

MYSTIC
AQUARIUM



Present

Aquatic Dances

Curriculum Guide

An artistic collaboration between:

Elm City Dance Collective
New Haven Symphony Orchestra
and
Mystic Aquarium



Generous support from the Connecticut Commission on Culture & Tourism, Mystic Aquarium, New Haven Symphony Orchestra, United Illuminating and Mohegan Sun have made this project possible.



Connecticut Commission
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MYSTIC
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NEW HAVEN SYMPHONY ORCHESTRA



Table of Contents

Aquatic Dances.....	3
Program.....	4
Elm City Dance Collective’s Story.....	5
Mystic Aquarium History	6
History of the New Haven Symphony Orchestra	7
Keep It in Order.....	8
Program Notes	9
Artful Ocean.....	12
What is a String Quartet?.....	13
Composers	14
Then and Now.....	16
Animal Movements.....	17
Worksheets	23

Aquatic Dances

Aquatic Dances brings together the strengths of Elm City Dance Collective (ECDC), Mystic Aquarium, and New Haven Symphony Orchestra (NHSO) to create a cutting edge contemporary dance piece depicting the relationship of life on land and in the sea.

Aquatic Dances is a multi-movement dance piece created by choreographers Kellie Ann Lynch and Lindsey Bauer with contributions from ECDC Dancers. The choreographers and dancers gathered their inspiration from observing the animals at Mystic Aquarium and experimented with a variety of movements to create aquatic scenes through movement. The movement, habitat and behaviors of animals at Mystic Aquarium have been artistically interpreted in each movement of the dance piece and set to representative classical music selections performed by string quartet.

Weekend Festival Premiere

The NHSO and ECDC will host a two-day family festival at **Mystic Aquarium, May 14 and 15, 2011** celebrating music, dance and aquatic life to conclude the project. Hands on and participatory events include: an **Instrument Petting Zoo**; a **Glass Harp** performance; and a **Dance like a Fish** workshop with the ECDC dancers. Each day culminates with a full performance of *Aquatic Dances*, a dance tribute to Connecticut's sea life through dance, music and history.



Educational Assembly

The educational assembly performance you will see of *Aquatic Dances* presents an abridged “sneak peak” version of the dance piece that will be premiered in May combined with an informational and descriptive narration by an educational representative from Mystic Aquarium. The information in this study guide should be used to prepare students to attend the *Aquatic Dances* Educational Assembly as each teacher sees fit. Students, teachers and parents are invited to see the entire piece performed at the weekend festival premiere in May at Mystic Aquarium.



Aquatic Dances Program

I Aqua Dances

II Lobster Trio

III Tornado Fish

Philip Glass: *String Quartet No. 3: Mishima/Closing, Blood Oath*

IV Tango

Jeremy Cohen: *Tanguori for String Quartet*

V Anemone

Philip Glass: *String Quartet No. 5: IV*

VI Shark

Antonio Vivaldi: *Four Seasons op.8, Summer: Presto (Storm)*

Philip Glass: *String Quartet No. 3: 1934-Grandmother and Kimitake*

VII Ginger Duet

J.S. Bach: *Partita No. 2 in D Minor, BWV 1004: Allemanda*

The Aquatic Dances in-school performance will present the Tango, Shark, Anemone and Tornado Fish movements combined with narration and audience interaction.



Elm City Dance Collective's Story

Elm City Dance Collective (ECDC) is a New Haven based organization that values an experiential and collaborative approach to dance creation, education and performance. ECDC works to challenge ideas about movement and reinvent the performance experience.

ECDC began in 2008 as a conversation between four dance artists in the New Haven area. Kellie Ann Lynch, Lindsey Bauer, Jennifer Brubacher and Emilia VandenBroek envisioned an organization that would offer choreographic and performance opportunities for dance artists as well as classes and workshops. In addition, the founders discussed a shared commitment to building community and connection through art.

ECDC has produced three dance works with one in process: Bauer's *cityscape*; Lynch's *SNAP*; *h o u s e*, a collaboration between a variety of contributing artists and chef Melissa Kane of CRAVE; and *the BLUE project/Aquatic Dances*, a collaboration between the New Haven Symphony Orchestra and Mystic Aquarium.

Cityscape was performed at the 2009 REBOUND festival in New Haven. The piece examined the structure of the visual within a city. The dancers, community members and company members, were void of caricature but their movements explored gesture as well as the presence of angles, building design and skyline.

Next, ECDC premiered *SNAP* in May 2009 at an evening benefit at the Center for the Arts at Christ Church. *SNAP*, performed by company members, dived into the rarefied, hyper-stylized world of high fashion, offering a twisted perspective on the glamorous couture world of runway shows. *SNAP* was brought back to life in January 2010 for continued creation and performance opportunities. In 2010, *SNAP* has been performed in New Haven at the Shubert Theatre, International Festival of Arts and Ideas, and ECA Arts Hall as well as Martha's Vineyard and New York City.

ECDC produced *h o u s e* in December 2009. *h o u s e* was an evening of food, dance and movement installations in three different homes in Fair Haven. Artists of ECDC, New Haven, and New York collaborated with the New Haven community to create an original, inventive performance event.

In addition to performance and choreography ECDC offers a weekly technique class, facilitates improvisation jams and runs a spring semester master class series on Saturday afternoons. All educational events are open to the public.

