



# Around the World in 500 Years

## Social Studies, Science, Math and Language Arts

### Brief Description:

This lesson reinforces the other invasive species lessons about how animals and pests began their global journey with early explorers and settlers. It explores the huge global transformation of exploration and colonization and exchange of plants, animals and microorganisms that has occurred in the past 500 years. It explores both positive and negative impacts of the invasive species that followed that exchange. The lesson ends by exploring the rapid transportation of insects, diseases and other invasive pests through air travel and global trade that still exists today.

### Objectives:

By the end of this unit the students will be able to:

1. Identify that European explorers and colonists located in different areas of America;
2. List and describe the species that accompanied Europeans and became invasive species;
3. Explain the impact of wild horses and cattle on American Indians and immigrants, respectively;
4. Describe the impact of invasive European diseases; and
5. Explain the impact of trade on the colonies and today on invasive species.

### Getting Started

1. Prior to conducting this lesson, make copies of the map.
2. Print out the notes pages of the *Why Colonization Meant Invasives* PowerPoint program as a script to the presentation.
3. Make sure your computer is connected to the Internet and that the hyperlinks to the cracker horse and cattle video clips are active, if not reconnect the link.
4. Have students collect country of origin labels from fresh fruits and vegetables and on processed food labels as a homework assignment over a week or two prior to this lesson.

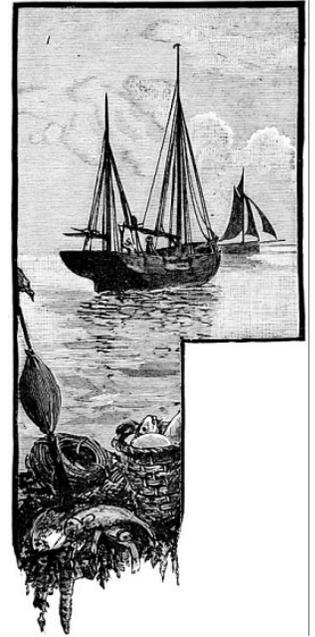
### Materials:

1. Copies of the map and quiz– one per student
2. Computers and Internet access

## Background

Prior to the age of exploration, most of the world's continents were isolated and the plants, animals and people developed in that isolation. Beginning with overland caravans that began to change and early sea trade expanded that change. The movement of plants, animals and microorganisms had begun. But it began slowly. A trip from Europe to China and back would take years. Sea trade from Europe to Africa would take months and the ships or animal caravans carried small amounts of goods. Also, the goods that they traded were limited and of high value. Large amounts of grain or other commodities were not traded. But 500 years ago, when explorers traveled further (across the Atlantic and eventually the Pacific Oceans), to discover and explore the America. While some groups came to America for Religious freedom, most came for economic reasons. When these

European settlers traveled by wooden ship to America, they had to carry all of the food, tools, seeds and animals they would require to meet their needs not only for the trip but for the future as well. Many European foods were brought to America in this process – wheat, barley, oats, carrots, watermelon, okra, apple, oranges, garlic, green peas, lemons, limes, onions, pears, plums, rhubarb, broccoli, cabbage, celery, cherries, cucumbers, eggplant, and beets to name a few. (Not all these foods originated in Europe but earlier trade with Asia and Africa had already established them in the European diet.) The settlers brought the actual foodstuffs, but also brought live plants, seeds, live dormant trees, plant cuttings, and animals. Hogs, cattle, ducks, chickens, geese and horses were transported on ship to help settle and establish farms in the new world. Settlers also bought fiber crops and animals to use to make clothing – cotton, flax for linen and sheep. At the same time, travelers brought along some unwelcomed guests as well; insect pests, weeds, diseases (human, plant and animal) and invasive animals. They did not know about invasive species or noxious weeds and diseases. In fact, at that time, they did not even know that microorganisms caused disease. It wasn't until the 1850s that Louis Pasteur postulated that microorganisms were the cause of disease.



Settlers were less interested in adapting to their New World environment than creating their familiar Old World environment in their new location. They wanted to farm in the same way, eat the same foods, wear the same clothes and have the same pets. So they brought the plants, animals, seeds and foods with them to their new settlements in the America's, Australia and Islands in the Caribbean and Pacific. Unknowingly, this meant that they were introducing weed plants, animals, and diseases that had no competition or natural enemies into a new environment. This meant that the introduced species could multiply rapidly and become invasive species. This was not always bad.

