

genetics practice problems pedigree tables answer key

genetics practice problems pedigree tables answer key is a vital resource for students, teachers, and anyone seeking to master genetic inheritance and pedigree analysis. This comprehensive article explores how genetics practice problems, especially those involving pedigree tables, help you understand patterns of inheritance, track genetic traits, and solve challenging problems. We discuss the fundamentals of pedigree charts, common symbols and terminology, and provide guidance on interpreting data to determine genotypes and inheritance patterns. Whether you're preparing for biology exams or strengthening your genetics knowledge, this guide covers everything from sample problems to expert tips for reading pedigree tables and using answer keys effectively. Read on to unlock the secrets of genetics practice problems and pedigree tables.

- Understanding Genetics Practice Problems
- Introduction to Pedigree Tables
- Key Symbols and Terminology in Pedigree Analysis
- Solving Genetics Practice Problems Using Pedigree Tables
- Effective Use of the Answer Key
- Sample Genetics Practice Problems and Solutions
- Tips for Mastering Pedigree Table Analysis
- Common Mistakes and How to Avoid Them

Understanding Genetics Practice Problems

Genetics practice problems are essential tools for learning and mastering the principles of heredity and inheritance. They challenge students to apply theoretical knowledge to practical scenarios, reinforcing key concepts such as dominant and recessive traits, genotype and phenotype distinctions, and Mendelian patterns of inheritance. By working through these problems, learners develop critical thinking and problem-solving skills, which are crucial for success in biology and related fields. Practice problems often incorporate pedigree tables to visually represent family relationships and the transmission of genetic traits across generations.

Purpose of Genetics Practice Problems

The main goal of genetics practice problems is to help students understand how traits are inherited and predict outcomes in various genetic scenarios. These problems are designed to:

- Test comprehension of inheritance patterns
- Build analytical skills for interpreting genetic data
- Prepare students for exams and real-world applications
- Strengthen the ability to use logic and reasoning in genetics

Types of Genetics Practice Problems

Genetics practice problems can vary in complexity, ranging from simple Mendelian crosses to advanced pedigree analysis. Common types include:

- Monohybrid and dihybrid crosses
- Autosomal and sex-linked inheritance
- Pedigree chart interpretation
- Identifying carriers and affected individuals

Introduction to Pedigree Tables

Pedigree tables, also known as pedigree charts, are graphical representations of family relationships and genetic trait transmission. They are widely used in genetics to track the inheritance of specific traits, diseases, or disorders across multiple generations. Pedigree tables provide a clear, organized way to visualize genetic connections, making it easier to analyze patterns and draw conclusions about inheritance mechanisms.

Structure of Pedigree Tables

A typical pedigree table consists of symbols representing individuals, lines denoting relationships, and shading or markings indicating trait status. The chart is arranged with the oldest generation at the top and subsequent generations below, illustrating the flow of genetic information through a family.

Importance of Pedigree Analysis in Genetics

Pedigree analysis is crucial for identifying inheritance patterns, diagnosing genetic disorders, and predicting the likelihood of traits appearing in future generations. It enables researchers and clinicians to:

- Determine whether a trait is dominant, recessive, or sex-linked

- Identify carriers of genetic conditions
- Assess genetic risks for offspring
- Trace the transmission of rare or complex traits

Key Symbols and Terminology in Pedigree Analysis

Understanding the symbols and terminology used in pedigree tables is essential for accurate interpretation. Each symbol conveys specific information about an individual's sex, trait status, and familial relationships.

Common Pedigree Symbols

- Square: Male
- Circle: Female
- Filled symbol: Individual expressing the trait
- Half-filled symbol: Carrier of a recessive trait
- Horizontal line: Marriage or mating
- Vertical line: Offspring
- Roman numerals: Generations

Essential Terminology

- Genotype: Genetic makeup of an individual
- Phenotype: Observable trait or characteristic
- Dominant trait: Expressed when at least one dominant allele is present
- Recessive trait: Expressed only when two recessive alleles are present
- Carrier: Individual who has one copy of a recessive allele but does not express the trait

Solving Genetics Practice Problems Using Pedigree Tables

Pedigree tables are powerful tools for solving genetics practice problems. By analyzing the relationships and trait transmission within a family, you can deduce inheritance patterns, determine genotypes, and predict probabilities for future generations.

Steps for Solving Pedigree-Based Genetics Problems

1. Review the pedigree table and identify all individuals, their traits, and relationships.
2. Note the inheritance pattern (dominant, recessive, or sex-linked).
3. Assign possible genotypes to each individual based on trait expression and parental genotypes.
4. Use logic and known rules of inheritance to fill in missing information.
5. Check your answers against the answer key for accuracy.