As an organization ECDC is committed to collaborating with artists and organizations in the New Haven area, providing performance opportunities to local dancers, contributing to the presence of dance as an accessible public art, and offering artistic development opportunities such as classes and improvisational jams. The organization welcomes partnerships, collaborations and new projects.

Mystic Aquarium was founded in 1973 to serve as a living laboratory and major public exhibit highlighting the most intriguing species of the aquatic world. The aquarium quickly established itself as a progressive research entity under the leadership of its first director, Dr. Stephen Spotte, whose publications became the cornerstone of modern aquarium keeping.

In 1997, Mystic Aquarium welcomed the addition of the Institute for Exploration, founded by explorer, oceanographer, and JASON Project founder Dr. Robert Ballard. In the spring of 1999, Mystic Aquarium and Dr. Robert Ballard's Institute for Exploration came together with the grand opening of a \$52 million expansion that became Mystic Aquarium & Institute for Exploration. The expansion featured, among other things, the Alaskan Coast, a one-acre outdoor exhibit of beluga whales and a unique exhibit center that presents both the artifacts found and the methods used by Dr. Ballard's Institute for Exploration in deep sea exploration.

In 2002, Immersion Learning was created to engage people of all ages in the exploration of unique ecosystems through the use of exciting new technologies, including interactive distance learning technology that delivers live content from the National Marine Sanctuaries. Immersion Learning has developed a strong partnership with the Boys & Girls Clubs of America to develop after-school science programming for at-risk youth. The partnership has enjoyed tremendous results and the demand for programming is growing rapidly.

Mystic Aquarium, the Institute for Exploration, and Immersion Learning are divisions of Sea Research Foundation, Inc., a 501(c)3 non-profit organization. The mission of Sea Research Foundation (SRF) is to inspire people to care for and protect our ocean planet through education, research, and exploration. SRF seeks to achieve its' mission by creating thought-provoking encounters with marine life, conducting research that advances aquatic animal husbandry and promoting the emerging science of deep-water marine archaeology, all while staying committed to excellence and innovation. Dedicated to serving as an interpreter of marine science discoveries and conservation issues, Sea Research Foundation presents elements of human history as it relates to the sea and shares resources and expertise with the scientific and education communities.

Sea Research Foundation's education programs have been a mainstay of marine science education for more than 30 years. Since its inception, SRF's education classes have served more than 1.5 million school children, college students and families, either at Mystic Aquarium, in the field or in Connecticut or Rhode Island schools. These education programs build a connection with the natural world and foster an understanding of how organisms, habitats, and ecosystems work. Moreover, the high-technology world of renowned explorer, Dr. Robert Ballard, brings exciting distance learning initiatives to the mix, making Mystic Aquarium uniquely positioned to offer a fully integrated approach to education through both hands-on, inquiry-based programs and expedition-based adventures.



In 1894 Morris Steinert, an immigrant from Germany, was persuaded by a group of New Haven amateur musicians to form a symphony orchestra. Steinert was a music merchant and an instrumentalist, who played piano, organ, flute, cello, and violin. Many of the men who approached Steinert were also German-Americans seeking to continue the musical traditions of their native country in their new land. Steinert consented and the group started rehearsals upstairs above his piano store.

The first performance of the fledgling orchestra took place in January 1895 at a now-defunct theater on Chapel Street. The program included works by Bach, Beethoven, Mendelssohn, and Schubert. The conductor was Horatio William Parker, newly arrived at Yale and already a composer of some reputation. It was through Parker's leadership over more than two decades that the Symphony was gradually transformed from a local band into an accomplished orchestra.

In its early years the NHSO was closely tied to Yale, drawing its conductors from the School of Music faculty and serving on occasion as a laboratory for Yale composers and performers. The University also offered financial and organizational support. Until the construction of Woolsey Hall, the orchestra performed in various local venues including the Hyperion Theater and College Street Hall (on the site of the present Palace Theater). In 1901 to commemorate the university's bicentennial Yale commissioned the construction of Woolsey Hall, which became the chief performance venue of the NHSO.

The years of World War II were good for the NHSO as restrictions on travel, especially gasoline rationing, meant that people made the best of opportunities close at hand. The second balcony of Woolsey was closed in 1942 because it lacked adequate exits for swift evacuation, should there be an emergency.

The Pops Concerts as such began 1945, with the first performance indoors at the New Haven Arena, on Grove Street, home of the New Haven Eagles ice hockey team. Later that summer four more concerts were played in the Yale Bowl, for which a band shell was eventually constructed. The outdoor concerts were a great financial success, drawing nearly 40,000 people the first summer.

Children's Concerts were first given in Yale's Sprague Hall in 1933 and later in Woolsey Hall, supported by Yale. The concerts were inexpensive—\$5 for four concerts—and attracted large audiences from New Haven and as far away as Bridgeport and Waterbury.

In 1969 the orchestra celebrated its 50th anniversary. A commemorative program was published with a folded gold sheet bearing a picture of the orchestra on the cover. Rudolf Serkin played Beethoven's Fifth Piano Concerto, and the orchestra also performed works by Bach and Brahms.

