphony (*Eroica*) of 1804 was the thunderclap that announced the Romantic century, and it embodies the titanic but rigorously controlled energy that was the hallmark of his style. In musical form he was a considerable innovator, widening the scope of sonata, symphony, concerto, and string quartet. His greatest achievement was to raise instrumental music, hitherto considered inferior to vocal, to the highest plane of art. His works include the celebrated 9 symphonies; 16 string quartets; 32 piano sonatas; the opera *Fidelio* (1805); 2 masses, including the *Missa Solemnis* (1823); 5 piano concertos; a violin concerto (1806); 6 piano trios; 10 violin sonatas; 5 cello sonatas; and several concert overtures.

Beethoven began to lose his hearing in 1795; by 1819 he was totally deaf. Despite his deafness, he continued to compose and he was unrivaled as the world's most famous composer for the last 15 years of his life.

Painting by Joseph Karl Stieler

Benjamin Britten (1913-1976)

British composer Benjamin Britten studied at the Royal College of Music, where he met the tenor Peter Pears, who became his lifelong companion. His Variations on a *Theme of Frank Bridge* (1937), for string orchestra, won him international acclaim. In 1945 his opera *Peter Grimes* established him as a leading opera composer. In 1948 he cofounded the Aldeburgh Festival, which became one of the most important English music festivals and the center of Britten's musical activities. His operas include *The Rape of Lucretia* (1946), *The Turn of the Screw* (1954), and *Death in Venice* (1973); they are admired for their skillful setting of English words and their orchestral interludes, as well as for their dramatic aptness and depth of psychological characterization. His large choral work *War Requiem* (1961) was greatly acclaimed. His best-known orchestral piece is *The Young Person's Guide to the Orchestra* (1946). In 1976 he became the first British composer in history to be ennobled.

Image from Oxford University Press

5 About Orchestras

Guiding Questions

- What is a symphony orchestra?
- What does the conductor do?
- Name the for sections of the orchestra and the instruments played in each.

An orchestra is a group of musicians that takes direction from a conductor to play music together. If an orchestra has more than 50 musicians, it is known as a symphony orchestra. If an orchestra has less than 50 musicians it is called a chamber orchestra.

The Conductor

An orchestra conductor generally assumes charge of the orchestra. Often the conductor has a dual role in the orchestra and serves as the music director as well, which means they choose music and musicians and interpret the way music selections should be performed by the orchestra. The conductor oversees both rehearsals and actual performances to ensure that the music is performed accurately and that the orchestra is properly executing the tempo, dynamics and style of a piece.

Orchestra Sections

Orchestras are divided into four sections, or families, which are based on the kind of instruments used in them. The string section covers all of the stringed instruments like the violins; the woodwind section covers instruments which are blown through and use reeds, like the clarinet; the brass section contains metal wind instruments like trumpets; and the percussion section includes all of the drums and rhythm instruments.

Instruments in an Orchestra

String Section

The string section is the largest in the orchestra. It is mainly made up of violins, arranged into first, second and third violins who all play different arrangements. The viola is a larger instrument, slightly deeper in pitch. Cellos are much larger and sit on the ground between the player's legs, playing a much lower melody. The largest instrument in the section is the double-bass, which provides the bass part to the strings.

Woodwind Section

Flutes are the oldest instruments in the woodwind section and often provide the melody. The orchestra also features piccolos, which are smaller, higher pitched flutes.

Clarinets come in a variety of sizes and tunings, and are capable of a wide range of tones. Oboes are like clarinets but use two reeds rather than one, and can play at higher pitches. Bassoons are the largest and lowest-pitched instruments in the woodwind section, although the larger and deeper contrabassoon is also sometimes used.

Brass Section

This section is so-named because all of the instruments are made from brass. They are the loudest instruments in the orchestra and support the rhythm or melody. Trumpets are the smallest and highest-pitched, while French horns are circular and slightly lower-pitched. Trombones are long instruments with sliders for adjusting the notes, playing at a similar pitch to the cellos.

Tubas are the largest and heaviest brass instruments, providing the bass tone.

Percussion Section

The percussion section uses a great range of instruments. Most of the musicians in the section move from instrument to instrument and can play several during any one piece. These instruments include cymbals, gongs, xylophones, tubular bells and a variety of drums. Timpani drums are the most common percussion instruments in the orchestra and the only ones which require a specialist player.

Other Instruments

There are a number of other instruments which can join the orchestra, each being attached to a different section. Saxophones are occasionally included as part of the woodwind section. Pianos and church organs can also be featured, generally being seen as part of the percussion section. If a harp is used, it joins the string section.

