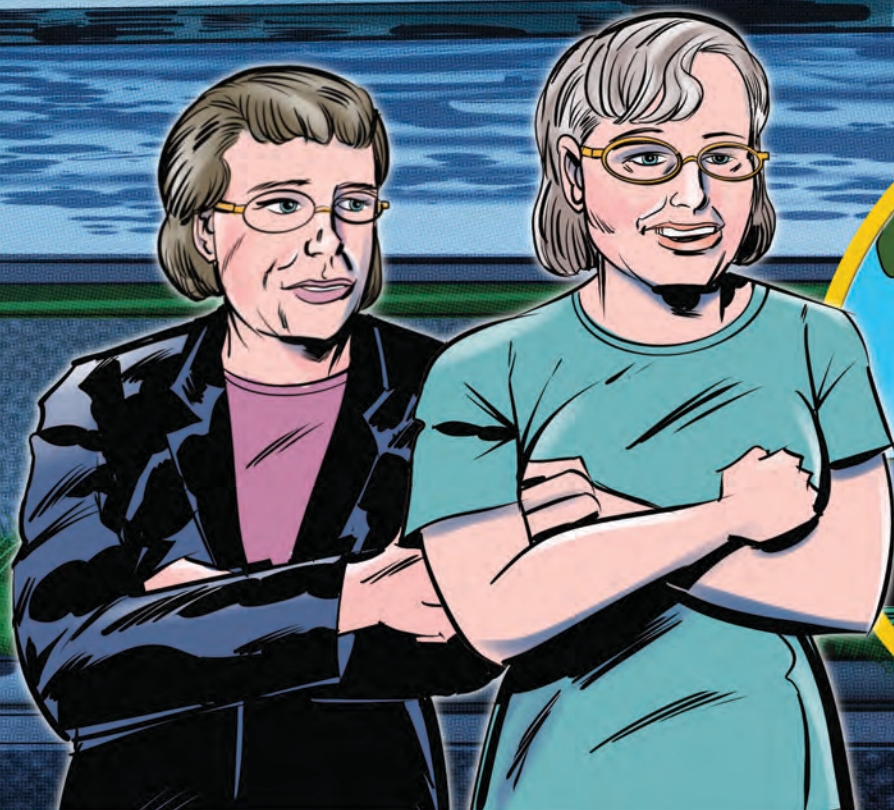


***UNLOCKING THE PAST!***

# Archaeology of the Cattle Economy

*in Colonial Charleston, South Carolina*



HOW THIS RESEARCH TEAM UNCOVERED THE ROLE OF CATTLE IN COLONIAL CHARLESTON, SOUTH CAROLINA ...

**W**ELCOME TO THE COLONIAL CHARLESTON CATTLE ECONOMY RESEARCH PROJECT - WHERE ARCHAEOLOGISTS AND HISTORIANS USE SCIENCE TO UNLOCK THE PAST! WE'RE GOING TO SHOW YOU HOW THE CATTLE (COWS!) THAT WERE RAISED IN AND AROUND CHARLESTON IN THE 17<sup>TH</sup>, 18<sup>TH</sup>, AND 19<sup>TH</sup> CENTURIES (AD 1600S THROUGH 1800S) CAN HELP US ANSWER QUESTIONS ABOUT TRADE, DIET, AND LOCAL ENVIRONMENTS FROM THAT TIME.

THIS KIND OF RESEARCH TAKES A WHOLE TEAM OF PEOPLE. HERE ARE JUST *SOME* OF THE RESEARCHERS WHO MAKE THE CHARLESTON PROJECT POSSIBLE...



**MARTHA**

CURATOR OF HISTORICAL ARCHAEOLOGY AT THE CHARLESTON MUSEUM.  
*SPECIALTY: HISTORICAL ARCHAEOLOGY*



**BETSY**

PROFESSOR EMERITA AT THE UNIVERSITY OF GEORGIA.  
*SPECIALTY: ZOOARCHAEOLOGY.*

THEY'VE BEEN STUDYING COLONIAL CHARLESTON FOR DECADES!



**BARNETT**

HISTORICAL ARCHAEOLOGIST.  
*SPECIALTY: ZOOARCHAEOLOGY.*



**HAYDEN**

HISTORIAN.  
*SPECIALTY: SOUTH CAROLINA ENVIRONMENTAL HISTORY.*



**GRANT**

ENVIRONMENTAL ARCHAEOLOGIST. *SPECIALTY: FIRE ECOLOGY.*



**ANGELINA**

ENVIRONMENTAL ARCHAEOLOGIST.  
*SPECIALTY: PALYNOLOGY AND FUNGAL STUDIES.*



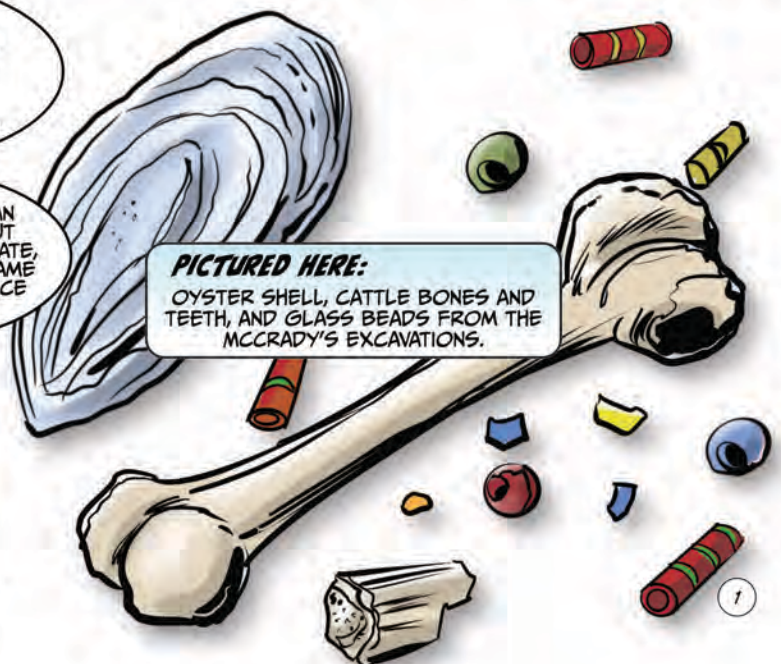
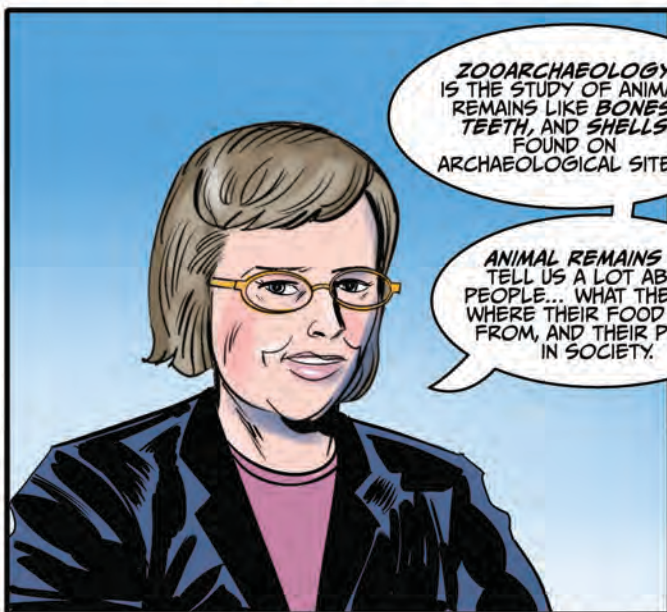
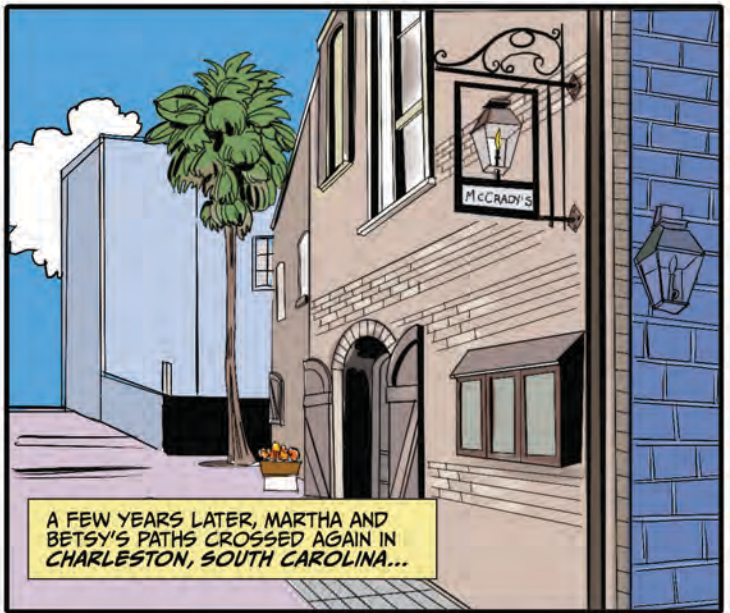
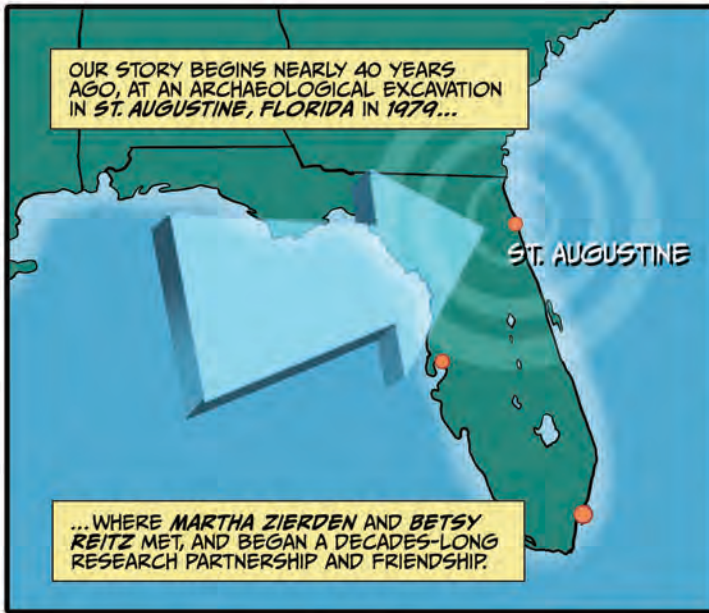
**JANA**

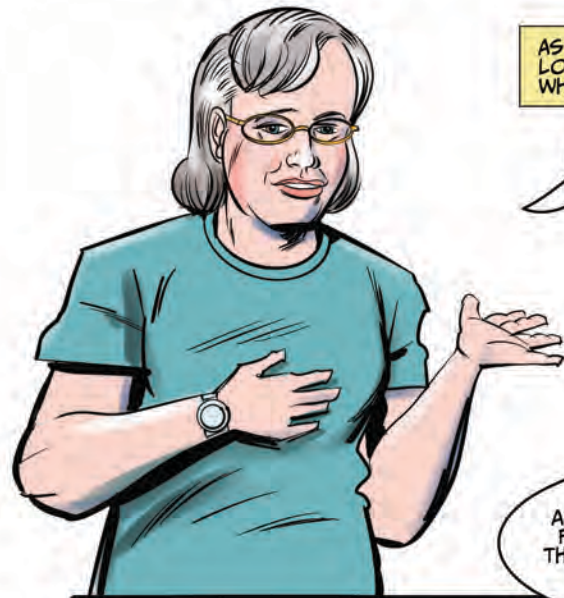
GRADUATE STUDENT AND CHEMIST.  
*SPECIALTY: BIOLOGICAL AND ANALYTICAL CHEMISTRY*



**CAM**

GRADUATE STUDENT AND HISTORICAL ARCHAEOLOGIST.  
*SPECIALTY: ZOOARCHAEOLOGY.*





AS THE YEARS PASSED, MARTHA AND BETSY CONTINUED WORKING ON SMALL ARCHAEOLOGICAL SITES IN HISTORIC CHARLESTON THAT WERE OCCUPIED FROM THE YEAR 1670, WHEN THE CITY WAS FIRST FOUNDED AS A EUROPEAN COLONY, THROUGH THE 1800S.