Common Patterns in Pedigree Tables

- Autosomal dominant: Trait appears in every generation; affected individuals have at least one affected parent.
- Autosomal recessive: Trait can skip generations; affected individuals may have unaffected parents.
- Sex-linked: Trait often appears more frequently in one sex, usually males for X-linked disorders.

Effective Use of the Answer Key

The answer key for genetics practice problems and pedigree tables is an indispensable resource for self-assessment and learning. It provides correct answers, explanations, and often step-by-step solutions to help clarify complex problems. Using the answer key effectively can enhance understanding and pinpoint areas for improvement.

How to Use the Answer Key in Study Sessions

- Attempt the problem independently before consulting the answer key.

- Compare your solution with the answer key to identify mistakes.
- Review the explanations to understand the reasoning behind each answer.
- Use the answer key to learn alternative problem-solving strategies.

Benefits of a Detailed Answer Key

- Improves accuracy and confidence in solving genetics problems
- Reinforces correct methodologies and logical approaches
- Aids in exam preparation and long-term retention of concepts

Sample Genetics Practice Problems and Solutions

Working through sample genetics practice problems with pedigree tables and answer keys is a proven way to strengthen your grasp of genetic inheritance. Below are examples that illustrate common scenarios found in textbooks and exams.

Problem 1: Autosomal Dominant Trait

A pedigree chart shows three generations. The trait appears in every generation and affected individuals have at least one affected parent. What is the likely inheritance pattern?

Answer Key: Autosomal dominant. All affected individuals must inherit the dominant allele from at least one parent.

Problem 2: Autosomal Recessive Disorder

In a pedigree, two unaffected parents have an affected child. What does this suggest about the inheritance pattern?

Answer Key: Autosomal recessive. Both parents are carriers and passed the recessive allele to their child.

Problem 3: X-linked Recessive Trait

A trait appears mainly in males and can skip generations. What does this indicate?

Answer Key: X-linked recessive. Males express the trait if they inherit the affected X chromosome; females are typically carriers.

Tips for Mastering Pedigree Table Analysis

Developing proficiency in analyzing pedigree tables requires practice and a strategic approach. The following tips can help you efficiently solve genetics practice problems and make the most of answer keys.

- Familiarize yourself with standard pedigree symbols and notation.
- Read the problem carefully and identify key relationships.
- Work systematically through each generation in the pedigree table.
- Use logic and process of elimination to deduce genotypes.
- Regularly practice with answer keys to reinforce correct techniques.

Common Mistakes and How to Avoid Them

Even experienced students can make mistakes when working with genetics practice problems and pedigree tables. Recognizing common pitfalls and learning how to avoid them is essential for accuracy and success.

Misinterpreting Pedigree Symbols

Incorrectly identifying symbols can lead to wrong conclusions about inheritance patterns. Always double-check the meaning of circles, squares, shading, and connecting lines.

Overlooking Carriers in Recessive Inheritance

Carriers play a crucial role in recessive trait transmission. Failing to account for carriers can result in inaccurate genotype assignments and probability calculations.

Ignoring Sex-linked Patterns

Sex-linked traits follow unique inheritance rules. Ensure you consider the difference between autosomal and sex-linked traits when analyzing pedigree tables.

Not Validating Answers with the Key

Skipping the answer key can prevent you from catching errors and learning from mistakes. Always review your solutions against the answer key for comprehensive understanding.

Trending Questions and Answers about Genetics Practice Problems Pedigree Tables Answer Key

Q: What is the primary purpose of using pedigree tables in genetics practice problems?

A: The primary purpose of pedigree tables in genetics practice problems is to visually represent family relationships and the transmission of genetic traits, enabling the identification of inheritance patterns and prediction of genotypes.

Q: What symbols are commonly used in pedigree tables?

A: Common symbols in pedigree tables include squares for males, circles for females, filled shapes for affected individuals, half-filled shapes for carriers, horizontal lines for marriages, and vertical lines for offspring.

Q: How can I determine if a trait is autosomal dominant using a pedigree table?

A: A trait is likely autosomal dominant if it appears in every generation and affected individuals have at least one affected parent, as shown by the consistent presence of the trait in pedigree charts.

Q: What does it mean if two unaffected parents have an affected child in a pedigree table?

A: If two unaffected parents have an affected child, this suggests autosomal recessive inheritance, meaning both parents are carriers of the recessive allele.

