

For decades, the foraging behavior of honeybees was widely perceived as a result of individual trial and error, where each bee navigated the landscape based on personal instinct. However, revolutionary behavioral research in the 20th century transformed this perspective by identifying a complex symbolic language known as the "waggle dance." This set of rhythmic movements, performed inside the dark hive, allows a scout bee to transmit specific data regarding the direction and distance of a food source to other colony members. By aligning their bodies at a particular angle relative to the sun, scout bees provide a biological compass for their peers, translating celestial information into a flight path. Moreover, the vigor and duration of the dance indicate the nutrient density of the nectar, allowing the colony to **allocate** its foraging labor with astonishing precision. This sophisticated system indicates a level of social coordination and abstract thought that challenges the traditional boundaries between human and animal communication. Recent ecological studies further suggest that this communication is vital for the hive's survival during periods of resource scarcity. Consequently, honeybee colonies are now viewed as highly organized collective intelligences where individual actions are synchronized to ensure the prosperity of the entire community.

Soru No: 43

According to the passage, the traditional scientific view of honeybee behavior ----.

- A) emphasized that bees possessed an innate ability to decode complex symbolic languages
- B) was based on the assumption that foraging was primarily a matter of individual exploration
- C) suggested that hives were led by a single leader who dictated every movement of the workers
- D) argued that bees were entirely incapable of surviving in environments with scarce resources
- E) claimed that the sun had no influence on the navigational strategies used by social insects

Soru No: 44

It is clearly stated in the passage that the "waggle dance" ----.

- A) is a chemical signaling process that occurs exclusively outside the honeybee hive
- B) allows scout bees to communicate both the location and the quality of a food source
- C) was first documented by researchers who were looking for ways to increase honey production
- D) prevents other colony members from finding nectar in areas that are too distant
- E) is performed only during the night to avoid being detected by potential predators

Soru No: 45

It can be inferred from the passage that a honeybee colony ----.

- A) would likely struggle to maintain its efficiency if the waggle dance was disrupted
- B) prioritizes the survival of individual scout bees over the prosperity of the community
- C) depends on modern technology to help its members navigate toward distant flowers
- D) is unable to differentiate between high-quality and low-quality nectar sources
- E) has a communication system that is much simpler than that of other social insects

Soru No: 46

The underlined word 'allocate' in the passage is closest in meaning to ----.

- A) restrict
- B) evaluate
- C) distribute
- D) overlook
- E) preserve

For centuries, maritime historians were deeply skeptical about the legendary "sunstones" mentioned in Norse sagas, which supposedly allowed Viking navigators to locate the sun even during heavily overcast or foggy conditions. These stories were often dismissed as mere mythological embellishments until recent optical research suggested a plausible scientific basis for such navigation. Scientists identified that certain crystals, specifically Iceland spar, possess a unique property called polarization. By observing the sky through these translucent minerals, navigators could detect the distinct patterns of polarized light that persist even through dense cloud cover. When the crystal is held up to the sky and rotated, it produces a specific change in brightness that reveals the sun's precise position with remarkable accuracy. This sophisticated optical technique provided a critical advantage during long transoceanic voyages where traditional celestial markers were frequently obscured. Consequently, what was once categorized as a supernatural element of ancient folklore is now recognized as a sophisticated application of physical mineralogy. This discovery not only highlights the advanced empirical knowledge of early seafarers but also reshapes our understanding of how Viking explorers successfully traversed the treacherous North Atlantic centuries before the invention of the magnetic compass.

Soru No: 47

The passage implies that the long-standing academic doubt regarding sunstones was mainly rooted in the assumption that ----.

- A) Norse sagas were primarily intended to be works of fiction rather than historical records
- B) ancient navigators lacked the necessary physical stamina for long-distance oceanic travel
- C) the environmental conditions of the North Atlantic were too stable to require such tools
- D) these objects were nothing but symbolic items with no practical scientific utility
- E) the magnetic compass had already been in widespread use during the Viking Age

Soru No: 48

As pointed out in the passage, the functional essence of Iceland spar in maritime navigation lies in its ability to ----.

- A) magnify the visual size of distant stars to make them visible during the daytime
- B) generate its own light source when exposed to extreme cold or high-pressure fog
- C) identify specific light vibrations that remain present despite the absence of direct sunlight
- D) store solar energy for several hours and release it when the sky becomes dark
- E) chemically react with salt water to indicate the ship's current geographical heading

Soru No: 49

One can conclude from the passage that the scientific validation of sunstones ----.

- A) proves that the Vikings had frequent cultural exchanges with Roman materials scientists
- B) reveals that Viking explorers intentionally hid their navigational secrets from future generations
- C) suggests that modern magnetic compasses are still less reliable than ancient optical tools
- D) indicates that Iceland spar is the only mineral capable of polarizing light in northern latitudes
- E) demonstrates that what was once seen as magic was actually a clever use of natural properties

Soru No: 50

Which of the following would be the most appropriate title for the passage?

