evolution regents questions

evolution regents questions are a key component of the New York State Regents Exams, designed to assess students' understanding of biological evolution and related concepts. These questions not only test knowledge of fundamental evolutionary principles but also evaluate critical thinking skills, the ability to interpret scientific data, and the application of evolutionary theory to real-world scenarios. Mastery of evolution regents questions is essential for students aiming to excel in biology and meet graduation requirements. This article provides a comprehensive overview of the types of evolution questions commonly found on the Regents exam, effective strategies for answering them, and important topics that frequently appear. Additionally, this guide highlights the significance of understanding natural selection, genetic variation, and evidence for evolution, offering insights for educators and students alike. The following sections will explore the structure of evolution regents questions, common themes, study tips, and sample questions to enhance preparation.

Overview of Evolution Regents Questions

Evolution regents questions are integral parts of the Living Environment Regents exam, which evaluates students' grasp of biology concepts, including evolution. These questions are designed to assess knowledge, comprehension, application, and analysis related to evolutionary biology. Students are expected to demonstrate an understanding of how species change over time, the mechanisms driving evolution, and how to interpret scientific evidence supporting evolutionary theory. Evolution questions may appear in multiple-choice format, short-answer responses, or extended open-ended questions, requiring a range of skills from recall to critical analysis.

Purpose and Importance

The purpose of evolution regents questions is to ensure students comprehend the foundational concepts of biology that explain the diversity and adaptation of life on Earth. Understanding evolution is critical for grasping broader biological principles such as genetics, ecology, and physiology. Additionally, these questions promote scientific literacy by encouraging students to analyze data, evaluate hypotheses, and apply evolutionary theory to novel situations.

Exam Structure and Weight

Within the Living Environment Regents exam, evolution questions typically constitute a significant portion, reflecting their importance in the curriculum. Students may encounter multiple questions that focus solely on evolution or incorporate evolutionary principles within broader biological contexts. Familiarity with the exam format and evolution question types is essential for effective preparation.

Common Topics Covered in Evolution Questions

Evolution regents questions commonly cover a range of topics integral to understanding evolutionary biology. These topics are aligned with New York State Science Learning Standards and the Regents curriculum framework. Mastery of these subjects is crucial for answering questions accurately and confidently.

Natural Selection and Adaptation

Natural selection is a fundamental mechanism of evolution covered extensively in Regents questions. Students are expected to understand how variation, competition, and environmental pressures lead to the selection of advantageous traits that increase an organism’s survival and reproductive success. Questions may ask about examples of adaptation, the role of mutations, and how selective pressures influence populations over time.

Genetic Variation and Mutation

Genetic variation within populations forms the raw material for evolution. Evolution regents questions often focus on sources of genetic diversity such as mutations, gene flow, and sexual reproduction. Understanding how these factors contribute to evolutionary change is critical, as is recognizing the difference between genotype and phenotype.

Evidence for Evolution

Students must be able to identify and explain various types of evidence supporting the theory of evolution. Common forms of evidence include fossil records, comparative anatomy, embryology, molecular biology, and biogeography. Evolution questions may require analysis of data or diagrams illustrating these evidences.

Speciation and Extinction

Speciation, the process by which new species arise, is another important topic. Regents questions might explore reproductive isolation, geographic barriers, and the role of genetic divergence in speciation. Additionally, extinction events and their impact on biodiversity are often covered.

Evolutionary Trees and Classification

Interpreting phylogenetic trees and understanding classification systems based on evolutionary relationships are common components of evolution questions. Students should be comfortable reading and analyzing cladograms and evolutionary diagrams to determine relatedness and ancestral traits.

Types of Evolution Regents Questions

Evolution questions on the Regents exam appear in various formats designed to test different cognitive skills. Recognizing these types helps students prepare and approach each question with appropriate strategies.

Multiple-Choice Questions

Multiple-choice questions often test factual knowledge and the ability to apply evolutionary concepts to specific scenarios. These questions may involve interpreting graphs, diagrams, or experimental data related to evolutionary processes.

Short-Answer Questions

Short-answer questions require concise explanations or definitions related to evolutionary terms and processes. Students may be asked to describe natural selection, explain the significance of genetic variation, or interpret a simple data set.