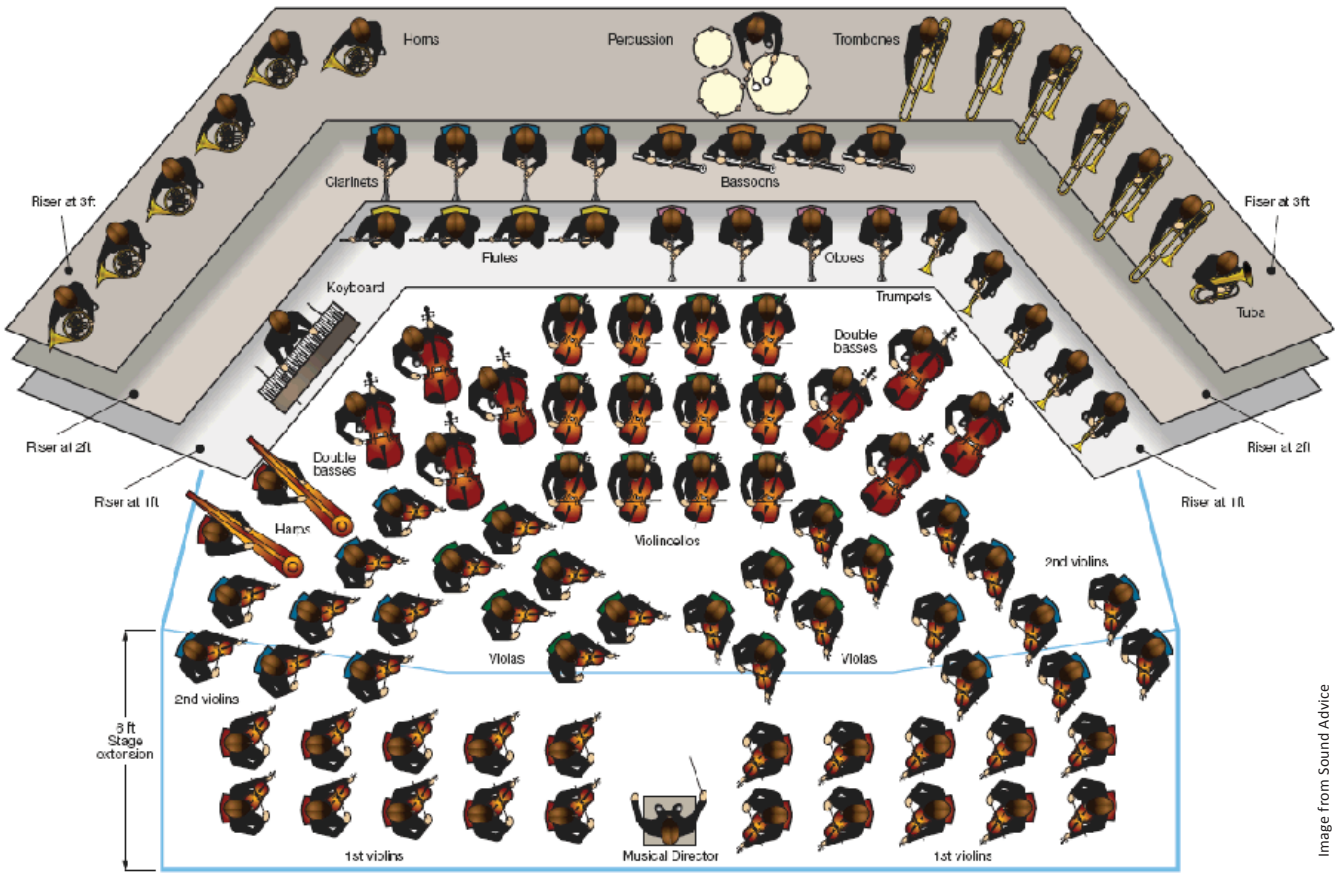


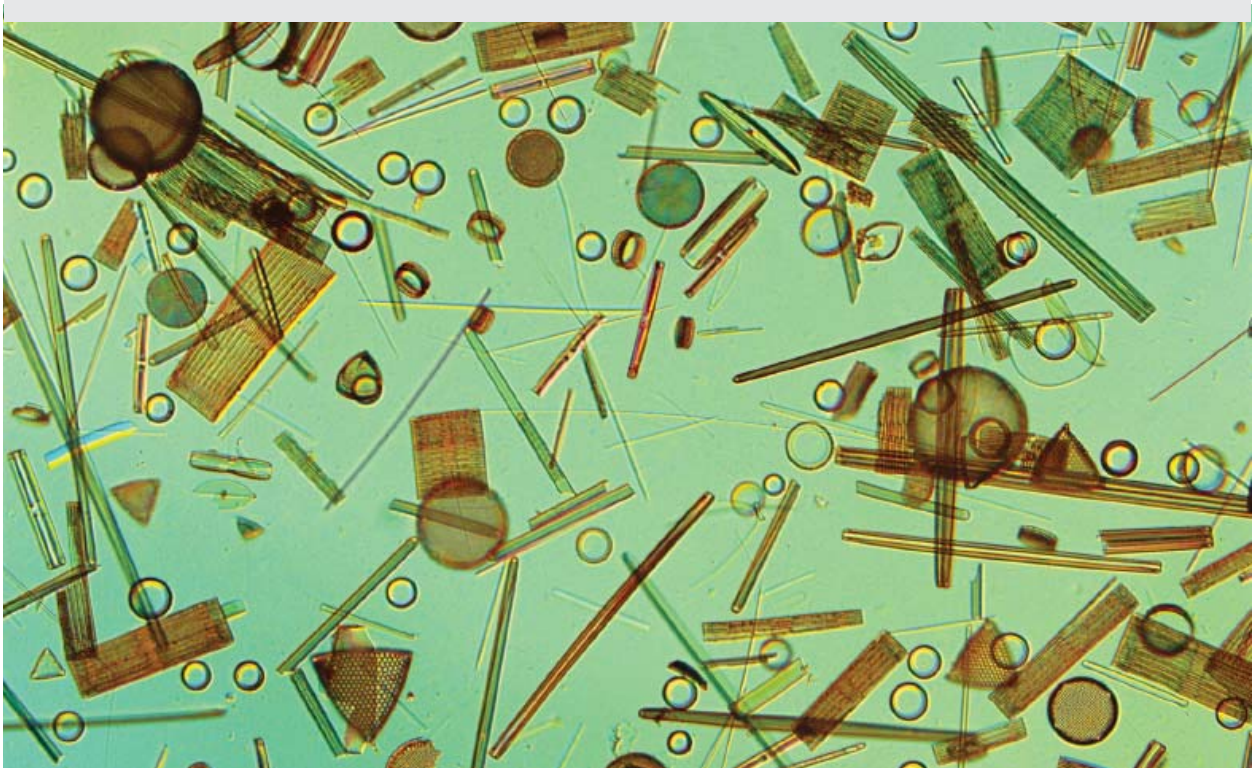
Image from Sound Advice

6 A Brief History of the Earth

by Klaus Rosmanitz

Guiding Questions

- What were the first life forms?
- What happened in the Mesozoic Era?
- How did earth's geography evolve?



Diatoms. Copyright Frans Lanting/www.lanting.com

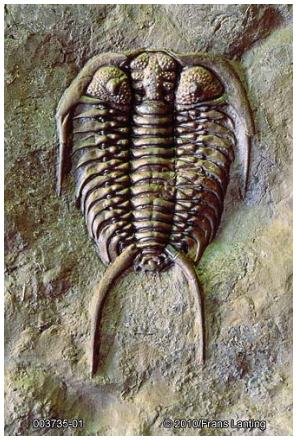
Geologists are scientists who study the structure of rocks and the history of the earth. By looking at and examining layers of rocks and the fossils they contain, geologists are able to tell us what the earth looked like at a certain time in history and what kind of plants and animals lived at that time.

Scientists think that the earth was probably formed at the same time as the rest of our solar system, about 4.6 billion years ago. The solar system may have begun as a cloud of dust, from which the sun and the planets evolved. Small particles crashed into each other to create bigger objects, which then turned into smaller or larger planets. Our earth is made up of three basic layers. The center has a core made of iron and nickel. Around it is a thick layer of rock called the mantle and around that is a thin layer of rock called the crust.

When the earth formed over 4 billion years ago it was totally different from the planet we live on today. There were no plants or animals, only rock, desert, water and ice. The atmosphere probably consisted of carbon dioxide and steam with almost no oxygen to breathe.

The Precambrian Time

The oldest period of the earth's history lasted from its beginnings four and a half billion years ago to about 600 million years ago. At first simple forms of one-celled life developed in the oceans. Later on, bacteria and algae evolved. Towards the middle of the Precambrian, about 2 billion years ago, more complex organisms, sponge-like creatures and soft-bodied animals lived in the seas. During this time there was no life on land because there was not enough oxygen to breathe.



Trilobites appeared at the end of the Precambrian period, and are the first animals with skeletons. Copyright Frans Lanting/www.lanting.com

As the Precambrian came to an end, the oceans were full of life. Plants started absorbing the carbon dioxide from the atmosphere and turned it into oxygen. Early continents formed, but they looked quite different than they do today.

The Paleozoic Era

The Paleozoic Era lasted from about 600 million to about 240 million years ago. Geologists divide this era into six periods. From the earliest to the latest these are the Cambrian, Ordovician, Silurian, Devonian, Carboniferous and the Permian.