In 1999 Gerald Steichen became Associate Conductor of the orchestra. In 2007 William Boughton became the tenth Music Director and Principal Conductor of the New Haven Symphony Orchestra. Under his leadership and that of Executive Director Natalie Forbes, programs have expanded both geographically and musically. The orchestra has premiered work by Composers-in-Residence Augusta Read Thomas and Jin Hi Kim, who have come to New Haven supported by *Music Alive*, a program of the League of American Orchestras and Meet-the-Composer. In May 2010 the Orchestra released its first commercial CD in over thirty years—a disc featuring the music of William Walton on the Nimbus (London) label. In October 2010 the orchestra released *Portrait of an Orchestra*, a photographic celebration of the musicians who make up the NHSO.

Keep It in Order

Aquatic Dances Reading Comprehension and Sequencing Lesson Plan

Objectives

In this lesson, students will:

1. Learn the histories of the Elm City Dance Collective (ECDC), Mystic Aquarium and New Haven Symphony Orchestra (NHSO)
2. Summarize the informational text they have read
3. Be able to put events they have read into proper sequential order

Materials

Aquatic Dances Curriculum Guide
NHSO, ECDC and Mystic Aquarium biographies
Keep it in Order worksheet (Page 24)

Introduction

Tell students that *Aquatic Dances* is a program that was created by three very different organizations with different histories in Connecticut. Ask students what they already know about the NHSO, ECDC and Mystic Aquarium and what they would like to know about these organizations.

Procedure

1. Distribute copies of NHSO, ECDC and Mystic Aquarium biographies to students.
2. Depending on reading level, have students read each biography or teacher can read and students follow along.
3. Students complete “Keep it in Order” worksheet based on what they have read.
4. Facilitate discussion on events from the biographies students decided to summarize and how the summaries were similar or different from student to student.

Variations

1. If time is limited, divide students into three groups and have each group work on the history of one of the organizations, then have the groups report back to the full class.
2. Divide class into three groups, have each group work on the history of one organization at a time and then switch biography sheets with the next group until all three have been completed on the worksheet.

Wrap-Up

Discuss the following questions with your students:

1. How are the organizations the same or different from each other?
2. Knowing their history, what do you think the future holds for each of these organizations?

Aquatic Dances

Program Notes

(Written by choreographers, Kellie Ann Lynch and Lindsey Bauer on the creative process)

Tango

Our tango section evolved from examining playful fish interactions. One exhibit in particular stood out to us in terms of spatial arrangement and fish encounters. The fish in this exhibit, at times, seemed to be paused in a two dimensional frame. Most of the fish held time facing many different directions as if they were waiting for a cue to move – a freeze frame. Brilliantly, and like fireworks, fish would shoot out of their stillness to find another fish to play with and then both fish would dance, swirl, and speed across the tank with a fiery energetic quality. They would return to a place of stillness when the time was right, hovering and watching other fish explore the same intensity.

The tango section involves tango duets, tango quintets and quartets, passion duets, aqua chases between two dancers, and phrase material from both Lindsey and Kellie. There is a palpable intensity between the dancers but the tango section most importantly highlights the playful occurrences that exist in aquatic life.

Accompanying Music

Jeremy Cohen: *Tanguori for String Quartet*

[Click Here to Listen to an Excerpt](#)

Sea anemone

In this particular section you'll see movements similar to that of the tentacles of a sea anemone. These tentacles float and twist around each other as clown fish play hide and seek within their tube-like arms. At times the anemone sits quietly, the tentacles calmly swaying in unison. Sometimes the anemone aggressively peels itself off of the floor it rests on in an attempt to wrap itself around the fish swimming within the grassy forest its body creates.

The dancers emulate the personality of this sea creature through soft fluid unison movement; movements that peel, rise and sink; and movements that shift quickly from a calm sway to tangled interactions – passing and spiraling around each other in space.

Accompanying Music

Philip Glass: *String Quartet No. 5: IV*

[Click Here to Listen to an Excerpt](#)

Aqua Dances

(Mystic Aquarium Festival Performance Only)

Comprised of duets, trios, quintets and unison, aqua dances developed from our first creations on location – Mystic Aquarium. Dancers were told to find an exhibit they were drawn to and then create six movements based on what they saw happening inside the tank. Once they developed their short phrase they had to describe the quality of the exhibit in one word. They then exchanged words with a partner and applied each other's words to their own phrases, which changed the quality of the phrase. The two partners then had to put their two phrases together to create one longer phrase.

Aqua Dances brings forth a subtlety and nuance that isn't present in any other section. Motifs are introduced and pieces of phrase material from other sections make appearances, but the happenings in this section lay the groundwork for the rest of the piece – it provides the structure and story even in its most abstract form.

Lobster Trio

(Mystic Aquarium Festival Performance Only)

The sinuous and sensual undulations of this trio, done primarily in unison, explore the segmentation and wavelike motion of the lobster tail. The three performers, all very different from one another, marvelously mold themselves into one entity as they move through space. The lobster trio seamlessly flows out of Aqua Dances and into the Tornado Fish section.

Tornado fish

This section was based on an exhibit at Mystic Aquarium in which flat silver fish swam at an incredible speed with intensity and purpose around a cylinder structure that sat inside the tank itself. The fish often swam as a school in one direction; however, one or two would abruptly change directions to swim against the rest of the fish.