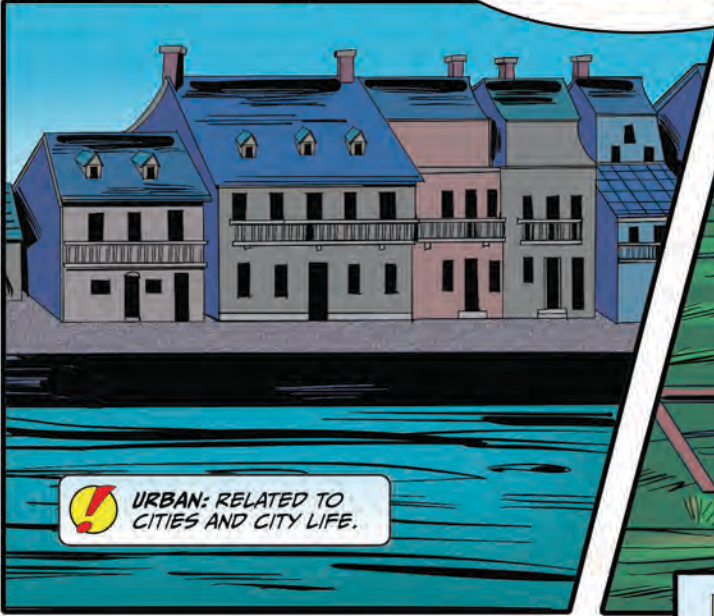
AT FIRST, WE WERE INTERESTED IN STUDYING THE DIFFERENCES BETWEEN URBAN AND RURAL LIFE IN CHARLESTON...

**\*COLONY:** A PLACE CONTROLLED BY ANOTHER COUNTRY. EARLY CITIES IN NORTH AMERICA, LIKE CHARLESTON, WERE FOUNDED BY COUNTRIES LIKE ENGLAND, SPAIN, AND FRANCE.

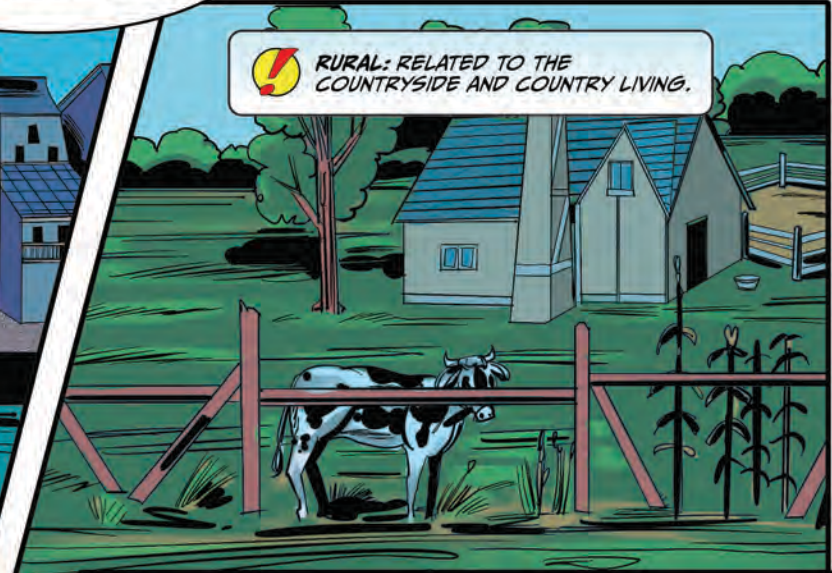
...THROUGH WRITTEN HISTORIES, ARTIFACTS, AND ANIMAL REMAINS AT ARCHAEOLOGICAL SITES IN AND AROUND THE CITY...

FOR THOUSANDS OF YEARS BEFORE EUROPEANS ESTABLISHED THE CAROLINA COLONY, THE LAND WAS SETTLED AND OCCUPIED BY NATIVE NATIONS LIKE THE ETIWAN, YAMASEE, AND MUSCOGEE (CREEK). THESE NATIVE NATIONS WERE REMOVED FROM THEIR LANDS BY FORCE THROUGH THE PROCESS OF COLONIZATION.

...BUT WE NOTICED THESE ARCHAEOLOGICAL SITES WERE FULL OF CATTLE BONES. SO THEN WE STARTED TO FOCUS ON THE CHARLESTON CATTLE.



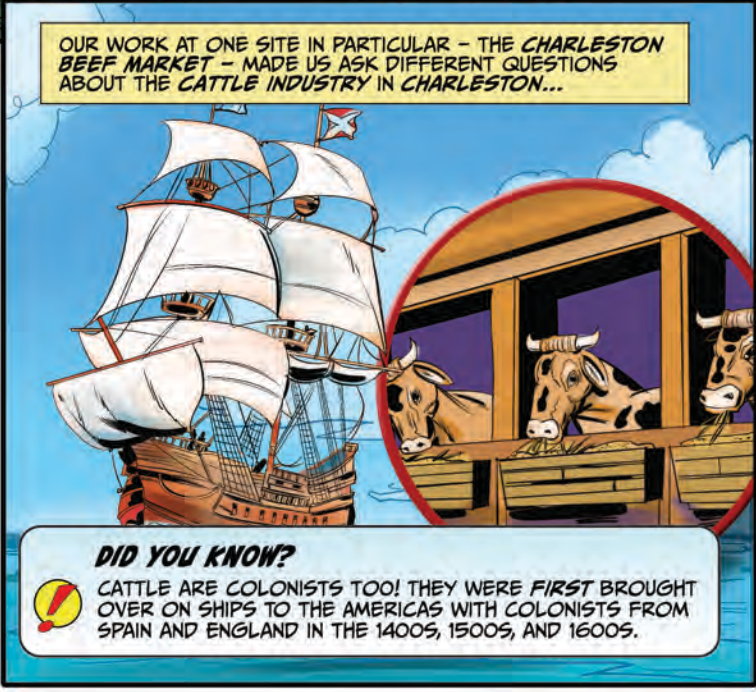
**URBAN:** RELATED TO CITIES AND CITY LIFE.



**RURAL:** RELATED TO THE COUNTRYSIDE AND COUNTRY LIVING.



CAROLINA CATTLE WERE ONE OF THE MAIN EXPORTED GOODS DURING THE COLONIAL PERIOD, WITH CATTLE REGULARLY SHIPPED TO MANY CARIBBEAN COLONIES.



OUR WORK AT ONE SITE IN PARTICULAR - THE CHARLESTON BEEF MARKET - MADE US ASK DIFFERENT QUESTIONS ABOUT THE CATTLE INDUSTRY IN CHARLESTON...

**DID YOU KNOW?** CATTLE ARE COLONISTS TOO! THEY WERE FIRST BROUGHT OVER ON SHIPS TO THE AMERICAS WITH COLONISTS FROM SPAIN AND ENGLAND IN THE 1400S, 1500S, AND 1600S.

THE CHARLESTON BEEF MARKET WAS A PUBLIC MARKET SPACE NEAR THE WATERFRONT, WHERE CATTLE WERE BOUGHT, SOLD, AND PROCESSED THROUGH MUCH OF THE 1700S.

PICTURED: HISTORICAL RECREATION OF THE 18TH CENTURY CHARLESTON BEEF MARKET



BEFORE WE STARTED WORKING AT THE BEEF MARKET, MOST ARCHAEOLOGICAL EXCAVATIONS IN CHARLESTON FOCUSED ON PRIVATE RESIDENCES (WHERE PEOPLE LIVED) RATHER THAN PUBLIC PLACES LIKE MARKETS.

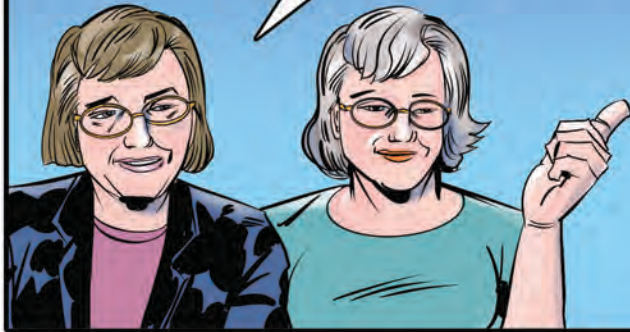
THE BEEF MARKET EXCAVATIONS HELPED US INVESTIGATE HOW CATTLE PRODUCTS MADE THEIR WAY INTO THE CITY.

HISTORIC CHARLESTON SQUARE

NATHANIEL RUSSELL HOUSE AND YARD

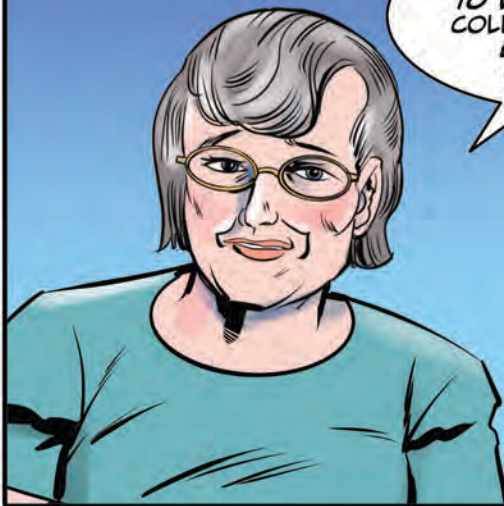
WE ALSO NOTICED THAT IN *SOME* PLACES WITHIN URBAN CHARLESTON, CATTLE WERE RAISED AND BUTCHERED ON-SITE RATHER THAN PURCHASED DIRECTLY FROM A MARKET. THIS WAS COMMON FOR LARGE HOUSEHOLDS.

BEFORE WE INTRODUCE THE **REST** OF THE TEAM AND OUR ONGOING RESEARCH, HERE ARE JUST A **FEW** OF THE THINGS WE LEARNED FROM OUR DECADES OF WORK IN **CHARLESTON**:



1. WHEN WE STUDY **ANIMAL REMAINS**, WE CAN TELL A MUCH MORE DETAILED STORY OF LIFE IN A CITY.
2. SPECIALIZED STUDIES (LIKE **ZOOARCHAEOLOGY**) SHOULD BE PART OF ANY ARCHAEOLOGICAL PROJECT.
3. THERE ARE PLENTY OF WAYS FOR ANIMAL PRODUCTS TO ENTER INTO AND MOVE AROUND A CITY. IN CHARLESTON, CATTLE WERE BOTH **BROUGHT TO MARKETS** AND **RAISED AT PRIVATE HOUSEHOLDS**.

... AND NOW WE **GET TO WORK** WITH OUR COLLEAGUES TO ASK **EVEN MORE** QUESTIONS!

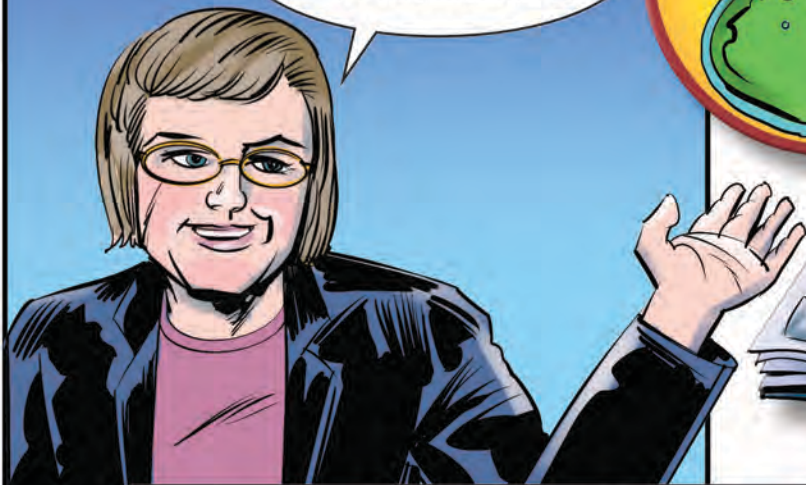


WHERE DID THE CATTLE SOLD IN CHARLESTON COME FROM, AND HOW WERE THEY RAISED?

HOW WERE CATTLE **MANAGED** AND **RAISED** IN AND AROUND CHARLESTON?

WHAT WAS THE IMPACT OF CATTLE ON **LOCAL ENVIRONMENTS**?

A PROJECT LIKE THIS TAKES A **BIG INTERDISCIPLINARY** TEAM OF SPECIALISTS TO ANSWER THESE QUESTIONS.



IN 2019, A TEAM OF ARCHAEOLOGISTS AND HISTORIANS BEGAN WORKING TOGETHER ON WHAT IS NOW CALLED **THE CHARLESTON CATTLE ECONOMY PROJECT**, SUPPORTED BY THE **NATIONAL SCIENCE FOUNDATION**.