Although most animals and plants still lived in the oceans, life started to develop on land and by the end of this era there was life in both the sea and on land. The earliest living things on land were simple plants and mosses, the first creatures to appear on land were animals that looked like spiders, scorpions and insects.

The middle of the era was dominated by all sorts of fish and invertebrates. Early amphibians, animals that could live on land and in the water, appeared. During the Carboniferous period the first reptiles evolved and insects grew to an enormous size.

The end of the era was the time of big forests and swamps. The earth got hot and wet. Plants and big trees died and were buried in sediments.

Over millions of years they turned into gigantic coal deposits which we find in the eastern United States, Europe, Russia and China.

During the Paleozoic era the land masses were constantly moving and by the end of the era they joined together to become a single continent called Pangaea. As these land masses collided several mountain chains, like the Appalachian and Ural Mountains emerged.

At the end of the Paleozoic about 90% of all living creatures on earth died out. We don't really know what caused this to happen but many scientists think that our climate changed dramatically. Maybe a big volcanic eruption thrust gas into the earth's atmosphere or perhaps a large asteroid hit the earth and dust obscured the sunlight for a long period of time.

Eurypterids (sea scorpions) are an extinct group of arthropods related to arachnids which include the largest known arthropods that ever lived. Their fossils can be found all over the world. Copyright Frans Lanting/www.lanting.com

Artwork representing life in the Lias Sea in the Mesozoic era. The Lias Sea existed off what is now north-western Europe. An ichthyosaur is seen attacking a long-necked plesiosaur at centre right. Above them, in the air, are pterosaurs. A crocodile-like animal is standing on the land at upper left, while ammonites are swimming at upper right. This image was taken from "Ancient Dorsetshire", a watercolour by H. T. de la Beche from around 1831. SHEILA TERRY/SCIENCE PHOTO LIBRARY

The Mesozoic Era

The Mesozoic era lasted from about 240 million to about 65 million years ago and is often called the age of dinosaurs because they dominated the earth's landmasses. Reptiles were the most powerful and fearsome creatures of that time. The archaeopteryx was a flying reptile, probably the first bird on earth. Some dinosaurs like the Tyrannosaurus Rex were meat eating predators; others only ate plants and leaves. The 30 meter long brontosaurus was the largest land animal that ever lived. During the Mesozoic era the first mammals also appeared on earth but they were very small and could not match the size and greatness of dinosaurs.