The dancers in this section glide continuously across the space with large sweeping movements and are organized in duets, trios and quartets. These groups circle the space, join each other for moments of unison, tumble across the space in carefully mapped out pathways with entrances and exits demonstrating cyclical and ongoing motion. The concept is simple – never stop moving.

Accompanying Music

Philip Glass: *String Quartet No. 3: Mishima/Closing*

[Click Here to Listen to an Excerpt](#)

Philip Glass: *String Quartet No. 3: Blood Oath*

[Click Here to Listen to an Excerpt](#)

Shark

Our first rehearsal was at Mystic Aquarium. We took the dancers to the shark tank and asked each dancer to create one movement that best described what they were looking at. We had thirteen movements for thirteen dancers and created an order to make these thirteen movements into one large “shark” phrase. While not much was happening in the shark tank, the dancers seemed to pull from the movement characteristics of the sharks themselves. The sharks’ movement qualities were sharp, linear, angular, and slow and sustained at times. One shocking moment in the shark tank was when a fish revealed to the observers that it had been attacked by one of the sharks – one side of the fish was in tact, but when the fish flipped sides you could see that half of its flesh had been chewed off. It was swimming in harmony with other sharks holding no grudge and happily on its road to recovery. Other parts of this section include vigorous interactions amongst the dancers; dancers intercepting each other’s movement; and bodies cutting through pathways already created highlighting intense moments of physical connectivity.

Accompanying Music

Antonio Vivaldi: *Four Seasons Op.8, Summer: Presto (Storm)*

[Click Here to Listen to an Excerpt](#)

Philip Glass: *String Quartet No. 3 (Mishima): 1934-Grandmother and Kimitake*

[Click Here to Listen to an Excerpt](#)

Ginger Duet

(Mystic Aquarium Festival Performance Only)

The choreographers’ duet, and a simple interlude of thematic material introduced in a slightly different way to cleanse the palate and prepare the audience for a new flavor. This duet involves rhythm, precision, and a beautiful aqua waltz.

Accompanying Music

J.S. Bach: *Partita No. 2 in D Minor, BWV 1004: Allemanda*

[Click Here to Listen to an Excerpt](#)

Movement Activity: Qualities of Sea Life

When thinking of sea life: fish, bodies of water, sea plants, what are words that can describe sea life?

How do fish/plants move in water? (smoothly, slowly flowing, erratic, quickly) teacher can list adjectives

- How do fish relate to their environments? (with other fish, with sea life, with the water)

If you were moving various parts of your body with the same qualities as the words that we have generated, what would that look like?

- Each student makes two or three movements that correspond with the words that the group generated.
- The teacher can facilitate demonstrations from the individual students to create a large phrase of movements for the whole group.

Artful Ocean

Aquatic Dances Artistic Expression Activity

Objectives

In this lesson, students will:

1. Be introduced to descriptions of each section of *Aquatic Dances*, written by the choreographers.
2. Use their imagination to identify what images, colors, sounds, feelings, movements, etc. are evoked by each section's description.
3. Draw the imagines that come to mind after hearing the choreographer's descriptions read to them.

Materials

Aquatic Dances Curriculum Guide

Aquatic Dances Program Notes

Artful Oceans worksheet (Page 25)

Art supplies (crayons, colored pencils, markers, etc.)

Introduction

Aquatic Dances was created by people using their imaginations to create dance movements based on sea life. Just like everyone's face is different, every person's imagination will create sights, sounds, tastes, smells and feelings that are unique to them. Tell students to close their eyes and turn on their imaginations as you read to them.

Procedure

1. Create a calm and relaxing environment in the classroom. Have students close their eyes.
2. Select 1 to 3 sections from *Aquatic Dances* Program Notes to read to the students.
3. Discuss with the students what their imaginations created (images, colors, sounds, etc.)
4. Have students transfer the images they imagined to the **Artful Oceans** worksheet using art supplies that are available.
5. Share different interpretations of each description with the class

Wrap-Up

Discuss the following questions with your students:

1. How were the pictures that everyone drew similar? or different?
2. Which drawing is correct? (The answer is none, they are all unique to each person)

Discuss these questions after seeing the *Aquatic Dances* performance:

1. How was the dance that was created by ECDC the same or different than you expected?
2. Having seen the dance for each description, would you change the picture you drew?

What is a String Quartet?

The music that accompanies the movements of *Aquatic Dances* is performed by a string quartet. A string quartet is an ensemble that typically is made up of two violins, a viola, and a cello all working together as if they were one musical instrument. Good quartets spend hours each day practicing together to try to make the tone of the instruments blend well with each other. In order to accomplish this, the musicians need to work on how the instruments are bowed and to make sure they all play in tune. They also spend time deciding on how they will interpret the music written by the composer.



The violin is the soprano member of the orchestral strings. The violin has a long history, which can be traced back hundreds of years. Various types of two, three, and four string fiddles exist in many different cultures all over the world, and many scholars believe the predecessors to the four string violin, which developed in Europe during the 1500's, originated from the Middle East. The violin was used primarily to accompany vocal music and dancing during the Renaissance. During the 1600's, composers began writing more for the violin and making greater demands on the instrument. These musical innovations were possible because of a school of Italian violinmakers who developed instrument making to a very high level. The modern bow was developed in the late 1700's, and the chin rest was developed in 1820. The violin has not had any significant developmental changes in design since the 18th century.