- A) The Impact of Iceland Spar on Early Maritime Navigation Routes
- B) Why Modern Historians Continue to Disregard Ancient Norse Folklore
- C) A Comparative Analysis of Medieval and Modern Magnetic Compasses
- D) The Geological Scarcity of Iceland Spar in the North Atlantic Region
- E) From Myth to Reality: The Optical Science Behind Viking Exploration

Botany is often perceived merely as a benign scientific pursuit concerned with the classification of plant life, and we utilize botanical knowledge daily for medicine and agriculture. However, many people are unaware of the deep historical links between botanical research and colonial expansion. Botany played a central role in the age of discovery. Beyond simple curiosity, countless commercial ventures, imperial acquisitions, and environmental transformations cannot be fully understood without considering the influence of "economic botany." Prominent historians advocate for examining plant sciences within the context of global trade dominance. To understand these connections, researchers look at how empires established botanical gardens as hubs for transferring valuable crops like rubber and tea across colonies. Conversely, the political structures of empire dictated which plants were prioritized, often ignoring indigenous ecological knowledge in favor of European economic models. Just as botanical networks shaped the global movement of species, the changing needs of colonial economies drove botanists to innovate in cultivation techniques.

Soru No: 51

Which of the following is true according to the passage?

- A) Modern medicinal breakthroughs are the primary reason why botany remains a relevant academic field today.
- B) The intricate historical association between botanical studies and imperial dominance is often ignored by contemporary society.
- C) Indigenous ecological knowledge has recently become the main source of data for international botanical gardens.
- D) Most people are entirely familiar with the economic history of global crops because of their daily consumption.
- E) Scientific institutions usually disregard the commercial value of plants due to a focus on theoretical classification.

Soru No: 52 The complex historical link between botanical research and colonial expansion ----.

- A) is currently being ignored by researchers who believe that history should be kept separate from natural sciences
- B) has been primarily used as a way to promote the preservation of rare tropical species in urban environments
- C) is frequently misunderstood because people focus solely on the medicinal benefits of plants rather than their economic impact
- D) can be comprehensively analyzed and better understood by looking at it through various socio-political lenses
- E) might help modern scientists to develop new agricultural techniques without any reference to historical data

Soru No: 53It is clearly stated in the passage that colonial economies and botanical research ----.

- A) were developed by the same group of scientists who were exclusively interested in global trade networks
- B) have maintained a stable and peaceful relationship since the first botanical gardens were established in Europe
- C) are so deeply interconnected that the growth of one often dictated the innovation and specific focus of the other
- D) should be studied only by those who have a formal education in both economics and environmental sciences
- E) have no significant influence on each other because scientific discovery is independent of political structures

Soru No: 54 What is the primary purpose of the author in writing this specific passage?

- A) To emphasize the lack of funding for modern botanical research in former colonial territories
- B) To focus on the environmental factors that motivate botanists to travel to remote tropical islands
- C) To argue that all modern agricultural practices are inherently based on outdated colonial models
- D) To provide an analytical overview of the reciprocal historical relationship between botany and imperial power
- E) To discuss the potential future roles of botanical gardens in solving the global food security crisis

Palynology, the scientific study of microscopic spores and fossilized pollen grains, has emerged as a crucial investigative tool for reconstructing ancient environments and establishing chronological contexts for archaeological strata. While early botanists had categorized various plant pollens, it was the Norwegian geologist Lennart von Post who formalized the methodology of "pollen zones" in the early 20th century. By analyzing the fossilized pollen trapped within sedimentary layers, researchers can identify the dominant vegetation of a specific period, which accurately reflects the broader climatic shifts of that era. Because different plant species produce uniquely shaped pollen grains that are remarkably resistant to environmental decay, these microscopic markers act as a biological fingerprint for a given landscape. By comparing the pollen profiles of newly excavated sites with established regional sequences, archaeologists can estimate the relative age of artifacts found within the same soil layers. However, the effectiveness of palynology is heavily dependent on the preservation conditions of the soil; highly acidic or oxygen-rich environments often destroy these delicate grains before they can be analyzed. In such cases, researchers must turn to alternative geophysical methods, such as thermoluminescence, which calculates the accumulated radiation dose in fired minerals to determine when they were last exposed to intense heat.

Soru No: 55

One can understand from the passage that palynology ----.

- A) originated from the efforts of prehistoric societies to document the diverse plant species surrounding their settlements
- B) is a specialized scientific discipline that utilizes fossilized microscopic markers to interpret past climatic conditions and date historical layers
- C) focuses exclusively on the chemical decomposition of minerals found in sedimentary layers rather than the physical structure of spores
- D) is considered the only reliable dating method in volcanic regions where high soil acidity prevents the survival of traditional organic artifacts
- E) was initially rejected by 20th-century geologists due to a perceived lack of accuracy in identifying dominant regional vegetation

Soru No: 56

It is clear from the text that the unique properties of pollen grains ----.