The invasion of horses benefitted the American Indians and over a several hundred year period transformed the lifestyle of the Indians, particularly Plains Indians. The introduction and invasion of the European Honeybee facilitated the growth of hundreds of plants that require pollination assistance. The invasion of cattle provided economic sustenance and food for people after the Civil War and enabled many to have a fresh start.

But, of course, most invasive species are harmful and have had serious, even deadly, ramifications. The diseases that accompanied the explorers, soldiers, settlers, and slaves created epidemics that devastated the indigenous Americans (or Aborigines in Australia and Maoris in New Zealand). While exact numbers will never be known, it is estimated that over 90 percent of American Indians were killed by wars and diseases brought by Europeans. Far more were killed by disease than in war.

Did that exchange and invasion occur 500 years ago and now the world has a new equilibrium? No, that exchange continues to this day but the movement occurs much more quickly. In food shipments flying from one continent to another, weeds, insects and diseases can be hidden from human examination. People traveling across the world in a day can transmit SARs, Bird Flu, influenza, Swine Flu, and West Nile Virus or other diseases with potential for pandemics. Illegal aliens or new immigrants often smuggle foods from their country of origin that are not readily available in their new homeland. The foot and mouth outbreak that devastated animals and farmers in England in the 1990s was traced back to an improperly cured ham smuggled in from China by new Chinese immigrants. Millions of farm animals died as a result. Disease is not the only invasive species that still travels. New weeds, new insects and new animals invade. The movement of Fire Ants and Africanized Honeybees are two examples. In addition to accidental introductions, intentional introductions have a history of going wrong.

Kudzu was introduced as a legume to feed livestock and promoted by the US Soil Conservation Service (now Natural Resources Conservation Service) as a cover crop to prevent soil erosion. It is now recognized as a serious invasive species in the Southeast and considered a noxious weed. It was recently found as far north as Ontario, Canada. The European Starling was introduced as part of a plan to bring all of the birds found in the works of Shakespeare to the United States. Starlings are now in every state in the continental U.S. and every province in Canada. They push out native species of song birds. The water hyacinth was deliberately introduced as a pond or dam ornamental plant or used in aquariums as an ornamental plant. It is believed that discarded aquarium plants invaded waterways and led to invasion. However, in China, water hyacinths were deliberately introduced to be used as animal food. It was distributed to almost all provinces in China for that purpose. The list of these intentional introductions that became invasive species is so long that there is now a Federal protocol which is now used before new species is introduced.

## Activity One – Geography

1. Using the PowerPoint program “How Colonization Meant Invasive Species” review (or for younger grades introduce) European colonization of the Americas by Europeans – slides 1-13. Have students complete their own map of the colonies in America – color coded by European group. They may use either the map of North America or both North and South America.
  - ⇒ English – Massachusetts – Plimoth Plantation  
Virginia- Jamestown
  - ⇒ Dutch – New York
  - ⇒ Spain – Florida  
California
  - ⇒ France – Louisiana and Canada
  - ⇒ Sweden- Delaware and New Jersey and southeastern Pennsylvania

\*Interactive maps of Spanish Colonies can be found on

**<http://www.learner.org/interactives/historymap/colonists1.html>**

2. Younger students can use interactive maps to identify where various Europeans colonized at Interactive Maps **<http://www.learner.org/interactives/historymap/colonists.html>** to identify which states these areas now represent.
3. To extend the content of this lesson about colonization and for AP American History students, have students access the Smithsonian’s on-line exhibit of the American History Museum, “Jamestown, Quebec, Santa Fe, Three American Beginnings” at **<http://americanhistory.si.edu/exhibitions/jamestown-quebec-santa-fe-three-north-american-beginnings>** or the Library of Congress’s on-line exhibit “1492 An On-going Voyage” at **<http://www.loc.gov/exhibits/1492/intro.html>** and select a topic about the colonial period and impact it had, research and report on it.

## Activity Two – Invasions

1. Using the PowerPoint program *How Colonization Meant Invasive Species* present the information that everywhere the explorers, settlers, soldiers, indentured servants, and slaves traveled and lived, they brought plants, animals, and diseases with them – slides 14 - 17. As you present the two rat species and house mouse as invaders, indicate to the students that everywhere they identified colonies on their maps they should add the introduction of rats and mice because rats and mice were aboard the ships and they would land with the people in all locations.
2. Discuss what the invasion of rats and mice would mean. Share the information that both rats and mice carry deadly diseases. (Mice are responsible for carrying Hantavirus.)
3. Continue with the PowerPoint program, slides 18 – 25, and discuss the introduction of hogs, interbreeding with wild boars and the current problems with feral hogs. Have students determine if there is a feral hog problem in their community.