The viola is the alto member of the orchestral string family. It is held under the chin like a violin, but it is tuned a Perfect 5th lower. The size of a viola can vary greatly, with string length varying from 14" to 16" or greater. Violas are acoustically imperfect; the body of a viola would have to be an impractical size to correctly accommodate the string length, which explains why the viola has a different type of tone from the violin. A viola can be thin and cutting in the high register, yet very resonant in the mid to lower register. The viola developed alongside the violin, and their role within the modern string ensemble became standardized in the mid 1700's. The viola typically plays the crucial middle voice that fills in the harmony.

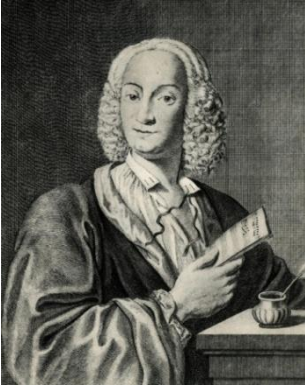


The cello, or violoncello, is the bass instrument of the violin family. It is tuned to the same pitches as the viola, one octave lower. The cello developed alongside the violin and viola, with several different sizes and tunings being experimented with during the 1500s and 1600s. The tuning of the instrument and size have been standardized since the late 1600s, although experiments such as the violoncello piccolo and a 5-string cello were developed in the 1700s. The cello was held between the legs of the performer until the late 1700s-early 1800s, when the endpin came into widespread use. Today, cellists are continuing to experiment with the length and shape of the endpin.



From: <http://www.umass.edu/fac/media/pacifica.pdf>

Works by the following composers accompany the movements of *Aquatic Dances*:



Antonio Vivaldi was born on March 4, 1678 in Venice, Italy.

Antonio's father, Giovanni Battista, a barber before becoming a violinist, taught young Antonio to play the violin and then toured Venice playing the violin with him.

At the age of 15, Antonio began training to become a priest. At the age of 25, he was ordained a priest and soon after became known as the Il Prete Rosso, "The Red Priest", because of his red hair. Due to his health, he left the priesthood in 1703 after only 3 years. But he was still able to pursue a career in music.

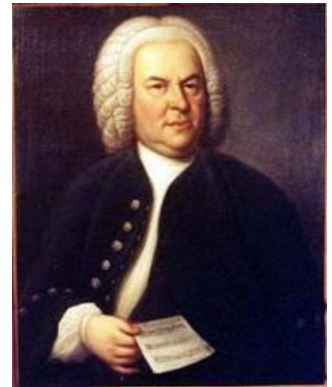
Vivaldi's music is joyful, almost playful, revealing his own joy of composing. In addition, Vivaldi was able to compose non-academic music which means it would be enjoyed by many people rather than just college professors. It was these qualities that made Vivaldi's music very popular. Vivaldi's *The Four Seasons*, composed in 1723, is a set of four concertos for violin. It is his most popular work and is among the most popular works of the Baroque Era.

From: http://makingmusicfun.net/htm/f_printit_biographies/vivaldi-print-it-biography.htm

Johann Sebastian Bach was born in Eisenach, Germany in 1685. As a child Bach's father taught him to play violin and harpsichord. His uncles were all musicians, serving as church organists and court chamber musicians. One of his uncles, Johann Christoph Bach, introduced him to the art of organ playing.

In 1707 Bach married his second cousin Maria Barbara Bach. They had seven children. In 1720 Maria died, and Bach married Anna Magdalena Wilcke in 1721. Bach had 13 more children with Anna Magdalena. He was a father to 20 children in all.

In 1723 Bach became the cantor, organist, and music composer for St. Thomas Lutheran Church in Leipzig, Germany. Bach remained there for the rest of his life. Some of Bach's most famous works include the *Brandenburg Concertos*, the *Well-Tempered Clavier*, and the celebrated organ work *Tocatta and Fugue in D Minor*.



Johann Sebastian Bach died in 1750. Bach was not appreciated during his own lifetime and was considered an "old-fashioned" composer. Today, Bach is considered to be one of the most influential composers of all time. In fact, he is now such an important composer that the year of his death is a defining point in music history. It marks the end of the Baroque Era.

From: http://makingmusicfun.net/htm/f_mmf_music_library/hey-kids-meet-johann-sebastian-bach.htm



Philip Glass discovered music in his father's radio repair shop. In addition to servicing radios, Ben Glass carried a line of records. When some didn't sell he took them home to play them for his three children, trying to discover why the customers didn't like them. Thus, as a youngster, Glass became familiar with works by Beethoven, Schubert, Shostakovich and others. He also learned how to play the flute.

At 19, Glass graduated from the University of Chicago with a major in mathematics and philosophy. (He skipped the last two years of high school.) He wanted to be come a composer, however, so he moved to New York City and attended the Juilliard School there. He also studied in Paris.

Glass took some time to find his own style. His early works were known as "minimalist" because they repeated and varied a very small number of basic musical ideas. However, this period was short-lived as Glass became very interested in Indian music and started writing in a very different manner. His later compositions include several operas, symphonies and film scores. He has collaborated with a variety of artists, including writers, dancers and other musicians.