In this era Pangaea started breaking up and land masses formed the continents we know today. They moved in all directions. By the end of the Mesozoic era South America had separated from Africa; Australia and Antarctica were joined together as one continent and North America had started to move away from Eurasia. Just like the Paleozoic era before it, the Mesozoic ended abruptly. About 65 million years ago 75% of all animals on earth, including the dinosaurs, died out. Geologists are pretty sure that a large asteroid hit Mexico sending dust into the atmosphere that blocked out sunlight for years. Without sunlight, plants died and plant-eating animals starved.

The Cenozoic era

The Cenozoic era started about 65 million years ago and continues on into the present. It is divided into the Tertiary period which ended about 1.8 million years ago and Quaternary period.

After the death of the dinosaurs and other reptiles, mammals started to dominate life on earth. In the early Cenozoic era horses, rhinoceroses, pigs, camels, deer and cattle started to evolve and as time went on mammals got bigger and bigger. Elephants and mammoths roamed the plains and forests.

About two to four million years ago apelike creatures lived in Africa. Apes that looked like humans appeared two million years ago, but the first real humans came to earth much later, maybe even less than 200 000 years ago.

During the Cenozoic era continents continued to move and crash into each other. Layers of rock folded and moved upward. During this era the biggest mountains of the world, the Alps, Himalayas, Rocky Mountains and Andes took shape. In the last 2 million years large parts of the earth were covered by huge ice sheets. In four Ice Ages, which were separated by warmer periods, glaciers moved across the northern hemisphere. The surface of the seas sank by about 100 meters and turned many shallow parts of the oceans, like the North Sea, into land. When the ice melted about 20,000 years ago, it caused other changes. For example, Great Britain, which had been part of the European mainland, became an island. The glaciers built up huge deposits of rock and reshaped mountains and valleys into today's forms.

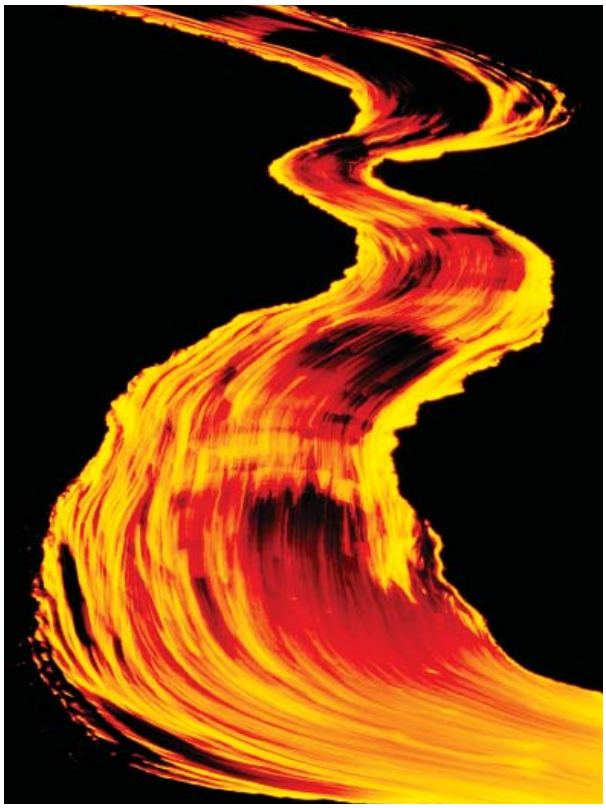
Woolly mammoth (Mammuthus primigenius), an animal that lived during the last Ice Age, now extinct.NATURAL HISTORY MUSEUM, LONDON/SCIENCE PHOTO LIBRARY

7 "Behind the Lens" from the book *LIFE: A Journey Through Time** by Frans Lanting

Stromatolites on the beach, Shark Bay, Australia. Copyright Frans Lanting/www.lanting.com

The simple idea of looking for the past in the present grew into a challenging photographic undertaking that extended over several years. My mission to capture images of nature that could evoke time and origins required lots of research and planning. I wanted to apply both new scientific ideas to my subjects and new photographic techniques to my images. On location, that often meant exposing cameras to all kinds of extremes.

Stromatolites challenged me to visualize a world from three billion years ago, back before the sky was blue. I worked by twilight and moonlight, which required long exposures sometimes extended even more with specialized neutral density filters. To photograph an erupting volcano in Hawaii, I had to use a different kind of filter--for myself. I wore a respirator against the caustic fumes that corrode camera parts and lungs alike. Film can buckle in the heat near an eruption, and when it rains, water mixes with volcanic gases in the air and comes down as diluted battery acid. I tried to keep my gear covered, but in the end, when the lava flowed, I chose for photos rather than keeping cameras safe.