**INTERDISCIPLINARY RESEARCH...**



...INVOLVES MORE THAN ONE AREA OF STUDY. THIS PROJECT REQUIRES THE EXPERTISE OF RESEARCHERS WHO STUDY **ARCHAEOLOGY, HISTORY, CHEMISTRY, ECOLOGY, AND BOTANY** (AMONG OTHER TOPICS!).

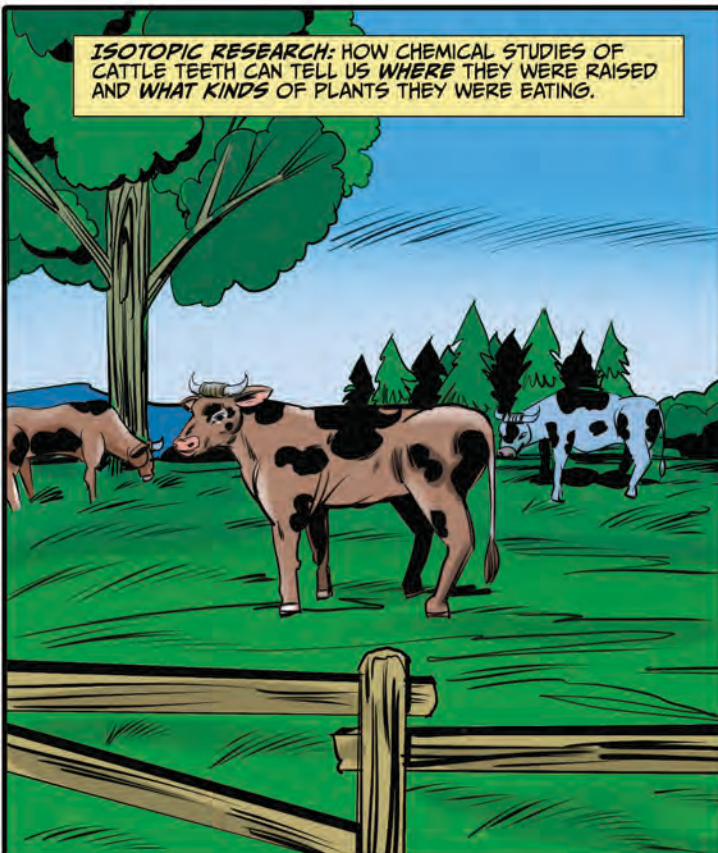
IN ORDER TO TELL THE STORY OF THE CHARLESTON CATTLE INDUSTRY AS ACCURATELY AS POSSIBLE, WE'LL BREAK IT DOWN INTO FOUR MAJOR AREAS OF STUDY:



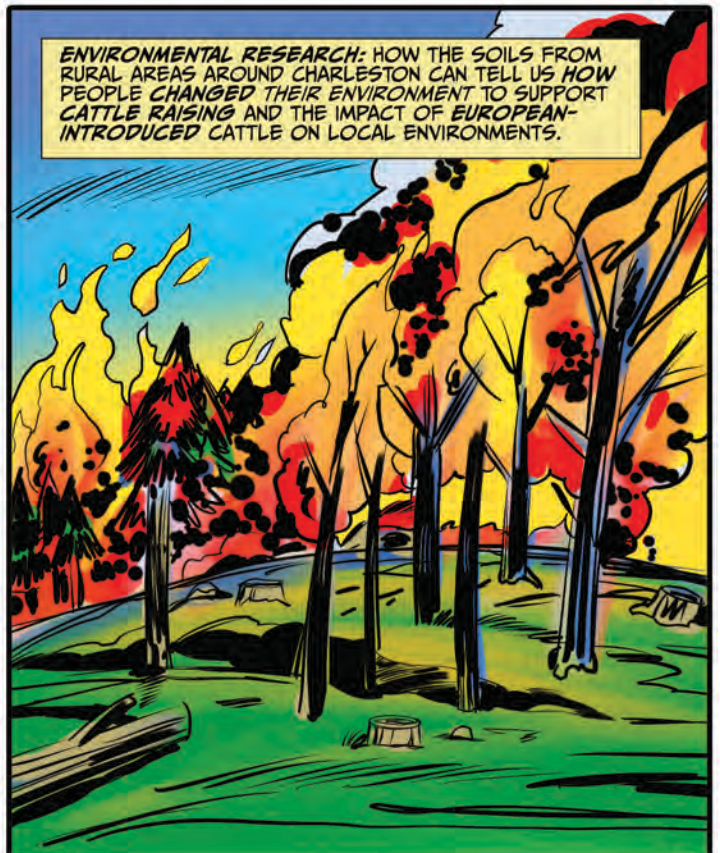
**HISTORICAL RESEARCH:** HOW HISTORIANS ANALYZED HISTORICAL DOCUMENTS RELATED TO CHARLESTON'S CATTLE INDUSTRY, INCLUDING EVIDENCE FOR **WHERE** CATTLE WERE RAISED AND SOLD, AND **WHO** WAS DOING THE RAISING AND SELLING.



**ZOOARCHAEOLOGICAL RESEARCH:** HOW CATTLE BONES AND TEETH FROM URBAN AND RURAL SITES IN AND AROUND CHARLESTON CAN TELL US WHERE AND HOW COWS WERE RAISED.



**ISOTOPIC RESEARCH:** HOW CHEMICAL STUDIES OF CATTLE TEETH CAN TELL US **WHERE** THEY WERE RAISED AND **WHAT KINDS** OF PLANTS THEY WERE EATING.



**ENVIRONMENTAL RESEARCH:** HOW THE SOILS FROM RURAL AREAS AROUND CHARLESTON CAN TELL US **HOW** PEOPLE **CHANGED** THEIR ENVIRONMENT TO SUPPORT **CATTLE RAISING** AND THE IMPACT OF **EUROPEAN-INTRODUCED CATTLE** ON LOCAL ENVIRONMENTS.

## RESEARCH QUESTION 1: HOW WERE CATTLE MANAGED AND RAISED IN AND AROUND CHARLESTON?



ONE OF THE **FIRST** STEPS TO UNDERSTANDING HOW THE CHARLESTON CATTLE INDUSTRY AND ENVIRONMENTS CHANGED OVER TIME WAS STUDYING THE **PRIMARY** AND **SECONDARY** SOURCE DOCUMENTS FROM THE COLONIAL PERIOD.

**PRIMARY** SOURCES CAN INCLUDE MAPS, JOURNALS, LETTERS, NEWSPAPERS, OR CITY RECORDS.



THESE **PRIMARY** SOURCES GIVE US A **BIG-PICTURE** LOOK AT HOW PEOPLE LIVING IN AND AROUND CHARLESTON WERE RAISING CATTLE, AND **HOW** THESE PRACTICES **CHANGED** OVER TIME.



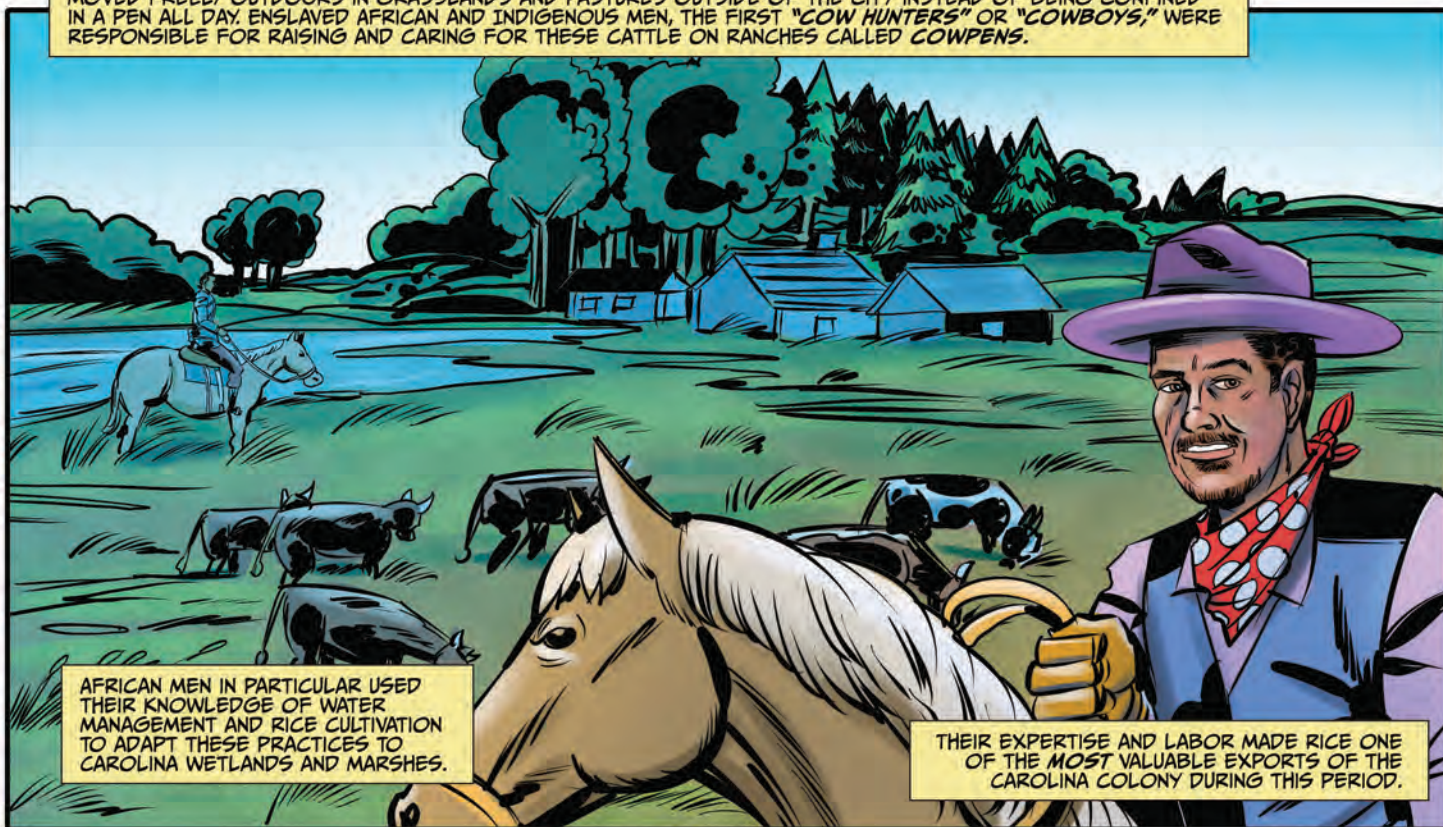
**PRIMARY SOURCES** ARE **FIRST-HAND** ACCOUNTS OF A PARTICULAR POINT IN TIME.



**SECONDARY SOURCES** ARE USUALLY **SUMMARIES** OR **INTERPRETATIONS** OF **PRIMARY** SOURCES.

### 1670-1730

DURING THIS PERIOD OF TIME, CATTLE THAT WERE SOLD IN CHARLESTON WERE **FREE RANGE**, WHICH MEANS THEY MOVED **FREELY** OUTDOORS IN GRASSLANDS AND PASTURES OUTSIDE OF THE CITY INSTEAD OF BEING CONFINED IN A PEN ALL DAY. ENSLAVED AFRICAN AND INDIGENOUS MEN, THE FIRST "**COW HUNTERS**" OR "**COWBOYS**," WERE RESPONSIBLE FOR RAISING AND CARING FOR THESE CATTLE ON RANCHES CALLED **COWPENS**.