From: <http://www.classicsforkids.com/composers/bio.asp?id=24>

What is Minimalist Music?

Minimalist music has been around for a long time in other cultures, but its spread into Western music and art began in the mid-1900's. The main concept behind minimalist composition is the use of a small (or "minimal") amount of musical material. Composers take these musical patterns and repeat them over and over and over and over... you get the idea. They vary these patterns over long stretches of time, often so that the listener cannot readily perceive the changes. For that reason, minimalist music is often said to have a trance-like or hypnotic effect.

From: <http://library.thinkquest.org/27110/noframes/periods/minimalism.html>



Jeremy Cohen's electrifying jazz violin performances have earned him nationwide accolades. Classically-trained and a student of Itzhak Perlman and Anne Crowden, Cohen's eclectic style reflects his respect for a wide range of violinists from Perlman and Fritz Kreisler to Joe Venuti and Eddie South.

Cohen has performed as soloist with numerous orchestras including the Virginia Symphony, the California Symphony and the Reno Philharmonic. His recording credits include motion picture and television soundtracks including "The Dukes of Hazzard" and Jane Fonda's "Dollmaker," and as concertmaster on recordings with Linda Ronstadt, Ray Charles, Aaron Neville, Howard Keel and Cleo Laine. He appeared on Carlos Santana's Grammy-winning CD "Supernatural" and the original "Star Wars" compilation CD with John Williams. On the stage

he was the solo violinist in "Forever Tango" and "The Best Little Whorehouse in Texas" and has toured and recorded with the 2006 Grammy winners, the Turtle Island String Quartet.

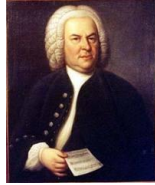
A faculty member of the Henry Mancini Institute (Los Angeles) since 1997 and The Jazz School (Berkeley) since 2004, Cohen also taught for six years at the Stanford Jazz Workshop. In addition to those with Quartet San Francisco, Jeremy has recorded two CDs of jazz standards with his "ViolinJazz" quartet (violin, piano, bass, guitar). In 2004 he released "Jeremy Cohen and Friends Celebrate Joe Venuti –100 Years," his DVD tribute to the great jazz violinist. Cohen's orchestral arrangements have been featured by the San Jose and San Francisco Chamber Orchestras, the Bay Area's Peninsula Symphony, the Reading (PA) Philharmonic, the Reno Philharmonic, and the Sun Valley (ID) and Mendocino Music Festivals. The 2006-2007 San Francisco Symphony season included two arrangements by Cohen.

From: http://www.quartettsanfrancisco.com/qsfo_jeremy.html

Then and Now

Aquatic Dances Time Period Comparison Worksheet

Instructions: J.S. Bach and Antonio Vivaldi lived more than 300 years ago during the Baroque Period of the 1600's in Europe. Philip Glass and Jeremy Cohen are contemporary composers living today in the United States. Compare what life was like then and now.



J.S. Bach



Antonio Vivaldi



Philip Glass



Jeremy Cohen

Baroque Period

Today

<p>Travel</p>	<p>On horseback and carriage, on foot and by boat.</p> <p><i>A trip from Philadelphia to New York City by stage coach took 2 full days.</i></p> <p>(Research to add your own ideas)</p>	<p>Cars, Trucks, Buses, Trains, Motorcycles, Bicycles, Airplanes, Spaceships...</p> <p><i>A car trip from Philadelphia to New York City takes less than 2 hours!</i></p> <p>(Write in your own ideas)</p>
<p>New Inventions</p>	<p>1620: Cornelius Drebbel builds the first 'submarine' made of wood and greased leather.</p> <p>1628: William Harvey publishes and explains his earlier discovery of the human circulatory system.</p> <p>1676: Antoni van Leeuwenhoek discovers bacteria</p> <p>(Research to add your own ideas)</p>	<p>2001: Apple Computers publicly announced their portable music digital player the iPod.</p> <p>2005: YouTube invented by Steve Chen, Chad Hurley and Jawed Karim.</p> <p>(Write in your own ideas)</p>
<p>Communication</p>	<p>Letters, newspapers, printed page and word of mouth.</p> <p><i>Letters back and forth between Britain and the American colonies took 4 months to deliver.</i></p> <p>(Research to add your own ideas)</p>	<p>Telephone, cell phone, email, video chat...</p> <p><i>Today, you can call a person in Great Britain on your cell phone in 4 seconds!</i></p> <p>(Write in your own ideas)</p>
<p>Government</p>	<p>What type of government did they have in Europe then?</p>	<p>What type of government do we have in the United States now?</p>
<p>Insert Your Own Category</p>	<p>What was it like then?</p>	<p>What is it like now?</p>



Animal Movement

Animals move around in the ocean in many different ways

- ❖ Lobsters and horseshoe crabs use their legs for walking along the sea floor, each species can also swim by flapping appendages on the underside of their bodies.
- ❖ Sea stars and sea urchins walk using hundreds of little suction cups called tube feet.
- ❖ Snails and sea anemones slide along the ocean floor on a suction cup foot.
- ❖ Fish move their tails from side to side to swim and use their fins to help direct them through the water.
- ❖ Mammals, like whales, move their tails (flukes) in an up and down motion to propel themselves.
- ❖ Some animals, like barnacles and coral, remain attached in one spot. Parts of their bodies move to help them catch food.
- ❖ Penguins use their wings for swimming.
- ❖ Clams use a muscular foot to dig themselves down in the sand.
- ❖ Scallops clap their two shells together to move.
- ❖ Some animals like sea jellies drift along with the oceans current.