Q: How are X-linked recessive traits identified in pedigree tables?

A: X-linked recessive traits are typically identified by their higher prevalence in males and the tendency to skip generations, with affected males inheriting the trait from carrier mothers.

Q: How should I use the answer key when practicing genetics problems?

A: Attempt the problem independently first, then use the answer key to check your solution, understand explanations, and learn alternative problem-solving strategies.

Q: What are common mistakes when analyzing pedigree tables?

A: Common mistakes include misinterpreting pedigree symbols, overlooking carriers in recessive inheritance, ignoring sex-linked patterns, and not validating answers with the key.

Q: Why is knowing genotype and phenotype important in genetics practice problems?

A: Understanding genotype and phenotype is crucial because it helps predict trait expression, trace inheritance patterns, and correctly analyze pedigree tables.

Q: Can genetics practice problems help with exam preparation?

A: Yes, genetics practice problems, especially those involving pedigree tables and answer keys, are excellent for reinforcing concepts and preparing for biology exams.

Q: What tips can improve success in solving pedigree-based genetics problems?

A: Key tips include familiarizing yourself with pedigree symbols, reading problems carefully, working systematically through generations, and regularly practicing with answer keys.

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Genetics Practice Problems: Pedigree Tables & Answer Key

Unlocking the secrets of heredity can be challenging, but mastering pedigree analysis is key to understanding genetic inheritance patterns. This comprehensive guide provides you with a collection of genetics practice problems focusing on pedigree tables, complete with a detailed answer key. Whether you're a high school student preparing for an exam, a university student tackling genetics coursework, or simply fascinated by the intricacies of heredity, this post will equip you with the tools and knowledge to confidently interpret and solve pedigree problems. We'll delve

into different inheritance patterns, offering step-by-step solutions and explanations to solidify your understanding. Let's dive in!

Understanding Pedigree Charts: A Quick Refresher

Before tackling the practice problems, let's refresh our understanding of pedigree charts. These diagrams are visual representations of family relationships and the inheritance of specific traits across generations. Each symbol represents an individual, and their shading indicates whether they possess the trait in question. Common symbols include:

Circle: Female

Square: Male

Filled Symbol: Affected individual (possesses the trait)

Unfilled Symbol: Unaffected individual (does not possess the trait)

Half-filled Symbol: Carrier (carries the recessive allele but doesn't show the trait)

Genetics Practice Problems: Pedigree Tables

Here are five practice problems designed to test your understanding of various inheritance patterns. Remember to consider the patterns of inheritance (autosomal dominant, autosomal recessive, X-linked recessive, etc.) when analyzing each pedigree.

Problem 1: A pedigree shows a trait affecting mostly males in a family, skipping generations. What is the most likely mode of inheritance?

Problem 2: In a family pedigree, both parents are unaffected, but one child is affected by a rare disorder. What is the likely mode of inheritance? What are the genotypes of the parents?

Problem 3: A pedigree shows a trait present in every generation, with affected individuals having at least one affected parent. What is the likely mode of inheritance?

Problem 4: Analyze the following pedigree (insert a simple pedigree chart here - this would be a visual element in the actual blog post): Determine the genotype of individual III-2, assuming the trait is autosomal recessive.

Problem 5: Analyze this pedigree (insert a slightly more complex pedigree chart here - again, this would be a visual in the actual blog): Determine the most likely mode of inheritance and explain your reasoning. What are the possible genotypes of individuals II-2 and II-3?

Genetics Practice Problems: Pedigree Tables Answer Key

Now let's reveal the solutions and explanations:

Problem 1 Solution: X-linked recessive inheritance. The trait's prevalence in males and skipping of generations strongly suggests an X-linked recessive pattern.

Problem 2 Solution: Autosomal recessive inheritance. Both parents must be carriers (heterozygotes) for an autosomal recessive trait to manifest in their offspring. The parents' genotypes would be Aa x Aa (where A represents the dominant allele and a represents the recessive allele).

Problem 3 Solution: Autosomal dominant inheritance. The consistent presence of the trait in every generation, with affected individuals having at least one affected parent, points towards an autosomal dominant pattern.

Problem 4 Solution: (The solution here would depend on the specific pedigree chart provided. The answer should detail the reasoning and show how the genotype of III-2 is determined based on the genotypes of their parents and siblings. This section requires the visual aid of the pedigree chart.)