4. Introduce the invasion of wild horses and cattle with PowerPoint slides 26-43 ending with the video clips of the cracker cattle and horses of Florida and efforts to save them from extinction.
5. Share information about the impact of these cattle after the civil war. In 1860, there were 3,786,433 longhorn cattle in Texas. Six times as many cattle as people.
6. Have older students develop an equation to calculate the exponential growth of feral horses.
  - a. Use it to validate the number of horses given in the presentation.
  - b. Use it to calculate growth of mice populations with numbers doubling every 3 months or rat populations doubling every four months or hog numbers doubling twice a year.
7. Explain that these are not the only invasions courtesy of early explorations and colonists and that many invaders would seem to be native. Continue with slide 44.
8. Have students research tumbleweeds and write a short report. Make sure various species are covered.



### **Activity Three – The Deadliest Invader**

1. Using the PowerPoint presentation slide 45, explain that the explorers and soldiers that accompanied them introduced infectious diseases from Europe that the Indians had never encountered.
2. Explain that unfortunately for the Native American tribes, many of these diseases were deadly. Smallpox, typhus, measles, influenza, bubonic plague, cholera, malaria, tuberculosis, mumps, yellow fever, pertussis (whooping cough) may have killed up to 90 percent of the native Americans. While exact numbers of indigenous Americans prior to exploration and colonization of Europeans will never be known, millions died from infectious diseases that were non-lethal to their carriers.
3. Discuss the exploration trails presented of the various explorers and the distances they covered. and explain that many epidemics followed the explorers as they met with various tribes. By the time the colonists arrived to settle and build villages and farms they found wide swaths of land abandoned as the tribes that had lived on them had been wiped out.
4. Continue to explain that other infectious diseases (that were also deadly to Europeans) were carried by African slaves also spread to American Indian tribes (Malaria, Yellow Fever).
  - a. Ask: “Why did so many die? Some of these are considered survivable childhood diseases.”
  - b. Explain that the American landmass was isolated from the European landmass and as a result the Indians were isolated from these diseases and so, had no immunity.

- c. Describes that oftentimes, disease epidemics occurred concurrently and having two or more unknown diseases proved lethal. Or, tribes would survive one disease only to have an epidemic of a second right on its heels when people were weak and the second epidemic would be fatal.
  - d. Illuminate that modern medicine was in its infancy. Techniques were crude and often made the patient weaker (blood-letting). There were no antibiotics to disable bacterial infections. There were no vaccinations to develop immunity to viruses.
  - e. Continue with - couple this with other invasive species such as mice and rats and transmission came in vectors unknown and unexpected. Rats and mice (and the fleas that live with them) transmit diseases to and from human populations. Bubonic plague still exists and is still spread in this manner.
5. Ask: “Was this invasion only in one direction? From Europe and Africa to America?” No, the invasion occurred in both directions. Scientists believe that two deadly diseases traveled back to Europe and Africa to cause disease and death. A new and deadly strain of tuberculosis and syphilis (a deadly sexually-transmitted disease) were transmitted back to the old world and wreaked havoc there.
  6. Have students select one of these diseases, research it and make a classroom chart that contains disease, causative agent (bacteria, virus, fungus, parasite), symptoms, treatment, prevention, transmission, mortality rate.

#### **Activity Four – Continuing with Trade**

1. Using the PowerPoint presentation slides 46 – 48 explain that once the colonies were established and thriving, their economics depended upon trade with Europe. But Europe also wanted goods that the colonies could not supply but Caribbean islands could. So, the Triangle Trade was established.
2. Explain that it was much more complicated than that, using slides 49- 53.
3. Ask the students: “When did this trade stop?” It didn’t. It continues today.
  - a. Have the students collect the country of origin labels found on fruits and vegetable and make a global map where they originate.
  - b. Divide the students into groups of five and select a commodity that cannot be produced in the continental U.S. (coffee, chocolate, cocoa, vanilla, bananas, coconuts, etc.), re-search it and create a PowerPoint presentation to present to the class about its place of origin, production today, where it is traded, problems, value, etc.