Interesting Facts

- ❖ Seal lions can support their weight on land and walk on their four flippers. Seals cannot and must flop around on their stomachs to move.
- ❖ Sailfish can swim over 68 miles per hour.
- ❖ California gray whales make one of the longest known migrations of any mammal—more than 11,000 miles round-trip.
- ❖ Snails use their slime to help them move around easier. But slime or no slime snails are slow movers, it would take a snail moving at top speed more than a day to move from one end of a football field to the other.

Activity- Animal Charades

Have students select an animal either from the land or the sea. Have each student come up in front of the class and without making any noise demonstrate how that animal moves. Have the rest of the class guess what animal they are.



Schooling Fish

Background Information on Schooling

Fish schools are composed of many fish of the same species moving in more or less harmonious patterns throughout the ocean. A very prevalent behavior, schooling is exhibited by almost 80% of the more than 20,000 known fish species during some phase of their life cycle.

It takes at least three fish to form a school. When two fish travel together one leads and the other follows, adjusting its speed and direction to match those of the leader. When the two are joined by a third fish, the pattern changes; then no fish leads and each adjusts its speed and heading to agree with those of the other two. In effect, the school is the leader and the members of it are the followers.

Why School?

- ❖ Easier to find food- the more fish that are looking for food, the more likely it is that they will find some. Hundreds of pairs of eyes can spot food far better than one pair could.
- ❖ Safety against predators- a potential predator hunting for a meal might become confused by the closely spaced school, which can give the impression of one large fish.
- ❖ Safety in numbers- a predator can only consume a certain amount of prey. The more fish are around the less likely each is to be eaten.
- ❖ Confusion- predators tend to attack prey that are distinct from the rest by appearance or behavior. Confronted with a tightly packed school of virtually identical fish, predators often have trouble making a choice.
- ❖ Reducing friction- schooling fish swim in fairly precise, staggered patterns and the to and fro motion of their tails produces tiny currents called vortices (swirling motions similar to little whirlpools). Each individual, in theory, can use the tiny whirlpool of its neighbor to assist in reducing the water's friction on its own body.

Activity

Provide students with crayons, markers or paints and have them draw a fish on a piece of paper. Have all of the students stand up with their fish and when the teacher says "school" have the students find other fish that their fish may school with (has similar coloration, shape, size). Go around the room and have each school explain what the uniting feature is between all of their fish. Have them go back to their seat and repeat the activity forming and explaining new schools.



Animal Relationships

Background Information

Many plants and animals have developed symbiotic relationships. Symbiosis is a close and prolonged relationship between two or more different species that benefit one or both members of the relationship.

There are three different types of symbiotic relationships:

Mutualistic- both partners benefit from the relationship.

Example- many birds get food by drinking nectar from flowers and in the process pollinate the flowers.

Commensal- one partner benefits while the other is seemingly unaffected.

Example- barnacles attach to a gray whale. The barnacles have a place to attach and feed while the whale is not affected.

Parasitic- one partner benefits while the other is harmed.

Example- dogs and fleas. The fleas get fed while the dog suffers itching and possible exposure to disease.

Interesting Examples of Animal Relationships

- ❖ **Remora fish** are often seen attached to **sharks**. The remora fish receives transportation in the ocean and feeds on the parasites it removes from the shark. The shark benefits by having the harmful parasites removed. The shark does not attempt to eat the remora.
- ❖ The **red bellied turtle** lays its eggs in an **American alligators** nest. The turtle's eggs get protection from predators, by the female alligator tending to the nest, and the alligator and its own eggs are unaffected.
- ❖ The **bluestreak cleaner wrasse** will form a symbiotic relationship with the other reef fish by cleaning them of unwanted parasites. Cleaner wrasse perform an intriguing "dance" to solicit clients (other fish) and to calm them, allowing the cleaners to remove parasites and other debris from their clients gills, fins, and mouths. They often set up a "cleaning station", an area where the other fish can visit just for this beneficial service. Often times the fish can be seen inside the mouths of much larger predatory fish like **eels** and **grouper** cleaning away!

Activity

Lead a discussion about relationships that students have with each other. Have students think of ways that they have mutualistic, commensal and parasitic relationships with one another.



Clownfish & Anemones

Clownfish or Anemonefish

Coloration- bright orange with three distinctive white bars

Species- 28 known species

Size- average 4.3 inches in length

Predators- any larger fish eating fish, such as grouper

Prey- zooplankton and phytoplankton (small plants and animals), only eat things they can swallow whole

Range- live in warm areas of the Pacific and Indian oceans

Habitat- shallow and calm lagoons or coral reefs to depths of 50 feet

Reproduction- all clownfish begin life as males and can change to female. The largest fish in the group is a female, second largest is male. All of the others do not have fully developed organs from either gender. If the female in the group dies the male will change sex to female and the next largest fish will develop functioning male organs to replace the male.