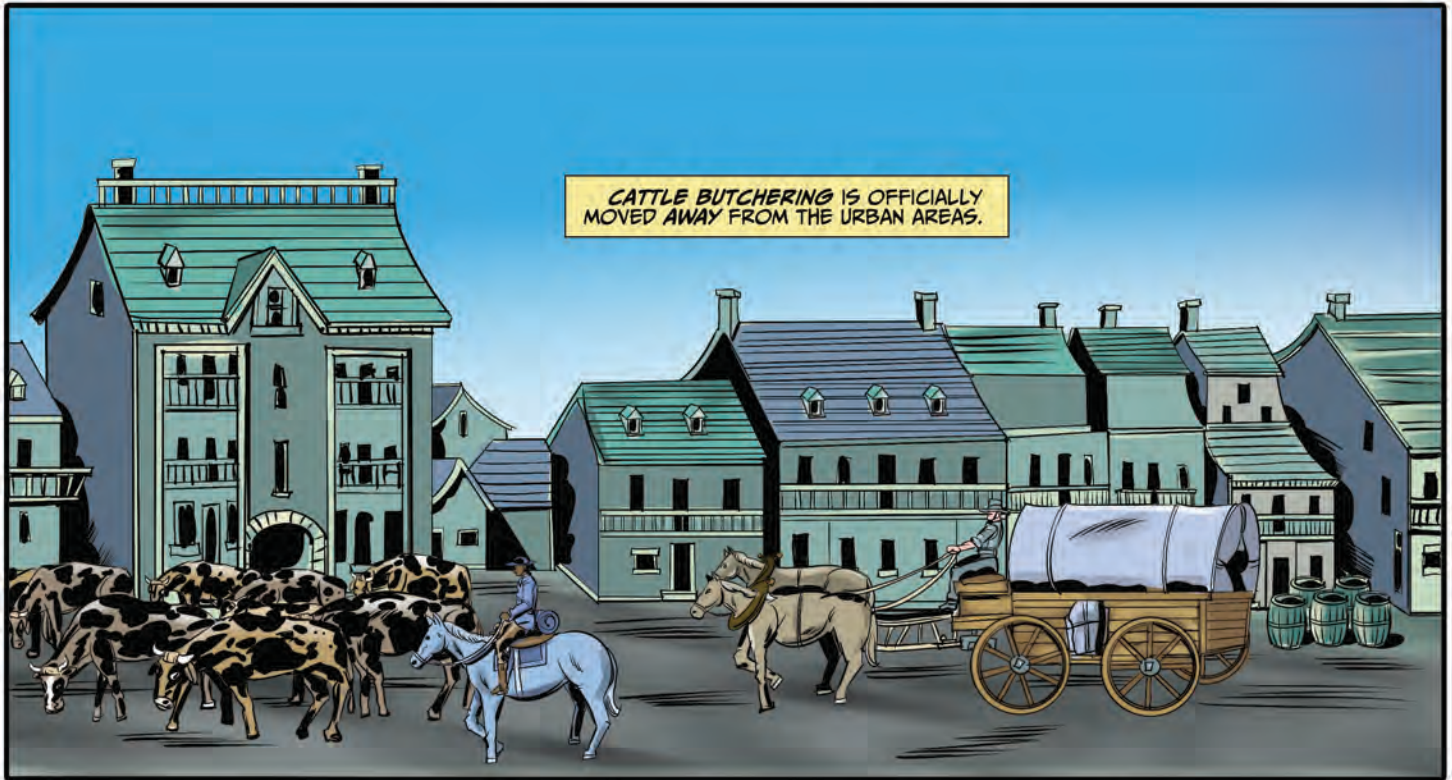
AFRICAN MEN IN PARTICULAR USED THEIR KNOWLEDGE OF WATER MANAGEMENT AND RICE CULTIVATION TO ADAPT THESE PRACTICES TO CAROLINA WETLANDS AND MARSHES.

THEIR EXPERTISE AND LABOR MADE RICE ONE OF THE **MOST VALUABLE** EXPORTS OF THE CAROLINA COLONY DURING THIS PERIOD.



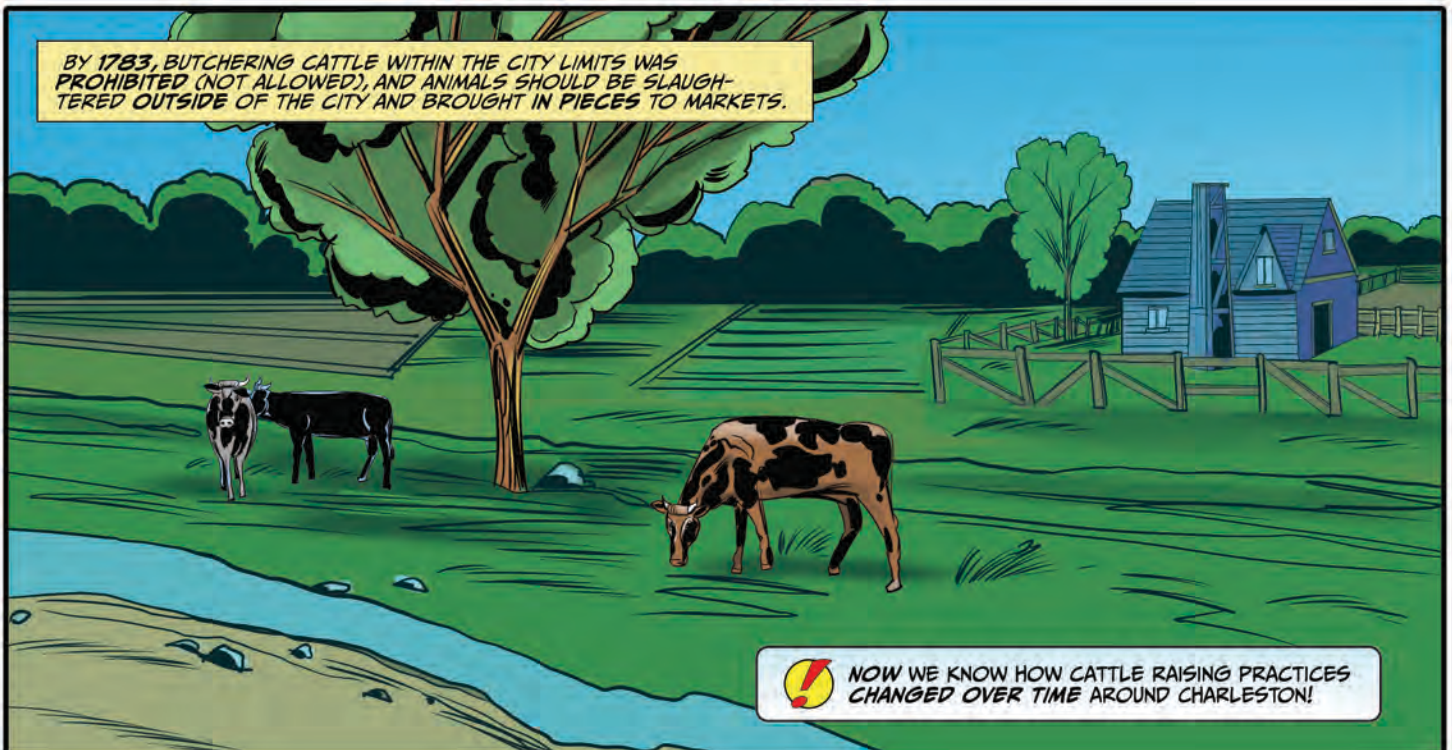
## 1730-1780

BY THE MID-TO-LATE 1700S, THE URBAN POPULATION WITHIN CHARLESTON WAS GROWING QUICKLY. TO KEEP UP WITH RISING DEMAND, CATTLE RANCHERS MOVED INTO RURAL LANDS FARTHER AWAY FROM CHARLESTON TO HAVE THE SPACE TO RAISE CATTLE.



## 1780-1820

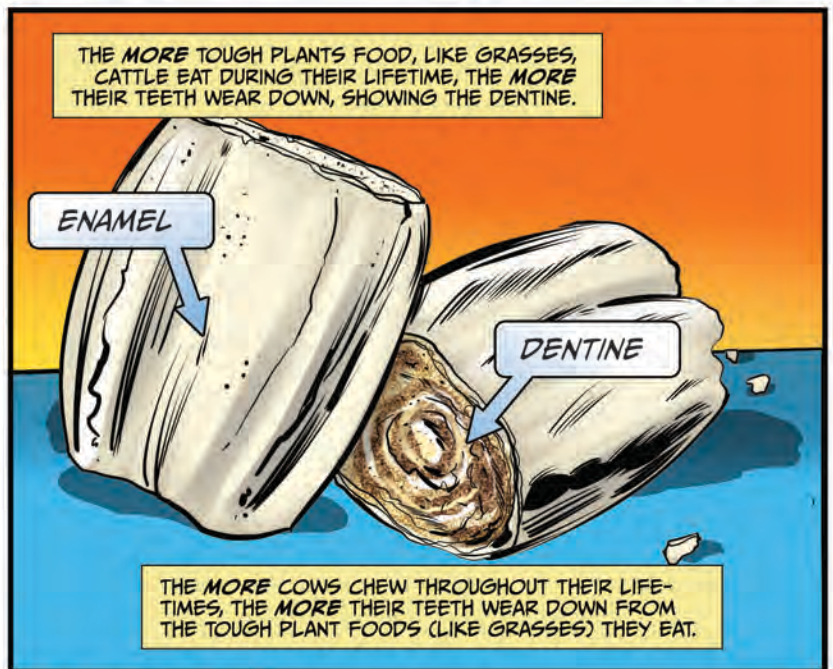
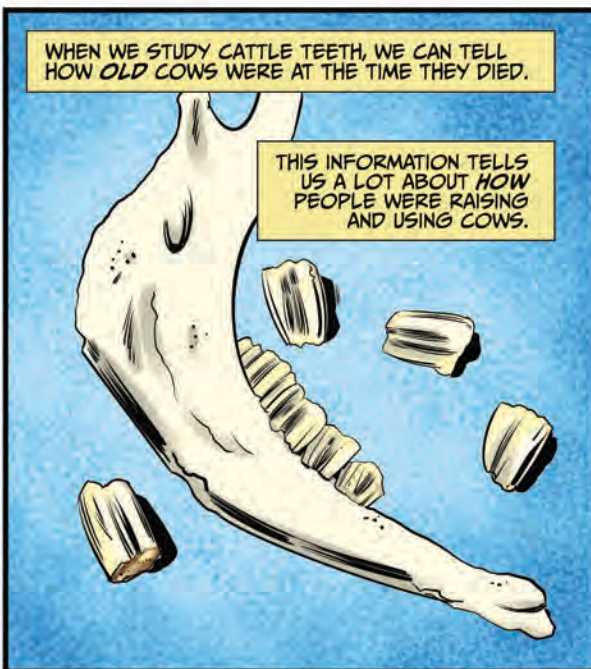
DURING THIS TIME PERIOD, THE URBAN CHARLESTON POPULATION CONTINUED TO GROW. AFTER THE REVOLUTIONARY WAR (1775-1783), SOUTH CAROLINA SOLD COMMON CATTLE GRAZING LANDS TO PAY WAR DEBTS. CATTLE RANCHERS HAD TO LIMIT THE NUMBER OF CATTLE THEY RAISED, OR MOVE FARTHER IN THE RURAL CAROLINA INTERIOR TO FIND OPEN LANDS FOR RAISING CATTLE.



...NEXT, WE NEED TO EXPLORE *WHERE* THESE CATTLE WERE RAISED. TO HELP ANSWER OUR NEXT QUESTION, WE NEED TO TALK TO OUR ZOOARCHAEOLOGICAL RESEARCHERS...

## RESEARCH QUESTION 2:

### WHERE DID THE CATTLE SOLD IN URBAN CHARLESTON COME FROM, AND HOW WERE THEY RAISED?



#### FROM THE TEETH WE LOOKED AT IN THIS STUDY\*, WE LEARNED THAT:

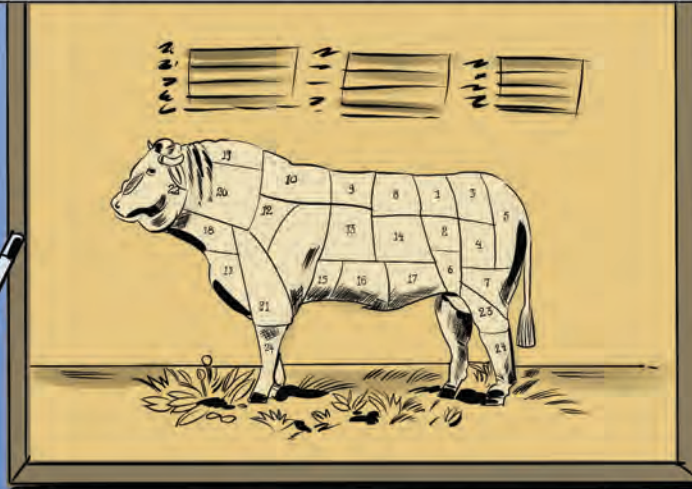
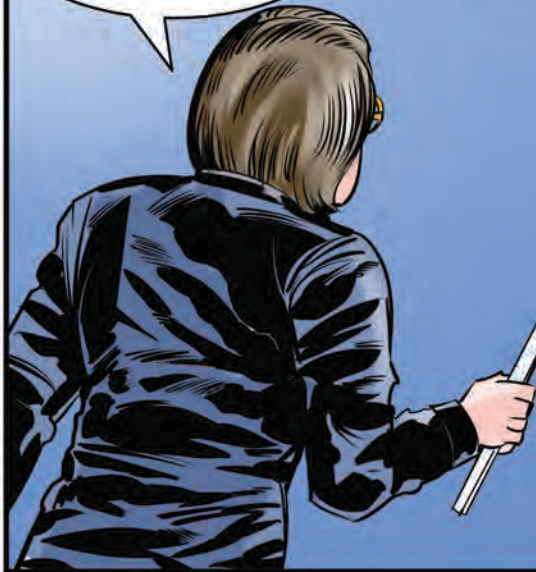
1. THERE WAS **LESS** TOOTH WEAR ON TEETH FROM URBAN CHARLESTON. THIS MEANS YOUNGER COWS WERE MORE DESIRABLE TO PEOPLE LIVING IN THE CITY, PROBABLY FOR FOOD AND HIDES.
2. IN RURAL LOCATIONS WHERE COWS WERE LIVING FREE RANGE OR ON RANCHES, TOOTH WEAR WAS MUCH MORE ADVANCED. THIS MEANS COWS WERE A LOT OLDER WHEN THEY DIED, PROBABLY BECAUSE THEY WERE KEPT UNTIL THEY WERE NO LONGER USEFUL.