Open-Ended or Extended Response Questions

Open-ended questions demand more detailed responses, often requiring students to analyze evidence, construct explanations, or compare evolutionary concepts. These questions assess critical thinking and the ability to integrate multiple ideas about evolution.

Data Analysis and Graph Interpretation

Many evolution regents questions involve interpreting data from experiments, fossil records, or population studies. Students must analyze graphs showing changes in allele frequencies, survival rates, or evolutionary timelines to answer questions accurately.

Strategies for Answering Evolution Questions

Effective strategies can significantly improve performance on evolution regents questions by enhancing comprehension and accuracy. The following approaches help students navigate various question types with confidence.

Understand Key Vocabulary

Familiarity with essential terms such as natural selection, mutation, adaptation, species, and fitness is crucial. Understanding these terms enables students to grasp questions quickly and formulate precise answers.

Analyze Diagrams and Data Carefully

Many questions rely on the interpretation of graphs, charts, and evolutionary trees. Taking time to read and understand these visual aids prevents misinterpretation and supports evidence-based answers.

Use Process of Elimination

For multiple-choice questions, eliminating clearly incorrect answers improves the chances of selecting the correct response. Focus on identifying options that conflict with evolutionary principles or data presented.

Practice Writing Clear Explanations

For short-answer and open-ended questions, concise and well-organized responses are essential. Practice explaining concepts in simple, direct language while incorporating relevant scientific terminology.

Review Past Regents Exams

Familiarity with the format and typical questions from previous exams provides insight into common themes and question structures. Regular practice with past questions builds confidence and reinforces knowledge.

Sample Evolution Regents Questions

Reviewing sample questions offers practical experience and highlights the types of challenges students may face on the exam. Below are examples representative of evolution regents questions:

1. **Multiple Choice:** Which of the following best explains why antibiotic resistance in bacteria is an example of natural selection?
    - A. Bacteria mutate to become resistant after exposure to antibiotics.
    - B. Antibiotics cause the bacteria to change their DNA.
    - C. Resistant bacteria survive and reproduce more than non-resistant bacteria.
    - D. All bacteria are resistant to antibiotics from the start.

2. **Short Answer:** Define genetic variation and explain its importance in evolution.

3. **Open-Ended:** Analyze the following data on finch beak sizes over several generations and explain how natural selection may have influenced these changes.

4. **Data Interpretation:** Given a cladogram of several species, identify which species share the most recent common ancestor and justify your answer.

Tips for Effective Study and Preparation

Preparing for evolution regents questions requires focused study and consistent practice. The following tips can enhance learning and exam readiness.

Create Study Guides and Flashcards

Organizing key concepts, definitions, and examples into study guides or flashcards facilitates active recall and long-term retention. Focus on important vocabulary and major evolutionary processes.

Engage in Practice Tests

Regularly completing practice questions and timed exams helps build familiarity with question formats and improves time management skills during the actual test.

Participate in Group Study Sessions

Collaborative learning enables discussion of challenging topics, clarification of concepts, and exposure to different perspectives on evolution questions.

Utilize Visual Aids

Drawing diagrams, charts, and flowcharts to illustrate evolutionary mechanisms and evidence can deepen understanding and aid memory.

Focus on Understanding, Not Memorization

Comprehending the underlying principles of evolution and their applications is more effective than rote memorization, particularly for data analysis and open-ended questions.

Frequently Asked Questions

What is the main principle of Darwin's theory of evolution?

The main principle of Darwin's theory of evolution is natural selection, where organisms better adapted to their environment tend to survive and produce more offspring.

How do fossils provide evidence for evolution?

Fossils provide evidence for evolution by showing changes in organisms over time and documenting the existence of species that are now extinct.

What role does genetic variation play in evolution?

Genetic variation provides the raw material for evolution, as differences in genes among individuals can lead to different traits that may be selected for or against in a given environment.

How can natural selection lead to the formation of new species?

Natural selection can lead to the formation of new species when populations of a species become isolated and adapt to different environments, eventually resulting in reproductive isolation and speciation.

What is the significance of homologous structures in evolutionary studies?

Homologous structures indicate common ancestry, as they are anatomical features shared by different species that have evolved from a common ancestor.

How does the fossil record support the concept of gradual evolution?

The fossil record supports gradual evolution by documenting a sequence of intermediate forms showing progressive changes from ancient to modern species.