Lava river, Hawaii Volcanoes National Park, Hawaii. Copyright Frans Lanting/www.lanting.com

Surf, bull kelp, and snares crested penguins, The Snares Islands, New Zealand. Copyright Frans Lanting/www.lanting.com

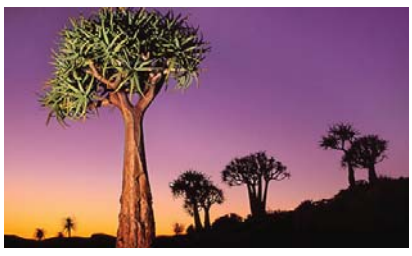
Fieldwork isn't always a struggle. In the warm waters of the Great Barrier Reef, I used a rig which on land was heavy and cumbersome: a digital Nikon camera in a Light and Motion housing with two strobes on articulated arms. Underwater it became a weightless window into a world of fluid motion, as I floated around coral reefs searching for early forms of marine life.

Aerial photography is a high-speed juggling act that involves coordinating photographic opportunities with the movements of a plane– and making decisions fast. Working from the cramped space of an open Supercub, I attached gyros to my cameras to stabilize them as the pilot flew low through the turbulent air of Alaska's wilderness valleys. With diatoms, by contrast, I had all the time in the world. I photographed these minuscule organisms on specimen slides the size of a fingernail using a polarizing light microscope to which I attached a camera body. I experimented with different filters and settings to achieve an impressionistic rather than a scientific rendition. Some of my exposures were so long that I could break for lunch while the camera recorded an image.

All the images for this book were made with 35mm Nikon cameras. My camera bodies included a Nikon F6 for film capture, and a D2X, a D1, and a D100 for digital capture. I used Nikkor zoom lenses that gave me a continuous range of focal lengths, from a 12-24mm, to a 28-70 mm, a 70-200mm, and a 200-400mm, with 1.4x and 2x teleconverters. I employed Nikon Speedlight strobes to add light to situations that needed it.

My camera kit now includes an Apple MacBook Pro laptop with editing software and external hard drives for storing images I download in the field. Digital capture has altered the way I work on location, enabling me to work out solutions to technical problems on the spot. But while it was exciting to see the translation of ideas into images in real time, it was even more rewarding to experience for myself the living wonder of horseshoe crabs, stromatolites, giant tortoises, and others--the subjects who had lured me on my journey through time.

***Lanting, Frans, and Christine K. Eckstrom. 2006. *LIFE: A Journey Through Time.* Cologne: Taschen.**



Scarlet macaws, Peru; Quiver trees, South Africa; Flower Hat jelly, California. Copyright Frans Lanting/www.lanting.com

8 Glossary

Music Glossary

bass – of the lowest pitch or range

choreograph – to plan out or oversee the movement, development, or details of a piece

classical music – music in the European tradition that includes such forms as art song, chamber music, opera, and symphony as distinguished from folk or popular music or jazz

composer – person who creates and writes a piece of music

concerto – an instrumental composition written for one or more solo performers accompanied by an orchestra

conductor – leader of the orchestra or chorus who makes sure that everyone is playing or singing the right thing, in the right way, at the right time. The conductor stands in front of the group and directs them throughout the performance.

dynamics – variation and gradation in the volume of musical sound

interlude –a musical composition inserted between the parts of a longer composition, a drama, or a religious service

mass – a musical setting of certain parts of a church mass service

melody – a pleasing succession or arrangement of sounds

music director – person who leads a musical group; in orchestras it describes the primary conductor and artistic leader of the orchestra

opera – a theatrical presentation in which a dramatic performance is set to music

orchestra –a large group of musicians, led by a conductor, who play together on various instruments, usually including strings (instruments with strings), woodwinds (instruments in which sound is produced by the vibration of reeds in the mouthpiece), brass instruments (made of brass), and percussion instruments (sound is produced by striking objects together.)

overture – an instrumental composition intended especially as an introduction to an extended work, such as an opera or oratorio

pitch – the highness or lowness of a musical tone

rhythm – the patterns of time and beats in music

score –notation of a musical composition

sonata – a piece of music written for a solo instrument, or a solo instrument with accompaniment, having three or four movements, each complete in itself

string orchestra – an orchestra consisting only of violins, violas, cellos, and double basses

string quartet –an ensemble of four musicians playing stringed instruments, usually two violins, a viola, and a cello

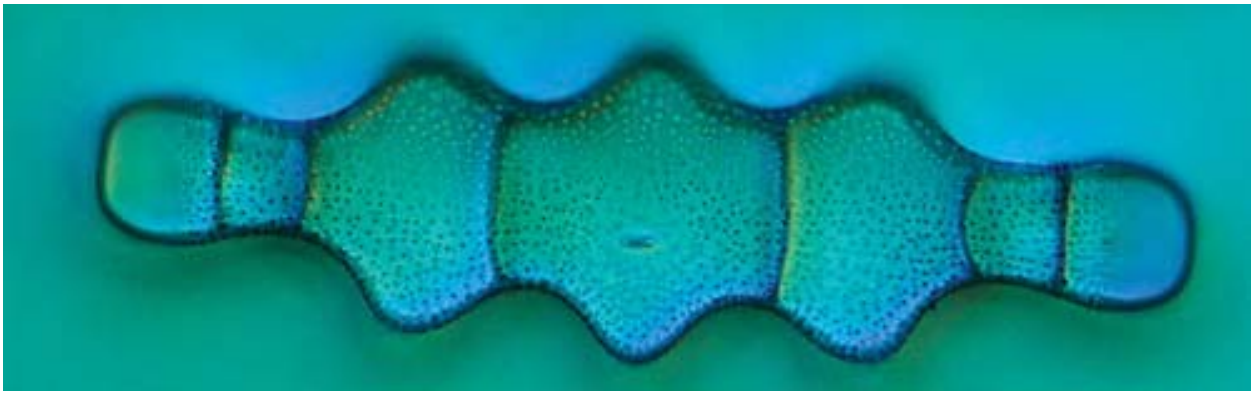
symphony – an elaborate instrumental composition in three or more movements (self-contained sections) for symphony orchestra

