ANTIBIOTICS (lesson 6)

Read the article and complete the tasks that follow:

Prehistoric People Developed Antibiotics

A chemical analysis of the bones of ancient Nubians shows that they were regularly consuming tetracycline, most likely in their beer. The finding is the strongest evidence yet that the art of making antibiotics, which officially dates to the discovery of penicillin in 1928, was common practice nearly 2,000 years ago.

The research, led by Emory anthropologist George Armelagos and medicinal chemist Mark Nelson of Paratek Pharmaceuticals, Inc., is published in the American Journal of Physical Anthropology.

"We tend to associate drugs that cure diseases with modern medicine," Armelagos says. "But it's becoming increasingly clear that this prehistoric population was using empirical evidence to develop therapeutic agents. I have no doubt that they knew what they were doing."

Armelagos is a bioarcheologist and an expert on prehistoric and ancient diets. In 1980, he discovered what appeared to be traces of tetracycline in human bones from Nubia dated between A.D. 350 and 550, populations that left no written record. The ancient Nubian kingdom was located in present-day Sudan, south of ancient Egypt.

Armelagos and his fellow researchers later tied the source of the antibiotic to the Nubian beer. The grain used to make the fermented gruel contained the soil bacteria streptomyces, which produces tetracycline. A key question was whether only occasional batches of the ancient beer contained tetracycline, which would indicate accidental contamination with the bacteria.

Nelson, a leading expert in tetracycline and other antibiotics, became interested in the project after hearing Armelagos speak at a conference. "I told him to send me some mummy bones, because I had the tools and the expertise to extract the tetracycline," Nelson says. "Its a nasty and dangerous process. I had to dissolve the bones in hydrogen fluoride, the most dangerous acid on the planet."

The results stunned Nelson. "The bones of these ancient people were saturated with tetracycline, showing that they had been taking it for a long time," he says. "Im convinced that they had the science of fermentation under control and were purposely producing the drug."

Even the tibia and skull belonging to a 4-year-old were full of tetracycline, suggesting that they were giving high doses to the child to try and cure him of illness, Nelson says.

The first of the modern day tetracyclines was discovered in 1948. It was given the name auereomycin, after the Latin word "aerous," which means containing gold. "Streptomyces produce a golden colony of bacteria, and if it was floating on a batch of

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beer, it must have look pretty impressive to ancient people who revered gold," Nelson theorizes.

The ancient Egyptians and Jordanians used beer to treat gum disease and other ailments, Armelagos says, adding that the complex art of fermenting antibiotics was probably widespread in ancient times, and handed down through generations.

The chemical confirmation of tetracycline in ancient bones is not the end of the story for Armelagos. He remains enthused after more than three decades on the project. "This opens up a whole new area of research," he says. "Now were going to compare the amount of tetracycline in the bones, and bone formation over time, to determine the dosage that the ancient Nubians were getting."

Task 1. Choose the best summary:

(A) Modern chemists reproduced ancient beer for medical use.

(B) The Nubians primarily used the fermented gruel for religious rituals, not for medical purposes.

(C) The study concludes that the source of the tetracycline was accidental contamination from ancient Egyptian river water.

(D) Ancient Nubians intentionally produced antibiotics through beer fermentation.

(E) The research proves that the modern discovery of penicillin was entirely based on the previously known ancient Nubian written records.

Task 2. Decide whether each statement is True (T), False (F), or Not Stated (N) according to the information in the text.

1.	The Nubians accidentally created antibiotics while brewing beer.	**T / F / N**
2.	Tetracycline was discovered only in adult bones and not in children.	**T / F / N**
3.	The antibiotic found in Nubian bones came from *Streptomyces* bacteria.	**T / F / N**
4.	The research shows that ancient Egyptians were the first to invent antibiotics.	**T / F / N**
5.	Scientists used hydrogen fluoride to dissolve bones and extract tetracycline.	**T / F / N**
6.	The yellowish color of the bacteria colony may have been associated with gold.	**T / F / N**
7.	The Nubians used fermentation intentionally to produce a healing substance.	**T / F / N**
8.	Researchers proved that the Nubians used beer mainly for religious rituals.	**T / F / N**

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9.	The study confirmed that Nubians used antibiotics to treat animals as well as humans.	**T / F / N**
10.	Armelagos plans to study the level of tetracycline in bones to estimate the dosage.	**T / F / N**

<u>Task 3.</u> Read the questions carefully and choose the correct answer (A, B, C, or D) according to the information in the article:

1. The first of the modern-day tetracyclines was discovered in 1948 and given the name 'auereomycin.' What does the Latin word 'aerous'—from which the name is derived—mean?

A. Containing disease

B. Containing gold

C. Containing acid

D. Containing life

2. What specific academic field is lead researcher George Armelagos identified as an expert in?

A. Molecular Biology

B. Medicinal Chemistry

C. Bioarchaeology and Anthropology

D. Forensic Science

3. Which specific item did the ancient Nubians regularly consume that was the likely vehicle for the tetracycline?

A. Water from contaminated rivers

B. A fermented gruel made from grain

C. A special medicinal plant extract

D. A mixture of honey and herbs

4. The Nubian bones that George Armelagos first discovered traces of tetracycline in were dated to which period?

A. Between A.D. 350 and 550

B. Around 1948

C. Around 2,000 B.C.

D. Between 1980 and the present

5. According to George Armelagos, what is the main significance of the finding that prehistoric people consumed tetracycline?

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A. It proves that modern medicine has not advanced since ancient times.

B. It confirms that only wealthy ancient populations could afford antibiotics.

C. It is the first proof that ancient people had diseases.

D. It suggests the population was using empirical evidence to develop therapeutic agents.

6. Mark Nelson was 'stunned' by his results, stating that the bones were 'saturated with tetracycline.' What does the word 'saturated' imply in this context?

A. The bones were accidentally contaminated by the acid used for testing.

B. The people had only recently started consuming the antibiotic before they died.

C. The antibiotic was present in extremely high concentration, suggesting long-term, regular consumption.

D. The bones were structurally intact and dissolved easily in the hydrogen fluoride.

7. In addition to the Nubians, what other ancient people were mentioned as using beer to treat ailments like gum disease?

A. The Romans and Greeks

B. The Babylonians and Sumerians

C. The Incas and Mayans

D. The Ancient Egyptians and Jordanians

Task 4. Match the words with their definitions:

1.	ailment	**a.**	knowledge and skill in a particular field
2.	consume	**b.**	very important or necessary for life or success
3.	empirical	**c.**	a simple dish made from boiled grain or cereal in water or milk
4.	gruel	**d.**	deliberately, with the aim of achieving a particular result
5.	contamination	**e.**	a minor illness or disease
6.	vital	**f.**	based on observation or experience rather than theory
7.	expertise	**g.**	to eat, drink, or ingest (food or drink)
8.	purposely	**h.**	the process of becoming dirty, impure, or infected by harmful substances

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