**REMEMBER:**



WHEN WE LOOK AT ANIMAL BONES ON AN ARCHAEOLOGICAL SITE, WE USUALLY ONLY FIND **FRAGMENTS** OF BONES INSTEAD OF A **WHOLE SKELETON**. A **SKELETAL COMPLETENESS STUDY** LOOKS AT HOW MANY BONES WE HAVE FOR EACH INDIVIDUAL ANIMAL WE FIND. WE ASK QUESTIONS LIKE "ARE WE MISSING ANY LEG BONES? WHAT OTHER PIECES OF THIS SKELETON ARE MISSING?"

ANOTHER WAY ZOOARCHAEOLOGY TELLS US **MORE** ABOUT WHERE THESE COWS CAME FROM IS THROUGH STUDIES OF **SKELETAL COMPLETENESS**.



WHAT CAN A SKELETAL COMPLETENESS STUDY TELL US ABOUT WHERE THESE COWS CAME FROM?

SOME COWS WERE RAISED IN HOUSEHOLD YARDS INSTEAD OF PURCHASED FROM BUTCHERS AT MARKETS. PEOPLE WHO RAISED AND BUTCHERED THEIR OWN COWS USED EVERY PART OF THE ANIMAL, FROM ALL PARTS OF THE SKELETON.



**BUT**

SOME OF THESE COWS WERE SLAUGHTERED OUTSIDE OF THE CITY AND SOLD AT MARKETS IN CHARLESTON. BUTCHERS PREPARED THE BEST CUTS OF MEAT (NOT THE WHOLE SKELETON) TO SELL TO PEOPLE WHO LIVED IN THE CITY.

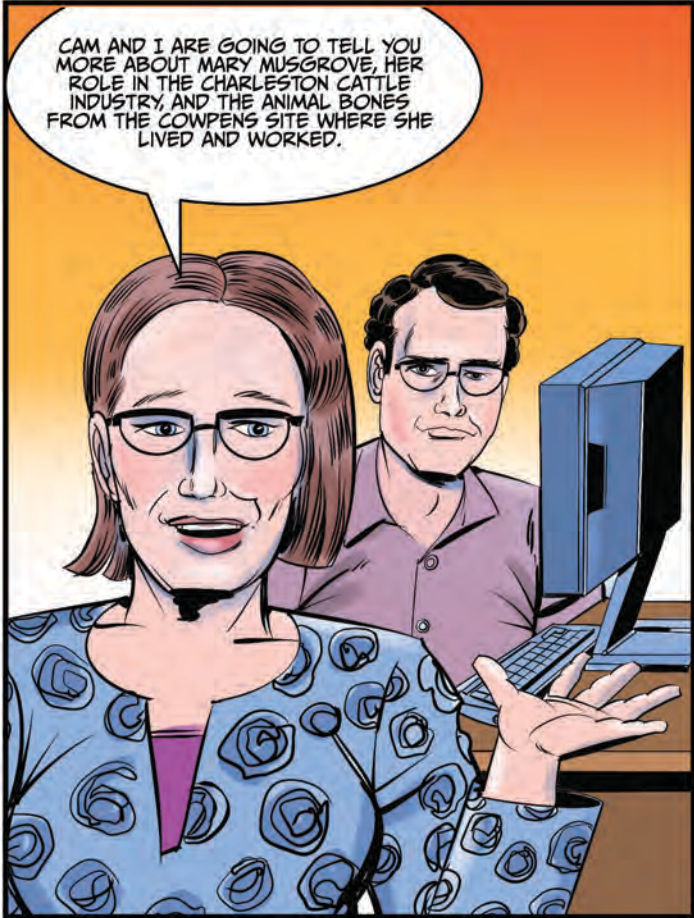
SKELETAL COMPLETENESS TELLS US A LOT ABOUT THE DECISIONS PEOPLE MADE ABOUT WHERE THEIR BEEF PRODUCTS CAME FROM.



**WE LEARNED THAT:**

1. THERE WAS A **HIGH DEGREE OF SKELETAL COMPLETENESS** AT ARCHAEOLOGICAL SITES IN THE CITY. THAT MEANS COWS WERE **PROBABLY** KEPT ALIVE IN OR NEAR THE CITY AND BUTCHERED WHEN NEEDED.
2. THE BEEF MARKET WASN'T THE ONLY PLACE PEOPLE ACQUIRED THEIR BEEF PRODUCTS. SOME HOUSEHOLDS KEPT COWS IN THEIR YARDS. THOSE HOUSEHOLDS HAVE A **HIGH DEGREE OF SKELETAL COMPLETENESS** AMONG THEIR CATTLE BONES.

NOW WE'LL LOOK AT A **SPECIFIC** EXAMPLE OF HOW ZOOARCHAEOLOGICAL RESEARCH HELPED US UNDERSTAND THE IMPORTANCE OF CATTLE IN A CHANGING COLONIAL MARKET: **MARY MUSGROVE'S COWPENS SITE...**

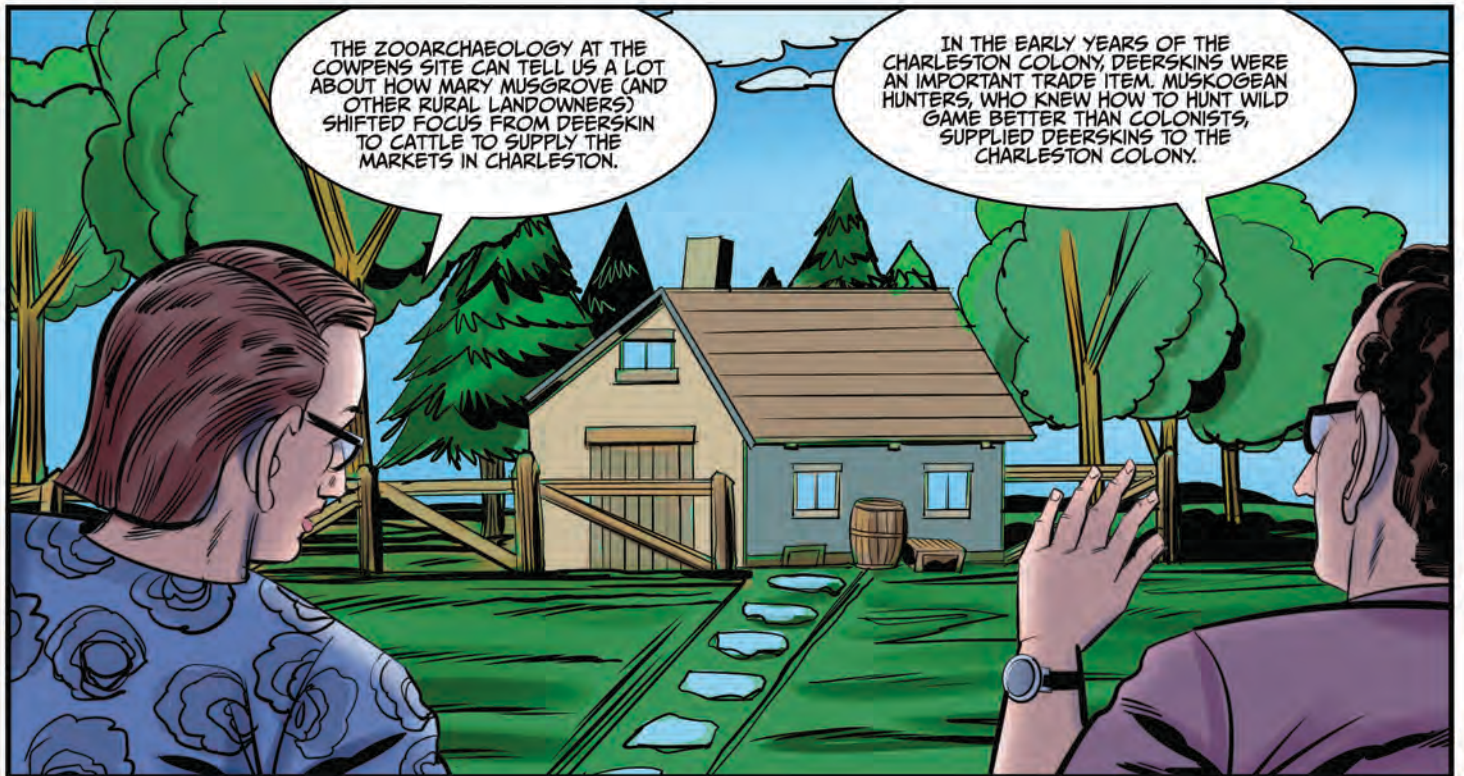


COOSAPONAKEESA (OR, AS MANY KNOW HER, MARY MUSGROVE) WAS BORN TO A CREEK MOTHER AND AN ENGLISH FATHER IN A COWETA TOWN NEAR THE OCMULGEE RIVER IN GEORGIA. SHE WAS MULTILINGUAL IN NATIVE MUSKOGEAN LANGUAGES AS WELL AS ENGLISH.



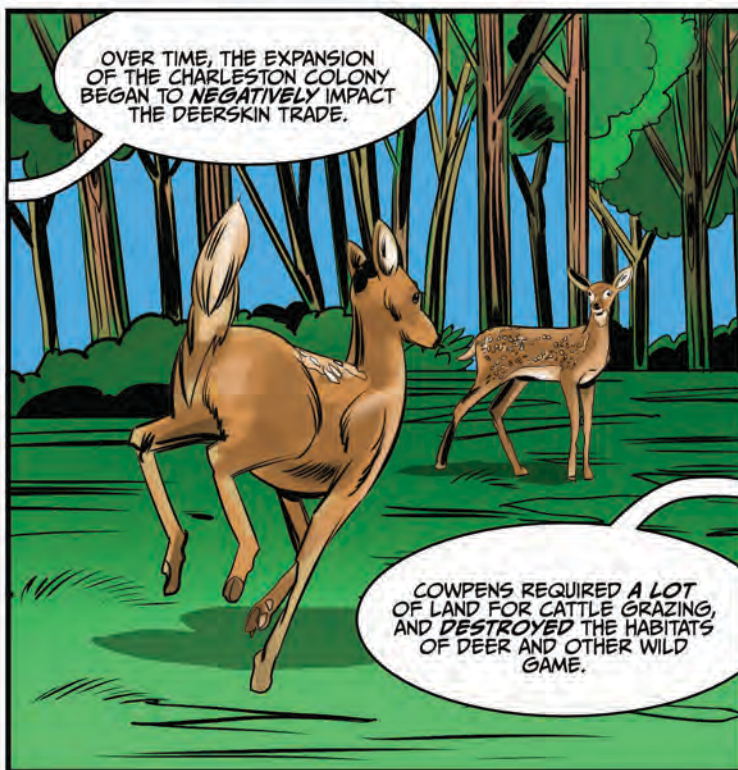
MARY MUSGROVE RAN A COWPEN AND TRADING POST NEAR PRESENT-DAY SAVANNAH FROM THE YEARS 1734 TO 1746.