4. Once all groups have completed their reports, ask if these are the only commodities traded and discuss why global trade occurs.
5. Using slide 54 discuss why there are still problems with new invasive species being introduced.

### **Activity Five - Invasives Today**

1. Have students identify what diseases have recently been global concerns and how quickly they can be transmitted.
2. Have students explore how SARS, H1N1, Flu, and West Nile Virus are transmitted and what Scientists are doing to control each of them on the BAM: Body and Mind, Centers for Disease Control and Prevention Department of Health and Human Services Web site at <http://www.cdc.gov/bam/>. This is a kid-friendly site.

### **Extensions and variations**

1. Have students research environmental damage done by wild horses and burros and prepare a debate about saving wild plants and habitat for other animals versus allowing wild horses and burros freedom to roam. Have students come to consensus with a recommendation.
2. Use the Colonial Williamsburg teacher site and virtual field trips <http://www.history.org/history/teaching/> to explore more information about colonists and the life led during that time.
3. Use the lessons developed by Sally Miles, Crystal Lake Elementary “Cracker Horses, Cracker Cattle, and Cracker Crumbs: Florida’s Cattle Industry from the 16<sup>th</sup> Century to the Present” at <http://www.polk-fl.net/staff/teachers/tah/documents/floridaflavor/lessons/b-6a.pdf>
4. Have students access primary information sources and explore a singular explorer or region of the country and the documentation of early European explorers. Be sure to read the section on sensitive content to deal with violence, racism, sexism and other sensitive content that may be found in these diaries and reports. *American Journeys* at <http://www.americanjourneys.org/>.
5. Have students explore with undersea archeologists the “Ship That Changed The World” at <http://www.deepsea.se/?id=current&productionid=29> as they examine a wreck of a mid-17<sup>th</sup> century Dutch trading ship.



## Credits

Florida Cracker Cattle and horses [http://www.florida-agriculture.com/livestock/cracker\\_cattle.htm](http://www.florida-agriculture.com/livestock/cracker_cattle.htm)

Florida Cracker Cattle <http://crackercattle.org/>

Florida Cracker Horses <http://www.floridacrackerhorses.com/>

Texas Wild Cattle [http://www.utexas.edu/student/housing/pdfs/history\\_of\\_the\\_texas\\_longhorn.pdf](http://www.utexas.edu/student/housing/pdfs/history_of_the_texas_longhorn.pdf)

*The First Cattle in Texas and the Southwest Progenitors of the Longhorns*, Texas State Historical Association. [http://207.200.58.4/publications/journals/shq/online/v042/n3/contrib\\_DIVL2852.html](http://207.200.58.4/publications/journals/shq/online/v042/n3/contrib_DIVL2852.html)

Cattle Kingdom and Cattle Boom [http://www.rootsweb.ancestry.com/~txecm/texas\\_cattle\\_trails.htm](http://www.rootsweb.ancestry.com/~txecm/texas_cattle_trails.htm)

100 of the World's Worst Invasive Alien Species [http://www.issg.org/database/species/reference\\_files/100English.pdf](http://www.issg.org/database/species/reference_files/100English.pdf)

Environmental Impacts of Feral Hogs  
<http://www.huntinghog.com/biology-of-wild-feral-hogs/ecological-impacts-of-feral-hogs/>

Damage from Invasive species [http://endangeredspeciesmediaproject.org/ESMP%20TEA%20Grant%20Project/Field%20Trips\\_files/pimentel\\_update%25202005.pdf](http://endangeredspeciesmediaproject.org/ESMP%20TEA%20Grant%20Project/Field%20Trips_files/pimentel_update%25202005.pdf)

Smallpox epidemics and the American Indian [http://www.thefurtrapper.com/indian\\_smallpox.htm](http://www.thefurtrapper.com/indian_smallpox.htm)

For More information Feral Hogs Southwest Florida Water Management District Fact Sheet  
<http://www.swfwmd.state.fl.us/recreation/hoghunt/faq.html>

Wild Boar USDA Invasive Species Information Center <http://www.invasivespeciesinfo.gov/animals/wildboar.shtml>

Map of States with Wild Boar invasions <http://128.192.20.53/nfsms/>  
(Map is update monthly and is most accurate for the Southeast. New York has wild hogs but the map does not indicate such.)