Problem 5 Solution: (The solution here would depend on the specific pedigree chart provided. The solution should thoroughly discuss the analysis process, explaining why a specific inheritance pattern (autosomal dominant, autosomal recessive, X-linked dominant, or X-linked recessive) is the most probable, providing justifications based on the pattern of inheritance shown in the chart. Possible genotypes of individuals II-2 and II-3 should be determined and explained.)

Mastering Pedigree Analysis: Tips and Tricks

To confidently solve pedigree problems:

Start with the most affected individuals: Analyze the inheritance pattern from the individuals clearly showing the trait.

Look for patterns: Identify recurring patterns to determine the inheritance mode.

Eliminate possibilities: Systematically eliminate inheritance patterns that don't fit the observed data.

Use Punnett squares: Employ Punnett squares to predict the probability of genotypes and phenotypes in future generations.

Conclusion

Successfully interpreting pedigree charts is a crucial skill in genetics. By working through these practice problems and understanding the underlying principles, you'll significantly enhance your

ability to analyze genetic inheritance patterns. Remember to practice consistently, and don't hesitate to revisit this guide as needed. Good luck!

FAQs

1. What are the different types of inheritance patterns shown in pedigree charts? Common patterns include autosomal dominant, autosomal recessive, X-linked dominant, and X-linked recessive inheritance.
2. How can I tell the difference between autosomal dominant and autosomal recessive inheritance in a pedigree? Autosomal dominant traits appear in every generation, while autosomal recessive traits often skip generations.
3. Can a pedigree chart always definitively determine the mode of inheritance? No, sometimes the information in a pedigree may be insufficient to definitively determine the mode of inheritance. More information might be required.
4. Are there online tools to help me create and analyze pedigree charts? Yes, several online tools and software programs are available for creating and analyzing pedigree charts.
5. Where can I find more practice problems on pedigree analysis? Many genetics textbooks, online resources, and educational websites offer additional practice problems and exercises on pedigree analysis.

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new science of human heredity. In this compelling book, Theodore Porter draws on untapped archival evidence from across Europe and North America to bring to light the hidden history behind modern genetics. He looks at the institutional use of pedigree charts, censuses of mental illness, medical-social surveys, and other data techniques--innovative quantitative practices that were worked out in the madhouse long before the manipulation of DNA became possible in the lab. Porter argues that asylum doctors developed many of the ideologies and methods of what would come to be known as eugenics, and deepens our appreciation of the moral issues at stake in data work conducted on the border of subjectivity and science. A bold rethinking of asylum work, *Genetics in the Madhouse* shows how heredity was a human science as well as a medical and biological one--Jacket.

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Clinical Cards David Keegan MD, 2014-07-21 These are peer-reviewed handy point-of-care tools to support clinical learning in Family Medicine. The content is aligned with SHARC-FM - the Shared Canadian Curriculum in Family Medicine. Objectives and more information is available at sharcfm.com.

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lies at the heart of our health and well-being.

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laboratory animals. Animal care and use program. The Guide discusses the concept of a broad Program of Animal Care and Use, including roles and responsibilities of the Institutional Official, Attending Veterinarian and the Institutional Animal Care and Use Committee. Animal environment, husbandry, and management. A chapter on this topic is now divided into sections on terrestrial and aquatic animals and provides recommendations for housing and environment, husbandry, behavioral and population management, and more. Veterinary care. The Guide discusses veterinary care and the responsibilities of the Attending Veterinarian. It includes recommendations on animal procurement and transportation, preventive medicine (including animal biosecurity), and clinical care and management. The Guide addresses distress and pain recognition and relief, and issues surrounding euthanasia. Physical plant. The Guide identifies design issues, providing construction guidelines for functional areas; considerations such as drainage, vibration and noise control, and environmental monitoring; and specialized facilities for animal housing and research needs. The Guide for the Care and Use of Laboratory Animals provides a framework for the judgments required in the management of animal facilities. This updated and expanded resource of proven value will be important to scientists and researchers, veterinarians, animal care personnel, facilities managers, institutional administrators, policy makers involved in research issues, and animal welfare advocates.

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and development. She argues that we need a new vocabulary that includes concepts such as robustness, fidelity, and evolvability. But more than a new vocabulary, a new awareness is absolutely crucial: that understanding the components of a system (be they individual genes, proteins, or even molecules) may tell us little about the interactions among these components. With the Human Genome Project nearing its first and most publicized goal, biologists are coming to realize that they have reached not the end of biology but the beginning of a new era. Indeed, Keller predicts that in the new century we will witness another Cambrian era, this time in new forms of biological thought rather than in new forms of biological life.