What is the difference between divergent and convergent evolution?

Divergent evolution occurs when two species evolve different traits from a common ancestor, while convergent evolution happens when unrelated species develop similar traits due to similar environmental pressures.

Why is genetic mutation important for evolution?

Genetic mutations introduce new genetic variations, some of which may provide advantages that can be acted upon by natural selection, driving evolutionary change.

How do scientists use DNA evidence to study evolution?

Scientists compare DNA sequences among species to determine genetic similarities and differences, helping to reconstruct evolutionary relationships and estimate how long ago species diverged.

Additional Resources

1. *Evolution Essentials: Regents Review Guide*
This comprehensive guide focuses on key concepts of evolution aligned with the Regents exam curriculum. It breaks down complex topics such as natural selection, genetic variation, and speciation into easy-to-understand sections. The book includes practice questions and detailed explanations to reinforce learning and improve exam performance.

2. *Mastering Evolution for the Regents Exam*
Designed specifically for Regents students, this book offers in-depth coverage of evolutionary theory and its applications. It features clear summaries, diagrams, and real-world examples to illustrate evolutionary processes. End-of-chapter questions simulate the style and difficulty of Regents questions to aid exam preparation.

3. *Regents Biology: Evolution Focused Workbook*
This workbook provides targeted practice on evolution-related topics within the Regents Biology syllabus. It includes multiple-choice questions, short answers, and essay prompts that mirror those found on the actual exam. Detailed answer keys help students understand mistakes and learn effectively.

4. *Understanding Natural Selection: Regents Study Aid*
Natural selection is a cornerstone of evolutionary biology, and this book explains the concept thoroughly for Regents students. It presents case studies, graphical data interpretation, and step-by-step problem-solving strategies. The text prepares learners to tackle common Regents questions by emphasizing critical thinking.

5. *Evolutionary Biology for High School Regents*
This textbook covers all major themes of evolutionary biology required for the Regents exam. Topics include fossil records, genetic evidence, evolutionary trees, and adaptation mechanisms. The book is enriched with illustrations and review questions to reinforce comprehension and retention.

6. *Practice Questions in Evolution: Regents Edition*
A collection of over 300 practice questions focused solely on evolution topics relevant to the Regents exam. Each question is followed by a detailed explanation and tips for answering similar questions. This resource is ideal for students seeking extensive practice to build confidence and mastery.

7. *Concepts of Evolution: Regents Review and Practice*
This book combines concise concept reviews with practice exercises tailored for Regents evolution questions. It emphasizes understanding rather than memorization, helping students grasp evolutionary processes and evidence. The interactive format encourages active learning and self-assessment.

8. *Evolution and Genetics: Regents Study Companion*
Focusing on the genetic basis of evolution, this guide explores mutation, gene flow, genetic drift, and natural selection in depth. It connects these concepts directly to the Regents curriculum with clear explanations and

relevant exam questions. Diagrams and charts enhance visualization of genetic mechanisms.

9. *Regents Prep: Evolution and Ecology*
While covering both evolution and ecology, this book provides a balanced approach to the biological sciences tested on the Regents exam. Evolution sections highlight key principles and recent scientific findings. Practice questions and review sections help students integrate knowledge across topics for comprehensive exam readiness.

Evolution Regents Questions

Evolution Regents Questions: A Comprehensive Guide

Author: Dr. Evelyn Reed, PhD in Evolutionary Biology

Ebook Outline:

Introduction: The Significance of Evolution in the Regents Exam
Chapter 1: Mechanisms of Evolution (Natural Selection, Genetic Drift, Gene Flow, Mutation)
Chapter 2: Evidence for Evolution (Fossil Record, Comparative Anatomy, Molecular Biology, Biogeography)
Chapter 3: Speciation and Macroevolution
Chapter 4: Human Evolution and Primate Relationships
Chapter 5: Common Misconceptions and Challenges to Evolutionary Theory
Chapter 6: Applying Evolutionary Concepts to Current Issues (e.g., antibiotic resistance, conservation biology)
Conclusion: Mastering the Regents Exam and Beyond

Evolution Regents Questions: A Comprehensive Guide

Introduction: The Significance of Evolution in the Regents Exam

The New York State Regents Examination in Living Environment places significant emphasis on the

understanding of evolutionary principles. Evolution isn't just a single topic; it's a unifying theme that underpins many biological concepts. A solid grasp of evolution is crucial not only for success on the exam but also for a comprehensive understanding of the biological world. This guide aims to provide a thorough exploration of key evolutionary concepts frequently tested on the Regents, helping students build a strong foundation and confidently tackle exam questions. The exam tests not just rote memorization, but also the ability to apply evolutionary principles to diverse scenarios and interpret data related to evolutionary processes. Therefore, a deep understanding of the underlying mechanisms and evidence is paramount.