tempo – the speed at which a piece or passage of music is meant to be played

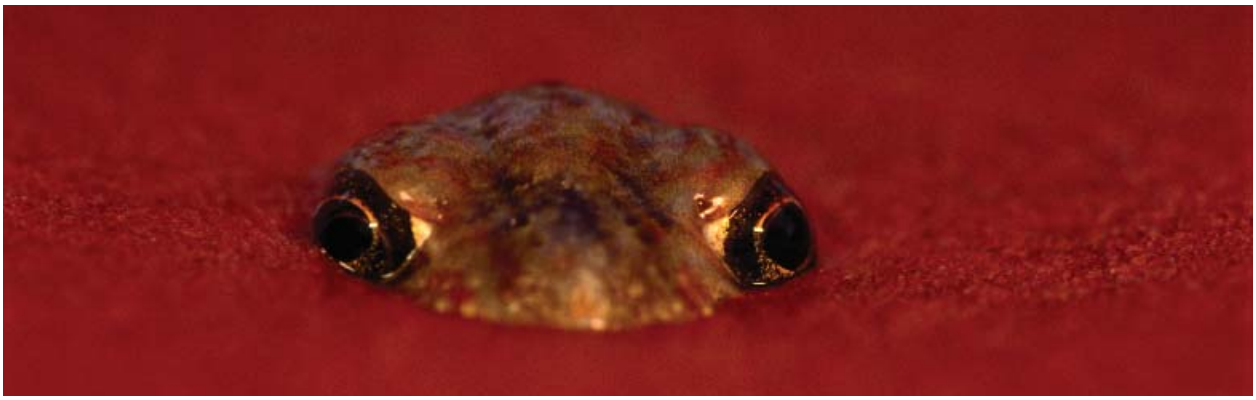
tone – sound of distinct pitch, quality, and duration

tone color – similar to timbre, the quality of sound that distinguishes one voice or musical instrument from another

trio –a piece of music for three instruments



Diatoms, Terpsinoe musica. Copyright Frans Lanting/www.lanting.com



Desert spadefoot frog emerging from sand, Notaden nichollsi, Central Australia. Copyright Frans Lanting/www.lanting.com

Photography/Visual Art Glossary

exposure – the act of exposing a photographic film or plate to light

gradation – (in painting, drawing, or sculpture) transition from one colour, tone, or surface to another through a series of very slight changes

gyro – rotating mechanism that offers resistance to turns in any direction

harmony – pleasing combination of elements in a whole

impressionistic – relating to the technique in art of conveying experience by capturing fleeting impressions of reality or of mood

neutral density filter – This filter ideally reduces light of all wavelengths or colors equally. The purpose is to allow the photographer greater flexibility to change the aperture (opening) or exposure time, allowing for more control, particularly in extreme circumstances.

photographer – person who takes photographs professionally

polarization – a process or state in which rays of light exhibit different properties in different directions, especially the state in which all the vibration takes place in one plane

proportion – agreeable or harmonious relation of parts within a whole; balance or symmetry.

strobe – a flash lamp that produces high-intensity short-duration light pulses by electric discharge in a gas

teleconverter –a secondary lens that is mounted between the camera and a photographic lens. Its job is to enlarge the central part of an image obtained by the objective lens.

zoom lens – a lens assembly whose focal length can be continuously adjusted to provide various degrees of magnification without any loss of focus, thus combining the features of wide-angle, normal, and telephoto lenses.

Natural History Glossary

atmosphere – the mixture of gases surrounding the Earth or other celestial body, held in place by gravity.

Cenozoic – the present era, beginning 65 million years ago and characterized by the ascendancy of mammals.

climate – the long-term weather conditions of an area, determined by latitude, position relative to oceans or continents, altitude, etc.

diatom – any of numerous microscopic, unicellular, marine or freshwater algae, having cell walls containing silica (crystalline compound)

fossil – Remains, impression, or trace of a living thing of a former geologic age, as a skeleton, footprint, etc.

geologist – person who studies the origin, history, structure, and composition of the earth

Ice Age – any of several cold periods during which glaciers covered much of the Earth.

invertebrate – any animal lacking a backbone

land mass – a large, continuous area of land, such as a continent or a very large island.

Mesozoic – an era occurring between 230 and 65 million years ago, characterized by the appearance of flowering plants and by the appearance and extinction of dinosaurs.

Paleozoic – an era occurring between 570 million and 230 million years ago, characterized by the advent of fish, insects, and reptiles.

Precambrian – the earliest era of earth history, ending 570 million years ago, during which the earth's crust formed and life first appeared in the seas.

organism – any living biological entity, such as an animal, plant, fungus, or bacterium

stromatolites – a laminated fossil structure containing calcium carbonate, built by marine algae and having a rounded or columnar form.