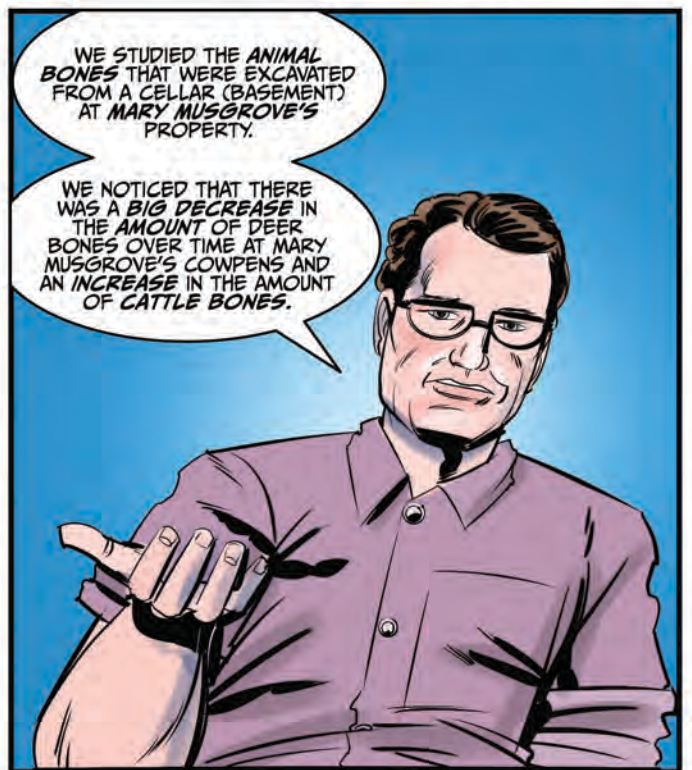
THE ZOOARCHAEOLOGY AT THE COWPENS SITE CAN TELL US A LOT ABOUT HOW MARY MUSGROVE (AND OTHER RURAL LANDOWNERS) SHIFTED FOCUS FROM DEERSKIN TO CATTLE TO SUPPLY THE MARKETS IN CHARLESTON.

IN THE EARLY YEARS OF THE CHARLESTON COLONY, DEERSKINS WERE AN IMPORTANT TRADE ITEM. MUSKOGEEAN HUNTERS, WHO KNEW HOW TO HUNT WILD GAME BETTER THAN COLONISTS, SUPPLIED DEERSKINS TO THE CHARLESTON COLONY.



OVER TIME, THE EXPANSION OF THE CHARLESTON COLONY BEGAN TO **NEGATIVELY** IMPACT THE DEERSKIN TRADE.

COWPENS REQUIRED A LOT OF LAND FOR CATTLE GRAZING, AND **DESTROYED** THE HABITATS OF DEER AND OTHER WILD GAME.



WE STUDIED THE **ANIMAL BONES** THAT WERE EXCAVATED FROM A CELLAR (BASEMENT) AT MARY MUSGROVE'S PROPERTY.

WE NOTICED THAT THERE WAS A **BIG DECREASE** IN THE **AMOUNT** OF DEER BONES OVER TIME AT MARY MUSGROVE'S COWPENS AND AN **INCREASE** IN THE **AMOUNT** OF CATTLE BONES.

**THIS TELLS US THAT:**

1. THE EXPANSION OF THE CHARLESTON COLONY AND THE LANDS REQUIRED FOR RAISING CATTLE TO SUPPLY THE CITY **HURT** THE DEERSKIN TRADE OVER TIME.
2. MARY MUSGROVE SHIFTED HER TRADING FOCUS FROM DEERSKINS TO RAISING CATTLE.
  - ▶ SHE AND HER HUSBAND WERE SUCCESSFUL CATTLE RANCHERS PRIOR TO RUNNING THE COWPEN. RAISING MORE CATTLE **MAY** HAVE BEEN MORE PROFITABLE FOR HER THAN DEERSKINS.
  - ▶ SHE CONTINUED TO BE A MAJOR SUPPLIER OF CATTLE FOR URBAN CHARLESTON UNTIL SHE MOVED FROM THE COWPENS SITE IN 1746.

**UP TO NOW...**

... WE'VE STUDIED THE HISTORY OF CATTLE MANAGEMENT IN AND AROUND CHARLESTON, AND WE KNOW MORE ABOUT THE AGE AND MOVEMENT OF CATTLE ACROSS THE LANDSCAPE FROM THE ZOOARCHAEOLOGICAL STUDIES. REMEMBER OUR SECOND RESEARCH QUESTION...

**WHERE DID THE CATTLE SOLD IN URBAN CHARLESTON COME FROM...?**

ANOTHER WAY WE CAN ANSWER THIS QUESTION IS THROUGH **BIOGEOCHEMISTRY** (BIO-GEO-CHEMISTRY).

IN ORDER FOR US TO FIND OUT WHERE THESE COWS WERE RAISED, WE NEED TO LEARN MORE ABOUT **CARBON, NITROGEN, AND STRONTIUM ISOTOPES** FOUND IN NATURE AND IN THE BONES AND TEETH WE STUDY.

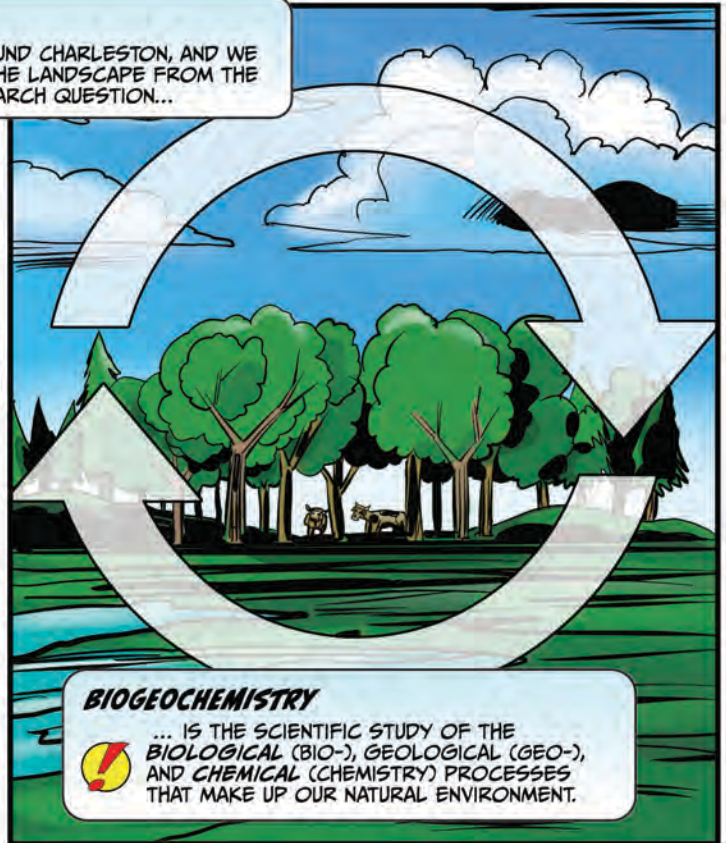
**ISOTOPES** ARE DIFFERENT FORMS OF AN ELEMENT. SOME ARE RADIOACTIVE AND DECAY OVER TIME INTO OTHER ISOTOPES OR ELEMENTS, BUT OTHERS ARE STABLE, WHICH MEANS THEY DON'T BREAK DOWN OVER TIME.

WE CAN STUDY **STABLE ISOTOPES** OF ELEMENTS LIKE CARBON, NITROGEN, AND STRONTIUM IN ANIMAL REMAINS LIKE CATTLE TEETH. TOGETHER, THEY CAN TELL US **WHERE** THESE COWS WERE RAISED, AND **WHAT TYPES** OF PLANTS THEY WERE EATING.



**ABBREVIATIONS SCIENTISTS USE FOR ELEMENTS:**

CARBON - C NITROGEN - N  
STRONTIUM - SR



**BIOGEOCHEMISTRY**

... IS THE SCIENTIFIC STUDY OF THE **BIOLOGICAL** (BIO-), **GEOLOGICAL** (GEO-), AND **CHEMICAL** (CHEMISTRY) PROCESSES THAT MAKE UP OUR NATURAL ENVIRONMENT.

CARBON AND NITROGEN EXIST IN OUR ATMOSPHERE AS CARBON DIOXIDE (CO<sub>2</sub>) AND NITROGEN (N<sub>2</sub>) GASES.

PLANTS ABSORB CO<sub>2</sub> DURING PHOTOSYNTHESIS...

... WHILE BACTERIA IN THE GROUND TURN N<sub>2</sub> INTO NUTRIENTS FOR PLANTS.

PLANTS ABSORB THE CO<sub>2</sub> AND NITROGEN INTO THEIR TISSUES...

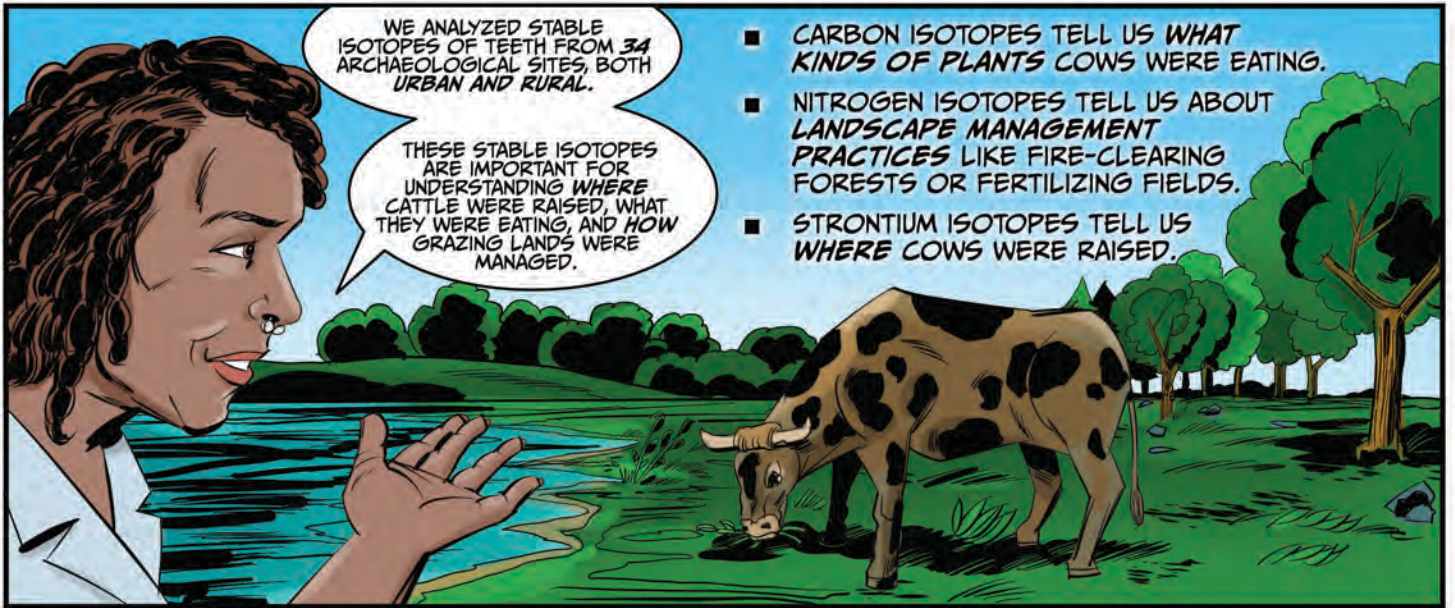
... AND ANIMALS (LIKE COWS!) THAT EAT THESE PLANTS ABSORB CARBON AND NITROGEN INTO THEIR BODIES.

ANIMALS EXHALE CO<sub>2</sub>...

... AND RELEASE NITROGEN BACK INTO THE SOIL WHEN THEY DIE AND DECOMPOSE.

STRONTIUM ISOTOPES ARE FOUND IN ROCKS. WHEN ROCKS BREAK DOWN INTO SOILS, PLANTS ABSORB SOME OF THIS STRONTIUM.

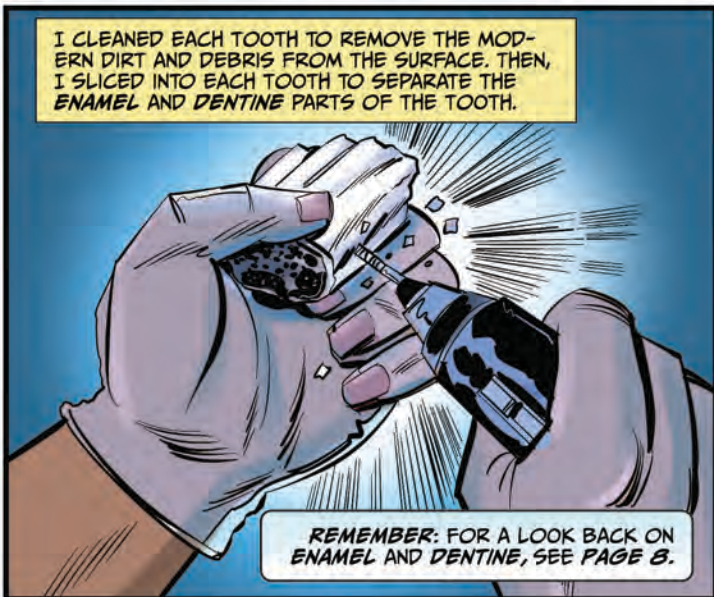
WHEN ANIMALS EAT PLANTS, THAT STRONTIUM IS TRANSFERRED INTO ANIMAL TISSUES.