Chapter 1: Mechanisms of Evolution (Natural Selection, Genetic Drift, Gene Flow, Mutation)

Evolution is driven by several key mechanisms, each contributing to changes in the genetic makeup of populations over time. Understanding these mechanisms is essential for interpreting evolutionary patterns.

Natural Selection: This is the cornerstone of evolutionary theory. Natural selection favors individuals with traits that enhance their survival and reproduction in a specific environment. These advantageous traits, encoded in their genes, are passed on to their offspring, leading to a gradual shift in the genetic makeup of the population. The Regents exam often presents scenarios requiring students to identify the selective pressures driving natural selection and predict the outcome on a population's genetic diversity. Key terms to understand include: adaptation, fitness, selective pressure, variation.

Genetic Drift: This refers to random fluctuations in gene frequencies, particularly pronounced in small populations. Genetic drift can lead to the loss of genetic variation or the fixation of certain alleles (gene versions) purely by chance, not due to selective advantage. Bottleneck effect and founder effect are common examples tested on the Regents. Understanding these concepts requires knowing how random events can significantly influence the evolutionary trajectory of a population.

Gene Flow: This describes the movement of genes between populations through migration. Gene flow can introduce new alleles into a population, increasing genetic diversity and potentially reducing differences between populations. The Regents may present questions involving gene flow’s impact on the adaptation of populations to different environments.

Mutation: Mutations are changes in DNA sequence. While many mutations are neutral or harmful, some can be beneficial, providing the raw material for natural selection to act upon. Mutations are the ultimate source of all genetic variation. The exam will test your understanding of how mutations can lead to new traits and contribute to evolution.

Chapter 2: Evidence for Evolution (Fossil Record, Comparative Anatomy, Molecular Biology, Biogeography)

Evolutionary theory is supported by a vast body of evidence from diverse fields. The Regents exam frequently tests students' ability to interpret and analyze this evidence.

Fossil Record: Fossils provide a tangible record of life's history, showing the progression of organisms over time and documenting the extinction of species. Understanding how fossils are formed, dated, and interpreted is crucial. The Regents may ask about transitional fossils, which show intermediate forms between ancestral and descendant species, providing strong evidence for evolutionary transitions.

Comparative Anatomy: Similarities in the anatomical structures of different species provide evidence of common ancestry. Homologous structures (similar structures with different functions) and analogous structures (different structures with similar functions) are important concepts to grasp. The Regents might ask you to compare and contrast these structures and infer evolutionary relationships.

Molecular Biology: Comparisons of DNA and protein sequences provide powerful evidence for evolutionary relationships. The more similar the sequences between two species, the more closely related they are likely to be. Phylogenetic trees, which depict evolutionary relationships, are frequently used to represent molecular data.

Biogeography: The geographic distribution of species provides insights into their evolutionary history. The distribution patterns of organisms often reflect their evolutionary relationships and historical events, such as continental drift. Understanding how biogeography supports evolutionary theory is key to answering Regents questions.

Chapter 3: Speciation and Macroevolution

Speciation is the formation of new and distinct species. This process is a crucial aspect of macroevolution, the large-scale evolutionary changes that lead to the diversity of life we see today.

Allopatric Speciation: This occurs when populations are geographically isolated, leading to independent evolution and the eventual formation of separate species.
Sympatric Speciation: This happens within the same geographic area, often due to reproductive isolation mechanisms such as habitat differentiation or sexual selection.
Adaptive Radiation: This is a rapid diversification of a lineage into many different species, often in response to the exploitation of new resources or environments.
Gradualism vs. Punctuated Equilibrium: These are competing models explaining the pace of evolutionary change. Gradualism suggests slow, steady change, while punctuated equilibrium posits periods of rapid change punctuated by long periods of stasis. Understanding the differences and evidence supporting each model is important.