9 Learning Activities & Resources

Music / Visual Art (Grades 3-12)

Nature Soundscape

Materials

- Computer
- Projector

Engagement

Show students Frans Lanting's photographs on the website: www.lanting.com/stock
Decide on, or have students vote on a picture they want to examine in depth. Ask the students:

- When you look at the photograph what objects do you see? (e.g.: sand, turtle, dark cloudy sky)
- What movement would you see if you were to see this scene in person? (e.g.: fast, slow, start and stop)
- What sounds would you hear? (e.g.: rain drops, ocean waves crashing on the beach, hot water sizzling)
- What dynamic would those sounds be (eg.: loud/forte, medium loud/mezzo forte, soft/piano)
- What pitch would these sounds make? (e.g.: very high, high, low, very low)

Discuss what art elements the students see (line, color, texture, value, shape, space and form) and make connections to music elements (pitch, duration, form, dynamics, texture, and tone color.) Discuss what principles of design the students see (balance, rhythm, movement, repetition, harmony, gradation, proportion, emphasis, contrast, variety and unity) and make connections to music elements.

Activity

- Divide the class into groups of 4-5 students. Each group should choose one of Lanting's photographs to analyze. Have them go over the questions listed above.
- With the music elements (pitch, duration, dynamics, etc.) in mind, ask students create a 30-60 second soundscape for their photograph using vocal sounds and body percussion. (Invite them to be creative, they can include harmonies, rounds, repetition, etc.)
- Have each group share their soundscape and display the selected photograph during the soundscape performance.

Additional options

- Invite students to find and (carefully) use an "instrument" from the outside environment such as rocks, sticks and leaves.
- If available, offer students a variety of instruments to experiment with, and choose from, to create their soundscapes.

Science/Movement (Grades 2- 12)

Earth's Timeline Embodied

Materials

- Computer
- Projector

Engagement

Show students Frans Lanting's photographic depiction of Earth's timeline, by going to http://www.lifethroughtime.com/, clicking on Start the Journey, then clicking on View the Timeline.

Activity

- After viewing the entire timeline, choose a section of the timeline to focus on.
- Have students get into groups of 5 or 6.
- As you bring each photograph up, ask students to replicate the objects in the pictures using their bodies. Challenge them to be creative, to use their whole bodies and to create the object as a group, not just individually.
- Go through the section of timeline slides again and this time have students decide on transitional movements between pictures. They should consider if they want their movements to be fast or slow, large or small, jerky or fluid, etc.
- Show the slides again and ask students to repeat their movements and try to improve them (for e.g. bigger, whole body movements, clear transitional movements, etc.)
- Go through the slides once more and this time have students focus on a different group each time a photograph comes up.

Visual Art (Grades 1- 12)

Images Inspired by Music

Materials

- Crayons, Pastels or Markers
- Paper
- Watercolor paint (optional)

Engagement

Show students Frans Lanting's slideshow of Life: A Journey Through Time, by going to http://www.lifethroughtime.com/, clicking on Start the Journey, then clicking on View the Slideshow.

Activity

- After viewing some or all of the slideshow, have a discussion with students by asking:
  1) What did they see in the photographs?
  2) What did they wonder about as they observed the photographs? (Encourage them to free their imaginations.)
  3) What role did the music play in connection with the photographs?
- Tell students you are going to play some music for them and as they listen, they should notice what images come to mind. Ask them how the images move, what colors emerge, what might the images feel like, sound like, smell like?
- Play music by Philip Glass, Beethoven or Benjamin Britten for the students (invite them to close their eyes as they listen.)
- Pass out paper and crayons, pastels or markers. Have students draw what they envisioned (these can be abstract or concrete images.) Play the music again as they draw.
- Have students do a "gallery walk" around the class to look at all the different drawings.
- Reflect together on how the students' images emerged in their imaginations, how they translated their images to paper when drawing them. How did it feel to do that?

Extension:

- Students may enhance their drawings by painting on them with watercolors.

Additional Resources

Baltimore Symphony Orchestra: www.bsomusic.org/
Frans Lanting: www.lanting.com/
LIFE: A Journey Through Time: www.lifethroughtime.com/
Philip Glass: www.dunvagen.com/
Composers A-Z: www.classicsforkids.com/composers/composers_atoz.asp

Video Clips

Visit Marin Alsop's Baltimore: http://www.youtube.com/watch?v=_2K5eAdn1s0
Marin Alsop featured on NBC: http://www.youtube.com/watch?v=sFr6Ff9awMk&feature=related
Philip Glass performs Mad Rush: http://www.youtube.com/watch?v=JthxVHkRT9Y&feature=related

Books

Fortey, Richard. 1999. *Life: A Natural History of the First Four Billion Years of Life on Earth.* Vintage.
Glass, Philip. 1995. *Music by Philip Glass.* Da Capo Press, Updated Edition.
Lanting, Frans, and Christine K. Eckstrom. 2006. *LIFE: A Journey Through Time.* Cologne: Taschen.
Lanting, Frans, and Christine K. Eckstrom. 2009. *Eye to Eye: Intimate Encounters with the Animal World.* Cologne: Taschen.
Meier, Gustav. 2009. *The Score, the Orchestra, and the Conductor.* Oxford University Press.