Clownfish and Sea Anemone Relationship

Protection from anemones sting- sea anemones have tentacles that contain harpoon like stinging structures called nematocysts that the anemones use to capture prey and ward off predators.

The clownfish has a special mucus coating on its body to keep it from being killed by the anemone. Scientists think that the clownfish slowly begins to adapt to living in a stinging anemone by making quick contacts with its tentacles. The fish begins mixing the mucus slime of the anemone with its own skins slime. Every day the fish stays longer and longer among the anemone's tentacles until all of its slime is completely mixed with the anemones. This protects the clownfish from being stung.

Clownfish and anemones have a mutualistic relationship-

Benefit to clownfish- The clownfish gets protection from predators by hiding sting free among the sea anemone's tentacles.

Benefit to anemone- clownfish scare away other fish like the butterflyfish that would eat the anemone.

Clownfish also clean their anemone removing parasites and may even drop food scraps that the anemone eats.

Did You Know- Clownfish can be ferocious. They protect their host anemone so fiercely that they will even chase away and bite at human divers.



MYSTIC
AQUARIUM

Sharks

Shark Characteristics

Sharks are fish but they have many characteristics that are different from average bony fish.

- ❖ Most fish have a skeleton made of bone (bony fish). A shark's skeleton is made of cartilage (as is found in humans' nose and ears). Cartilage allows the shark to be more flexible.
- ❖ Sharks breathe through gills just like other fish but sharks have 5-7 gill slits instead of just 1 found in bony fish.
- ❖ Bony fish have 1 row of teeth. Sharks have multiple rows. Some sharks may lose more than 30,000 teeth in their lifetime. Each time a tooth is lost another rotates forward from a waiting row.
- ❖ The tail of a bony fish is symmetrical, the same on the top as on the bottom. The tail of a shark is asymmetrical, different on the top and bottom.
- ❖ Bony fish have scales to protect their bodies. Sharks have denticles which are like rough, sharp plates.

Interesting Shark Facts (learn more at <http://dsc.discovery.com/sharks/shark-facts.html>)

- ❖ There are at least 375 different species of sharks alive today and more are being discovered.
- ❖ Whale sharks are the largest shark species, weighing in at an estimated 60 tons and growing longer than 60 feet.
- ❖ Pygmy sharks and pale catsharks are the smallest shark species each measuring just 8 inches in length.
- ❖ Great white sharks off the coast of Seal Island, Africa, are known to jump almost 10 feet in the air to catch unsuspecting sea lions.
- ❖ Shortfin mako sharks have torpedo-like bodies that make them the fastest of all sharks. Many attain speeds up to 22 miles per hour. One shortfin mako was even clocked swimming at 43 miles per hour.
- ❖ Portuguese sharks are the deepest divers; known to dive more than 9,000 feet (over 1.5 miles) down into the ocean.

Unique Shark Anatomy and Senses

- ❖ Unlike humans, whose upper jaw is a fixed part of the skull, a shark can dislocate and protrude its upper jaw to help it grab and hang onto prey.
- ❖ Sharks have an astounding sense of smell, so powerful that they can detect a single drop of blood in an Olympic-sized pool.
- ❖ Sharks can use heartbeats to track their prey. Sharks have nodules on their noses about the size of a pimple, called ampullae of Lorenzini. These nodules sense electricity, so the electrical pulses that come from a beating heart can act like a beacon for nearby sharks.

Shark Conservation

Over 65 species of sharks are listed as vulnerable or in endanger of extinction. It is crucial that we protect sharks as they are at the top of the ocean food web. Sharks have been exploited in many ways:

- ❖ They have been over-fished for food or medicine
- ❖ Sharks are caught as by-catch (unwanted fish and other sea animals caught in a fishing net along with the desired kind of fish) in long lines or gillnets
- ❖ They have experienced the loss of habitat due to pollution
- ❖ Sharks are especially vulnerable because they have low reproductive potential. They grow slowly, do not reach maturity to reproduce until 4 to 18 years of age, have only one to two year reproductive cycles, bear small number of young per cycle, and have specific requirements for nursery areas.

Activity- Size Comparisons

Have student's research information on different shark species (make sure to include the size extremes by including whale sharks and pygmy sharks). Have students create graphs or charts illustrating the size comparisons or have each student cut out and label a piece of string that is the same length as the animal they researched and stand side by side to compare. Add in a few land animals, including humans, that they may be familiar with to illustrate the size.

Keep it in Order

Aquatic Dances Reading Comprehension and Sequencing Worksheet

Instructions: Read on your own or follow along as your teacher reads the biography of Elm City Dance Collective, Mystic Aquarium and New Haven Symphony Orchestra. Summarize specific events from each organization's history and list them below in the order they occurred.

Be sure to include specific information from each biography in your summary (dates, names, places, etc).

Organization #1: _____

Example: In 1894 Morris Steinert began orchestra rehearsals with mostly German-American musicians upstairs above his piano store in New Haven.

Then

Then

Then

Keep It in Order (Page 2)

Organization #2: _____

Then

Then

Then

Organization #3: _____

Then

Then

Then

Artful Ocean

Aquatic Dances Artistic Expression Activity

Instructions: Listen to the program note descriptions of *Aquatic Dances* read by your teacher. Choose one that you like and use art supplies to draw the images that your imagination creates in the space below.