Chapter 4: Human Evolution and Primate Relationships

Human evolution is a fascinating and complex area of study, frequently touched upon in the Regents exam.

Primate Characteristics: Understanding the shared characteristics of primates (e.g., grasping hands, binocular vision) is essential to understanding human evolutionary relationships.
Hominin Evolution: Tracing the evolutionary lineage leading to modern humans involves understanding the key characteristics and relationships of various hominin species (e.g., Australopithecus, Homo habilis, Homo erectus, Homo neanderthalensis).
Fossil Evidence: Interpreting fossil evidence to reconstruct human evolutionary history is crucial. This includes understanding the limitations and interpretations of fossil data.

Chapter 5: Common Misconceptions and Challenges to Evolutionary Theory

Addressing common misconceptions and understanding the ongoing scientific discussions surrounding evolution is crucial for a complete understanding. The Regents exam may test your ability to distinguish between scientific fact and common misunderstandings.

Evolution is just a theory: In science, a theory is a well-substantiated explanation supported by extensive evidence. Evolution is not merely a guess but a robust scientific theory.
Humans evolved from chimpanzees: Humans and chimpanzees share a common ancestor, but humans did not evolve directly from chimpanzees.
Evolution is always progressive: Evolution is not directional; it's driven by adaptation to specific environments, not necessarily towards a predetermined "better" state.
Individuals evolve: Evolution occurs at the population level, not the individual level. Individuals do not change their genetic makeup during their lifetime.

Chapter 6: Applying Evolutionary Concepts to Current Issues (e.g., antibiotic resistance, conservation biology)

Evolutionary principles are not just historical concepts; they have significant implications for current biological issues.

Antibiotic Resistance: The rapid evolution of antibiotic-resistant bacteria poses a major threat to human health. Understanding how natural selection contributes to this resistance is critical.
Pesticide Resistance: Similar to antibiotic resistance, the evolution of pesticide-resistant insects necessitates the development of new strategies for pest control.
Conservation Biology: Understanding evolutionary principles is essential for effective conservation efforts, such as preserving biodiversity and managing endangered species.

Conclusion: Mastering the Regents Exam and Beyond

Mastering the concepts presented in this guide will significantly enhance your performance on the Living Environment Regents exam. However, the value of understanding evolution extends far beyond the exam. Evolutionary thinking is a crucial framework for comprehending the biological world, from the diversity of life to the challenges facing humanity today. By grasping the mechanisms, evidence, and implications of evolution, you'll gain a deeper appreciation for the interconnectedness of life and the ongoing process of adaptation and change.

FAQs

1. What is the difference between homologous and analogous structures? Homologous structures share a common ancestry but may have different functions, while analogous structures have similar functions but different origins.

2. How does genetic drift differ from natural selection? Genetic drift is random change in allele frequencies, while natural selection is driven by differential survival and reproduction based on advantageous traits.

3. What is the role of mutations in evolution? Mutations create new genetic variations, providing the raw material for natural selection to act upon.

4. What is adaptive radiation? Adaptive radiation is the rapid diversification of a lineage into multiple species, often filling different ecological niches.

5. What is punctuated equilibrium? Punctuated equilibrium is a model of evolution that suggests that long periods of stasis are punctuated by short periods of rapid change.

6. How does gene flow affect genetic diversity? Gene flow can increase genetic diversity by introducing new alleles into a population.

7. What is the significance of the fossil record in evolutionary studies? The fossil record provides direct evidence of past life forms and their evolutionary relationships.

8. How does antibiotic resistance evolve? Antibiotic resistance evolves through natural selection, where bacteria with resistance genes survive and reproduce in the presence of antibiotics.

9. What is the difference between microevolution and macroevolution? Microevolution refers to small-scale changes within a population, while macroevolution refers to large-scale changes leading to the formation of new species and higher taxa.