- A) tend to lose their structural complexity rapidly when they are exposed to stable environmental conditions for long periods
- B) are utilized by modern astronomers to track historical changes in solar radiation by analyzing the chemical composition of floral remains
- C) possess distinct and durable physical characteristics that allow scientists to categorize specific plant types from various historical eras with high precision
- D) are typically found in the same geological strata as carbon isotopes, which makes the use of alternative geophysical dating methods unnecessary
- E) can be used to determine the exact nutritional value of crops cultivated by prehistoric indigenous communities during periods of extreme rainfall

Soru No: 57

Regarding cases where soil conditions are unsuitable for palynological analysis, ----.

- A) thermoluminescence is often preferred because it can determine the age of inorganic materials like fired clay by measuring their last exposure to heat
- B) researchers usually abandon the site since acidic environments make it impossible to apply any known archaeological dating or classification techniques
- C) tropical regions are more likely to utilize tree-ring dating because the constant growth of vegetation prevents the formation of sedimentary pollen zones
- D) the study of carbon isotopes is strictly avoided due to the high risk of contaminating delicate biological markers during the excavation process
- E) geologists strongly recommend focusing on the thickness of mineral fragments rather than attempting to reconstruct the broader climatic shifts of the era

Soru No: 58

The primary focus of the passage is on ----.

- A) the historical evolution of agricultural tools and their significant impact on the development of modern botanical classification systems
- B) why 20th-century researchers preferred using biological fingerprints over geophysical markers to study the impact of sunspot activity on terrestrial climates
- C) the groundbreaking astronomical discoveries made by Lennart von Post and their influence on early 20th-century geological research
- D) a comparison between the precision of radiocarbon dating and the efficiency of thermoluminescence in analyzing inorganic mineral radiation
- E) the operational principles and archaeological utility of palynology, along with the environmental factors that limit its effectiveness in certain contexts

For centuries, the nocturnal lifestyle of bats was shrouded in mystery, with early naturalists often attributing their effortless flight in total darkness to a supernatural "sixth sense" or an exceptional sense of touch. However, pioneering experiments in the mid-20th century, aided by the development of high-frequency recording technology, fundamentally shifted this perspective. Researchers discovered that bats navigate and hunt not through vision or touch, but through a highly sophisticated acoustic system known as echolocation. By emitting ultrasonic pulses—sounds far beyond the range of human hearing—bats create a detailed auditory map of their surroundings. This biological sonar is far from a primitive tool; it is an exceptionally precise adaptation used for remarkably complex tasks. For example, some species can detect an object as thin as a human hair or identify the specific texture of a moth's wings from several meters away. Conversely, certain moth species have evolved "acoustic camouflage" or defensive clicks to disrupt these pulses, illustrating an ongoing evolutionary arms race. Recent behavioral studies highlight that these acoustic adaptations are not just intriguing biological traits but are fundamental to a bat's daily survival, ecological niche, and position within the predatory hierarchy of the night sky.

Soru No: 59

According to the passage, the use of echolocation by bats ----.

- A) was initially thought to be a primitive version of the sixth sense possessed by most nocturnal birds
- B) allows these mammals to construct a precise mental representation of their environment using sound waves
- C) is a purely defensive mechanism used exclusively to avoid colliding with larger predators in dense forests
- D) depends heavily on the physical texture of the wings to determine the exact flight path of potential prey
- E) is a recently developed trait that emerged after high-frequency recording technology became available

Soru No: 60 One can understand from the passage that before the mid-20th century, scientists' perception of bat navigation ----.

- A) was based on a fundamental misunderstanding of the sensory mechanisms that enable flight in total darkness
- B) correctly identified the ultrasonic pulses emitted by bats but lacked the technology to record them efficiently
- C) hypothesized that bats and moths shared a cooperative relationship to maintain the predatory hierarchy of the night
- D) assumed that bats relied on their vision to detect objects as thin as a human hair during flight
- E) focused exclusively on the physical stamina of bats rather than their sophisticated light-based adaptations

Soru No: 61 It can be inferred from the passage that the relationship between bats and certain moths ----.

- A) is characterized by a lack of evolutionary interaction since moths do not possess any natural defensive mechanisms
- B) has remained entirely unstudied by behavioral scientists due to the extreme difficulty of recording ultrasonic pulses
- C) represents a complex evolutionary struggle where both species have developed specialized traits to counter each other
- D) is primarily based on a mutual sense of touch rather than the sophisticated use of biological sonar
- E) results in the complete eradication of bat populations in regions where moths have developed effective acoustic clicks

Soru No: 62 Which of the following would be the most appropriate title for this passage?

- A) The Impact of High-Frequency Recording Technology on Modern Avian Research
- B) How Ancient Naturalists Successfully Categorized Nocturnal Mammals and Bats
- C) The Evolutionary Decline of Moth Species in Response to Predatory Bats
- D) Echolocation: Navigating the Auditory Landscape of the Nocturnal World
- E) The Role of Echolocation in the Emergence of Bat and Moth Populations