WE ANALYZED STABLE ISOTOPES OF TEETH FROM 34 ARCHAEOLOGICAL SITES, BOTH URBAN AND RURAL.

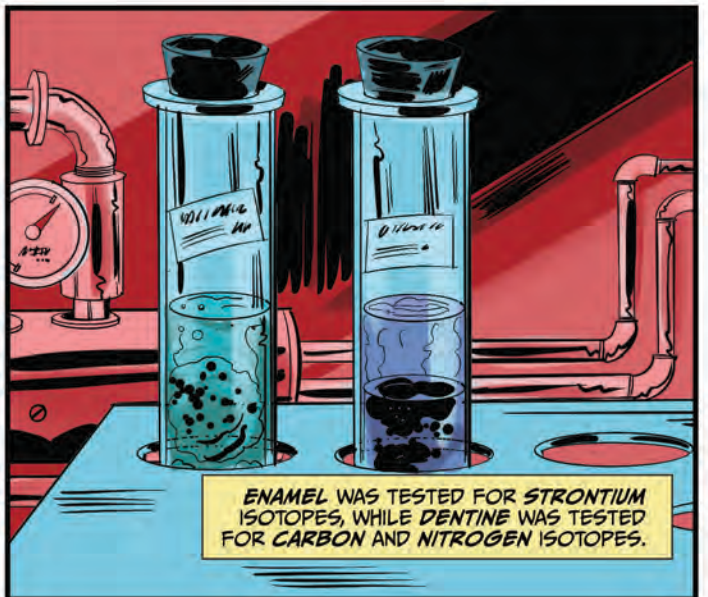
THESE STABLE ISOTOPES ARE IMPORTANT FOR UNDERSTANDING WHERE CATTLE WERE RAISED, WHAT THEY WERE EATING, AND HOW GRAZING LANDS WERE MANAGED.

- CARBON ISOTOPES TELL US WHAT KINDS OF PLANTS COWS WERE EATING.
- NITROGEN ISOTOPES TELL US ABOUT LANDSCAPE MANAGEMENT PRACTICES LIKE FIRE-CLEARING FORESTS OR FERTILIZING FIELDS.
- STRONTIUM ISOTOPES TELL US WHERE COWS WERE RAISED.



I CLEANED EACH TOOTH TO REMOVE THE MODERN DIRT AND DEBRIS FROM THE SURFACE. THEN, I SLICED INTO EACH TOOTH TO SEPARATE THE ENAMEL AND DENTINE PARTS OF THE TOOTH.

REMEMBER: FOR A LOOK BACK ON ENAMEL AND DENTINE, SEE PAGE 8.

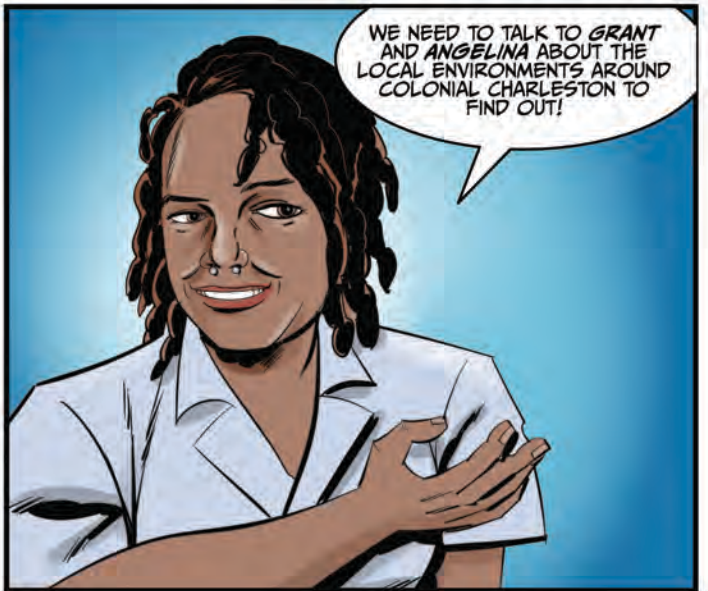


ENAMEL WAS TESTED FOR STRONTIUM ISOTOPES, WHILE DENTINE WAS TESTED FOR CARBON AND NITROGEN ISOTOPES.

**HERE'S WHAT WE LEARNED FROM OUR BIOGEOCHEMICAL STUDIES:**

- THE CARBON ISOTOPES INDICATED THAT COWS FROM BOTH URBAN AND RURAL SITES HAD ACCESS TO SIMILAR FOOD FOR GRAZING.
- THE NITROGEN ISOTOPES REVEALED THAT SOME COWS, ESPECIALLY IN RURAL AREAS, GRAZED IN FIELDS THAT HAD BEEN BURNED.
- THE STRONTIUM ISOTOPES INDICATED THAT COWS WITHIN URBAN CHARLESTON CAME FROM MANY DIFFERENT GEOGRAPHIC AREAS, FROM DIFFERENT RURAL FARMS AND PLANTATIONS.

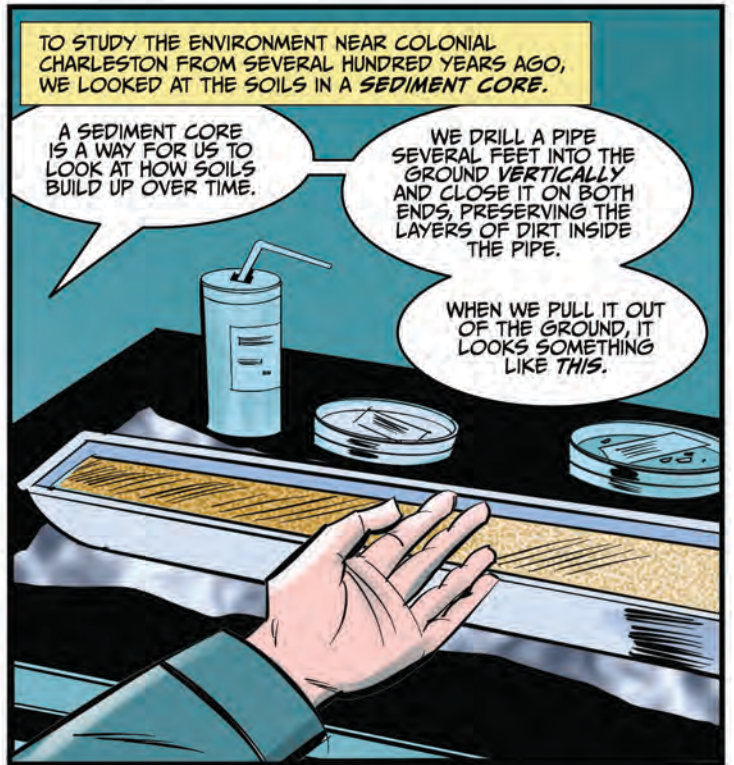
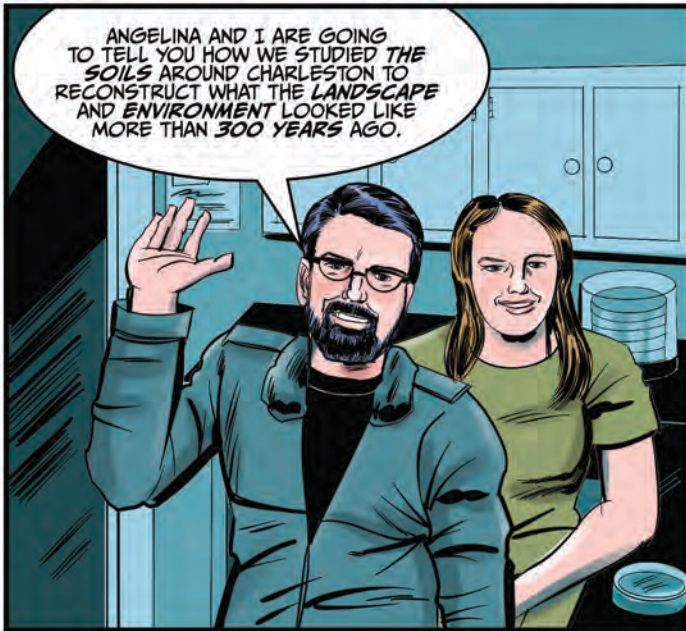
NOW THAT WE KNOW THESE CATTLE WERE RAISED IN DIFFERENT PLACES WITHIN AND AROUND CHARLESTON, WHAT DID THOSE LANDSCAPES ACTUALLY LOOK LIKE?



WE NEED TO TALK TO GRANT AND ANGELINA ABOUT THE LOCAL ENVIRONMENTS AROUND COLONIAL CHARLESTON TO FIND OUT!

### RESEARCH QUESTION 3:

## WHAT WAS THE IMPACT OF CATTLE RAISING ON LOCAL ENVIRONMENTS?



THE OLDEST LAYERS ARE ON THE BOTTOM OF THE CORE (THE SOILS BURIED THE DEEPEST UNDERGROUND), WHILE THE YOUNGEST LAYERS ARE CLOSEST TO THE SURFACE.

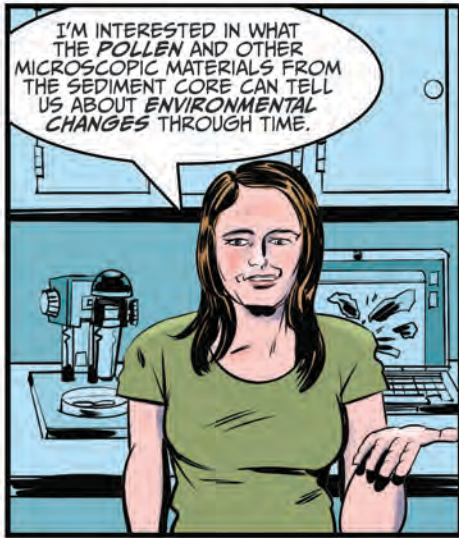
SEE THE DARK LAYER OF DIRT AT THE TOP OF THE CORE? THAT'S CHARCOAL - BURNT WOOD AND PLANT MATERIAL.

WE NOTICED A LOT OF CHARCOAL IN SOIL LAYERS NEAR THE TOP OF THE CORE. THESE LAYERS ARE THE SAME AGE AS COLONIAL CHARLESTON (1600S-1800S).

THIS DENSE LAYER OF CHARCOAL LETS US KNOW THAT THERE WERE A LOT OF FIRES ON THIS LANDSCAPE DURING THAT TIME PERIOD.



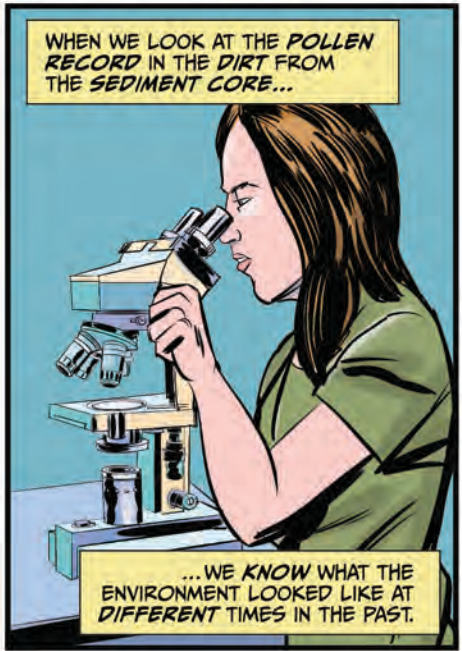




I'M INTERESTED IN WHAT THE **POLLEN** AND OTHER **MICROSCOPIC MATERIALS** FROM THE **SEDIMENT CORE** CAN TELL US ABOUT **ENVIRONMENTAL CHANGES** THROUGH TIME.



WHEN **POLLEN** IS RELEASED BY **PLANTS**, IT OFTEN FALLS TO THE **GROUND** AND IS **BURIED**.