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innovative celebration of diversity and affirmation of individuality in animals and humans, Joan Roughgarden challenges accepted wisdom about gender identity and sexual orientation. A distinguished evolutionary biologist, Roughgarden takes on the medical establishment, the Bible, social science—and even Darwin himself. She leads the reader through a fascinating discussion of diversity in gender and sexuality among fish, reptiles, amphibians, birds, and mammals, including primates. Evolution's Rainbow explains how this diversity develops from the action of genes and hormones and how people come to differ from each other in all aspects of body and behavior. Roughgarden reconstructs primary science in light of feminist, gay, and transgender criticism and redefines our understanding of sex, gender, and sexuality. Witty, playful, and daring, this book will revolutionize our understanding of sexuality. Roughgarden argues that principal elements of Darwinian sexual selection theory are false and suggests a new theory that emphasizes social inclusion and control of access to resources and mating opportunity. She disputes a range of scientific and medical concepts, including Wilson's genetic determinism of behavior, evolutionary psychology, the existence of a gay gene, the role of parenting in determining gender identity, and Dawkins's selfish gene as the driver of natural selection. She dares social science to respect the agency and rationality of diverse people; shows that many cultures across the world and throughout history accommodate people we label today as lesbian, gay, and transgendered; and calls on the Christian religion to acknowledge the Bible's many passages endorsing diversity in gender and sexuality. Evolution's Rainbow concludes with bold recommendations for improving education in biology, psychology, and medicine; for democratizing genetic engineering and medical practice; and for building a public monument to affirm diversity as one of our nation's defining principles.

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platforms and environments, Debates in the Digital Humanities 2016 offers a vision of DH as an expanded field—new possibilities, differently structured. Published simultaneously in print, e-book, and interactive webtext formats, each DH annual will be a book-length publication highlighting the particular debates that have shaped the discipline in a given year. By identifying key issues as they unfold, and by providing a hybrid model of open-access publication, these volumes and the Debates in the Digital Humanities series will articulate the present contours of the field and help forge its future. Contributors: Moya Bailey, Northeastern U; Fiona Barnett; Matthew Battles, Harvard U; Jeffrey M. Binder; Zach Blas, U of London; Cameron Blevins, Rutgers U; Sheila A. Brennan, George Mason U; Timothy Burke, Swarthmore College; Rachel Sagner Buurma, Swarthmore College; Micha Cárdenas, U of Washington–Bothell; Wendy Hui Kyong Chun, Brown U; Tanya E. Clement, U of Texas–Austin; Anne Cong-Huyen, Whittier College; Ryan Cordell, Northeastern U; Tressie McMillan Cottom, Virginia Commonwealth U; Amy E. Earhart, Texas A&M U; Domenico Fiormonte, U of Roma Tre; Paul Fyfe, North Carolina State U; Jacob Gaboury, Stony Brook U; Kim Gallon, Purdue U; Alex Gil, Columbia U; Brian Greenspan, Carleton U; Richard Grusin, U of Wisconsin, Milwaukee; Michael Hancher, U of Minnesota; Molly O'Hagan Hardy; David L. Hoover, New York U; Wendy F. Hsu; Patrick Jagoda, U of Chicago; Jessica Marie Johnson, Michigan State U; Steven E. Jones, Loyola U; Margaret Linley, Simon Fraser U; Alan Liu, U of California, Santa Barbara; Elizabeth Losh, U of California, San Diego; Alexis Lothian, U of Maryland; Michael Maizels, Wellesley College; Mark C. Marino, U of Southern California; Anne B. McGrail, Lane Community College; Bethany Nowviskie, U of Virginia; Julianne Nyhan, U College London; Amanda Phillips, U of California, Davis; Miriam Posner, U of California, Los Angeles; Rita Raley, U of California, Santa Barbara; Stephen Ramsay, U of Nebraska–Lincoln; Margaret Rhee, U of Oregon; Lisa Marie Rhody, Graduate Center, CUNY; Roopika Risam, Salem State U; Stephen Robertson, George Mason U; Mark Sample, Davidson College; Jentery Sayers, U of Victoria; Benjamin M. Schmidt, Northeastern U; Scott Selisker, U of Arizona; Jonathan Senchyne, U of Wisconsin, Madison; Andrew Stauffer, U of Virginia; Joanna Swafford, SUNY New Paltz; Toniesha L. Taylor, Prairie View A&M U; Dennis Tenen; Melissa Terras, U College London; Anna Tione; Ted Underwood, U of Illinois, Urbana–Champaign; Ethan Watrall, Michigan State U; Jacqueline Wernimont, Arizona State U; Laura Wexler, Yale U; Hong-An Wu, U of Illinois, Urbana–Champaign.

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