Children's Books

Ganeri, Anita, Britten, Benjamin, Kingsley, Ben. 1996. *The Young Person's Guide to the Orchestra Harcourt Children's Books*; Book & CD-ROM edition.
Jenkins, Steve. 2002. *Life on Earth: The Story of Evolution.* Houghton Mifflin Books for Children.
Levine, Robert (Author), Hamilton, Meredith (Illustrator). 2000. *Story of the Orchestra : Listen While You Learn About the Instruments, the Music and the Composers Who Wrote the Music!* Black Dog & Leventhal Publishers. (Book & CD)
Safram, Sheri (Author), Robinson, Nicole (Illustrator). 2011. *Orchestra!: Music Pops.* Tango Books.
Strauss, Rochelle and Thompson, Margot. 2004. *Tree of Life: The Incredible Biodiversity of Life on Earth.* Kids Can Press.
Westberg Peters, Lisa and Stringer, Lauren. 2003. *Our Family Tree: An Evolution Story.* Harcourt Children's Books.

Music

Philip Glass: The Orange Mountain Music Philip Glass Sampler Vol.I (2009) Orange Mountain Music
Philip Glass: Solo Piano (1989) Sony
Baltimore Symphony Orchestra, Marin Alsop, conductor: Dvorak: Symphony No. 9; "From The New World" (2008) Naxos

DVDs

Creative Outdoor Photography with Galen Rowell and Frans Lanting, directed by John Cole. (2004) Cole and Company, Inc.
Glass: A Portrait of Philip in Twelve Parts with Philip Glass and Errol Morris, directed by Scott Hicks. (2009) Koch Lorber Films

Local Organizations Featuring Orchestra Music

Cal Performances: www.calperfs.org
East Bay Symphony: http://oebs.org/
San Francisco Symphony: www.sfsymphony.org/

Local Organizations Featuring Natural History

California Academy of Sciences: www.calacademy.org

10 California State Standards

Music Grades K-12

1.0 ARTISTIC PERCEPTION

Processing, Analyzing, and Responding to Sensory Information Through the Language and Skills Unique to Music
Students read, notate, listen to, analyze, and describe music and other aural information, using the terminology of music.

2.0 CREATIVE EXPRESSION

Creating, Performing, and Participating in Music
Students apply vocal and instrumental musical skills in performing a varied repertoire of music. They compose and arrange music and improvise melodies, variations, and accompaniments, using digital/electronic technology when appropriate.

3.0 HISTORICAL AND CULTURAL CONTEXT

Understanding the Historical Contributions and Cultural Dimensions of Music
Students analyze the role of music in past and present cultures throughout the world, noting cultural diversity as it relates to music, musicians, and composers.

Role of Music
3.1 Describe the social functions of a variety of musical forms from various cultures and time periods (e.g., folk songs, dances).

Diversity of Music
3.2 Identify different or similar uses of musical elements in music from diverse cultures.

3.4 Describe the influence of various cultures and historical events on musical forms and styles.

4.0 AESTHETIC VALUING

Responding to, Analyzing and Making Judgments about Works of Music

Students critically asses and derive meaning from works of music and the performance of musicians according to the elements of music, aesthetic qualities, and human responses.

Grade 6: Focus on Earth Sciences

PLATE TECTONICS AND EARTH'S STRUCTURE

1. Plate tectonics accounts for important features of Earth's surface and major geologic events. As a basis for understanding this concept:

a. Students know evidence of plate tectonics is derived from the fit of the continents; the location of earthquakes, volcanoes, and midocean ridges; and the distribution of fossils, rock types, and ancient climatic zones.

b. Students know Earth is composed of several layers: a cold, brittle lithosphere; a hot, convecting mantle; and a dense, metallic core.

Grade 7: Focus on Life Sciences

EVOLUTION

3. Biological evolution accounts for the diversity of species developed through gradual processes over many generations. As a basis for understanding this concept:

a. Students know both genetic variation and environmental factors are causes of evolution and diversity of organisms.

b. Students know the reasoning used by Charles Darwin in reaching his conclusion that natural selection is the mechanism of evolution.

c. Students know how independent lines of evidence from geology, fossils, and comparative anatomy provide the bases for the theory of evolution.

d. Students know how to construct a simple branching diagram to classify living groups of organisms by shared derived characteristics and how to expand the diagram to include fossil organisms.

e. Students know that extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient for its survival.

music dance theater

Cal Performances

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About Cal Performances and *SchoolTime*

The mission of Cal Performances is to inspire, nurture and sustain a lifelong appreciation for the performing arts. Cal Performances, the performing arts presenter of the University of California, Berkeley, fulfills this mission by presenting, producing and commissioning outstanding artists, both renowned and emerging, to serve the University and the broader public through performances and education and community programs. Cal Performances celebrates over 100 years on the UC Berkeley Campus.

Our *SchoolTime* program cultivates an early appreciation for and understanding of the performing arts amongst our youngest audiences, with hour-long, daytime performances by the same world-class artists who perform as part of the main season. *SchoolTime* has become an integral part of the academic year for teachers and students throughout the Bay Area.

This Cal Performances *SchoolTime* Study Guide was written, edited and designed by Laura Abrams, Rica Anderson, and Nicole Anthony with additional materials by Kathryn Hatter and Philip Sim.

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