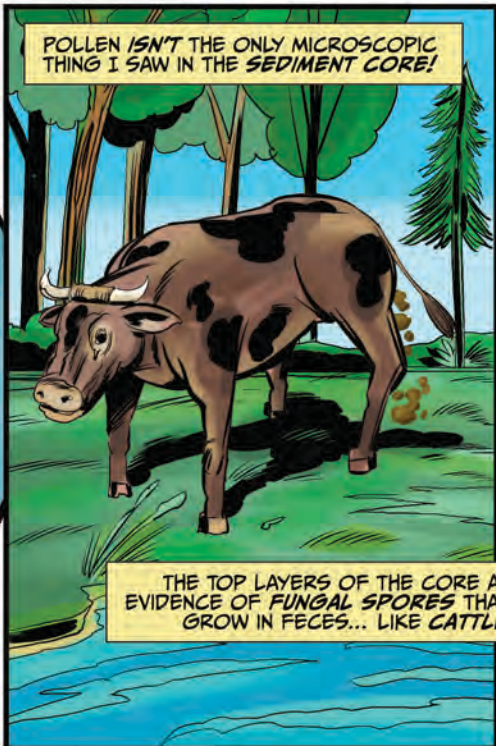


WHEN WE LOOK AT THE **POLLEN RECORD** IN THE **DIRT** FROM THE **SEDIMENT CORE**...

... WE **KNOW** WHAT THE **ENVIRONMENT** LOOKED LIKE AT **DIFFERENT TIMES** IN THE **PAST**.

**POLLEN** IS A **POWDERY SUBSTANCE** PRODUCED BY **PLANTS** TO **FERTILIZE** OTHER **PLANTS** OF THE SAME **SPECIES**. **POLLEN GRAINS** OF **DIFFERENT SPECIES** HAVE **DISTINCT SHAPES** THAT CAN BE **IDENTIFIED MICROSCOPICALLY**.

THE **SOILS** FROM **RURAL AREAS** AROUND **CHARLESTON** CONTAIN A **LOT** OF **PINE TREE** (GENUS **PINUS**) **POLLEN** AND SOME **GRASS POLLEN**, **ESPECIALLY** IN **SOILS** DATING TO THE **COLONIAL PERIOD**.



**POLLEN ISN'T** THE ONLY **MICROSCOPIC THING** I SAW IN THE **SEDIMENT CORE**!

THE **TOP LAYERS** OF THE **CORE** ALSO CONTAINED EVIDENCE OF **FUNGAL SPORES** THAT MOST COMMONLY GROW IN **FECES**... LIKE **CATTLE DROPPINGS**.



THESE ARE THE SAME **SOIL LAYERS** WHERE **GRANT** FOUND A **LOT** OF **CHARCOAL**.



**DELITSCHIA FUNGUS**

**WHAT DO THESE SEDIMENT CORE STUDIES TELL US ABOUT THE ENVIRONMENT AROUND COLONIAL CHARLESTON?**

1. THE **DENSE CHARCOAL LAYER** NEAR THE **TOP** OF THE **CORE** MEANS THAT **FIRES** WERE **COMMON** DURING THE **COLONIAL PERIOD** UP TO **TODAY**. **SOME** OF THE **RURAL FORESTED LANDS** **OUTSIDE** OF **CHARLESTON** WERE **PROBABLY BURNED** ON **PURPOSE**.
2. THE **POLLEN RECORD** FROM THE SAME **SOIL LAYERS** SHOWS THAT **PINE TREES** AND **GRASSES** WERE **FOUND** ON THIS **LANDSCAPE**. THE **ENVIRONMENT** IN THIS **AREA** HAD A **LOT** OF **PINE TREES** AND **GRASSES**. **BURNING** **IMPROVED** THE **GRASSES** THAT **CATTLE** **ATE**.
3. **FUNGAL SPORES** ASSOCIATED WITH **CATTLE FECES** WERE **FOUND** IN THE SAME **SOIL LAYERS** AS THE **CHARCOAL** AND **POLLEN**. **FREE RANGE CATTLE** WERE **PRESENT** ON THIS **LANDSCAPE**, **PROBABLY** AFTER THE **FORESTED AREA** WAS **BURNED** AND **NEW, TENDER GRASS** **GREW**.

AND SO...



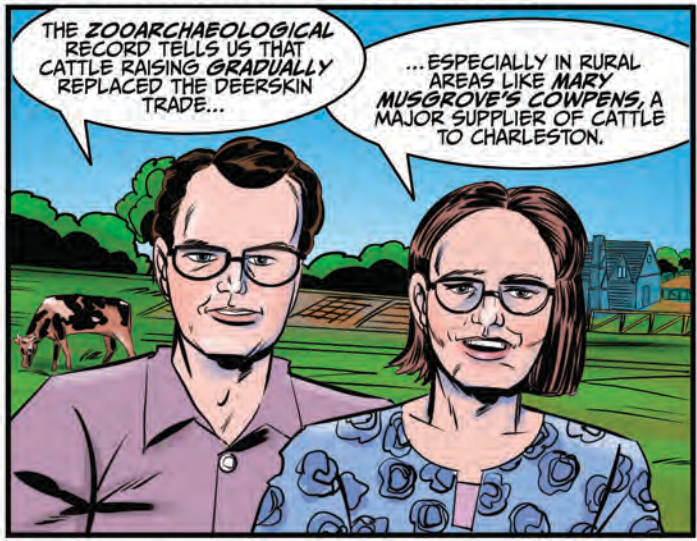
SO WHAT HAVE WE LEARNED ABOUT THE CHARLESTON CATTLE INDUSTRY FROM THIS PROJECT?

**RESEARCH QUESTION 1: HOW WERE CATTLE MANAGED AND RAISED IN AND AROUND CHARLESTON?**



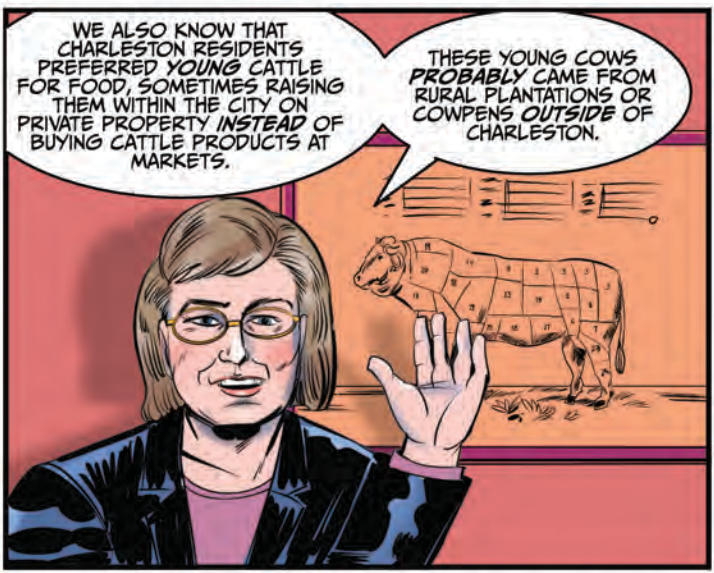
THE HISTORICAL RECORDS TELL US THE CATTLE SOLD IN CHARLESTON CAME FROM MANY PARTS OF THE SOUTH CAROLINA LANDSCAPE.

**RESEARCH QUESTION 2: WHERE DID THE CATTLE SOLD IN URBAN CHARLESTON COME FROM, AND HOW WERE THEY RAISED?**



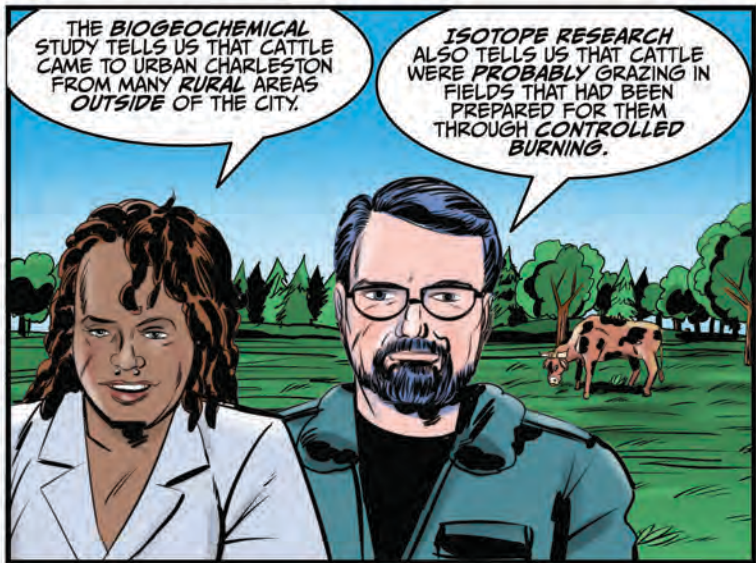
THE ZOOARCHAEOLOGICAL RECORD TELLS US THAT CATTLE RAISING GRADUALLY REPLACED THE DEERSKIN TRADE...

...ESPECIALLY IN RURAL AREAS LIKE MARY MUSGROVE'S COWPENS, A MAJOR SUPPLIER OF CATTLE TO CHARLESTON.



WE ALSO KNOW THAT CHARLESTON RESIDENTS PREFERRED YOUNG CATTLE FOR FOOD, SOMETIMES RAISING THEM WITHIN THE CITY ON PRIVATE PROPERTY INSTEAD OF BUYING CATTLE PRODUCTS AT MARKETS.

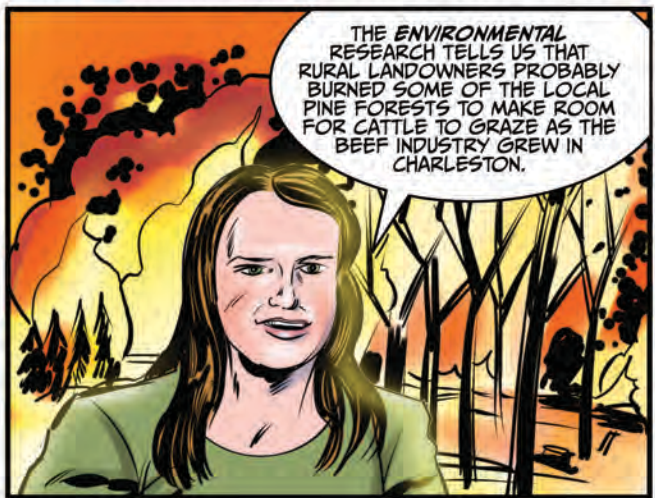
THESE YOUNG COWS PROBABLY CAME FROM RURAL PLANTATIONS OR COWPENS OUTSIDE OF CHARLESTON.



THE BIOGEOCHEMICAL STUDY TELLS US THAT CATTLE CAME TO URBAN CHARLESTON FROM MANY RURAL AREAS OUTSIDE OF THE CITY.

ISOTOPE RESEARCH ALSO TELLS US THAT CATTLE WERE PROBABLY GRAZING IN FIELDS THAT HAD BEEN PREPARED FOR THEM THROUGH CONTROLLED BURNING.

**RESEARCH QUESTION 3: WHAT WAS THE IMPACT OF CATTLE RAISING ON LOCAL ENVIRONMENTS?**



THE ENVIRONMENTAL RESEARCH TELLS US THAT RURAL LANDOWNERS PROBABLY BURNED SOME OF THE LOCAL PINE FORESTS TO MAKE ROOM FOR CATTLE TO GRAZE AS THE BEEF INDUSTRY GREW IN CHARLESTON.

THANKS FOR JOINING US ON A RESEARCH JOURNEY MANY YEARS IN THE MAKING!

IT TAKES A BIG TEAM WORKING TOGETHER TO SOLVE COMPLEX PROBLEMS LIKE THE HISTORY OF THE CATTLE INDUSTRY IN CHARLESTON.

RESEARCH LIKE THIS CREATES A FULLER HISTORY OF LIFE IN CHARLESTON AND HELPS US UNLOCK THE PAST.



Center for Applied  
Isotope Studies  
UNIVERSITY OF GEORGIA

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ILLUSTRATED BY JAMES BURNS

TRANSLATED BY EDGAR ALARCÓN TINAJERO



**NOW THAT YOU HAVE READ ALL ABOUT THE COLONIAL CHARLESTON CATTLE ECONOMY PROJECT, LET'S THINK ABOUT WHAT YOU LEARNED:**

LIST **3** NEW THINGS YOU LEARNED:

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WRITE **2** THINGS YOU WANT TO LEARN MORE ABOUT:

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WHAT IS **1** THING YOU LIKED ABOUT THIS PROJECT?

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