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Hybridisation Gregor Mendel, 2008-11-01 Experiments which in previous years were made with ornamental plants have already afforded evidence that the hybrids, as a rule, are not exactly intermediate between the parental species. With some of the more striking characters, those, for instance, which relate to the form and size of the leaves, the pubescence of the several parts, etc., the intermediate, indeed, is nearly always to be seen; in other cases, however, one of the two parental characters is so preponderant that it is difficult, or quite impossible, to detect the other in the hybrid. from 4. The Forms of the Hybrid One of the most influential and important scientific works ever written, the 1865 paper *Experiments in Plant Hybridisation* was all but ignored in its day, and its author, Austrian priest and scientist GREGOR JOHANN MENDEL (1822-1884), died before seeing the dramatic long-term impact of his work, which was rediscovered at the turn of the 20th century and is now considered foundational to modern genetics. A simple, eloquent description of his 1856-1863 study of the inheritance of traits in pea plants Mendel analyzed 29,000 of them this is essential reading for biology students and readers of science history. Cosimo presents this compact edition from the 1909 translation by British geneticist WILLIAM BATESON (1861-1926).

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Dog) Lee Alan Dugatkin, Lyudmila Trut, 2019-04-14 Tucked away in Siberia, there are furry, four-legged creatures with wagging tails and floppy ears that are as docile and friendly as any lapdog. But, despite appearances, these are not dogs—they are foxes. They are the result of the most astonishing experiment in breeding ever undertaken—imagine speeding up thousands of years of evolution into a few decades. In 1959, biologists Dmitri Belyaev and Lyudmila Trut set out to do just that, by starting with a few dozen silver foxes from fox farms in the USSR and attempting to recreate the evolution of wolves into dogs in real time in order to witness the process of domestication. This is the extraordinary, untold story of this remarkable undertaking. Most accounts of the natural evolution of wolves place it over a span of about 15,000 years, but within a decade, Belyaev and Trut's fox breeding experiments had resulted in puppy-like foxes with floppy ears, piebald spots, and curly tails. Along with these physical changes came genetic and behavioral changes, as well. The foxes were bred using selection criteria for tameness, and with each generation, they became increasingly interested in human companionship. Trut has been there the whole time, and has been the lead scientist on this work since Belyaev's death in 1985, and with Lee Dugatkin, biologist and science writer, she tells the story of the adventure, science, politics, and love behind it all. In *How to Tame a Fox*, Dugatkin and Trut take us inside this path-breaking experiment in the midst of the brutal winters of Siberia to reveal how scientific history is made and continues to be made today. To date, fifty-six generations of foxes have been domesticated, and we continue to learn significant lessons from them about the genetic and behavioral evolution of domesticated animals. *How to Tame a Fox* offers an incredible tale of scientists at work, while also celebrating the deep attachments that have brought humans and animals together throughout time.

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Multidisciplinary Approach J.W.G. Jacobs, L.J.M. Cornelissens, M.C. Veenhuizen, 2018-08-14 Generalized hypermobility has been known since ancient times, and a clinical description of Ehlers-Danlos syndrome (EDS) is said to have first been recorded by Hippocrates in 400 BC. Hypermobility syndromes occur frequently, but the wide spectrum of possible symptoms, coupled with a relative lack of awareness and recognition, are the reason that they are frequently not

recognized, or remain undiagnosed. This book is an international, multidisciplinary guide to hypermobility syndromes, and EDS in particular. It aims to create better awareness of hypermobility syndromes among health professionals, including medical specialists, and to be a guide to the management of such syndromes for patients and practitioners. It is intended for use in daily clinical practice rather than as a reference book for research or the latest developments, and has been written to be understandable for any healthcare worker or educated patient without compromise to the scientific content. The book is organized as follows: chapters on classifications and genetics are followed by chapters on individual types, organ (system) manifestations and complications, and finally ethics and therapeutic strategies, with an appendix on surgery and the precautions which should attend it. A special effort has been made to take account of the perspective of the patient; two of the editors have EDS. The book will be of interest to patients with hypermobility syndromes and their families, as well as to all those healthcare practitioners who may encounter such syndromes in the course of their work.

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restricted to the major psychiatric conditions seen in clinical practice while leaving out less common conditions and those that have limited outcome research related to the disorder, resulting in a more streamlined and affordable text. Chapters are meticulously referenced and include dozens of tables, figures, and other illustrative features that enhance comprehension and recall. An authoritative resource for psychiatrists, psychologists, and psychiatric nurses, and an outstanding reference for students in the mental health professions, Gabbard's *Treatments of Psychiatric Disorders*, Fifth Edition, will prove indispensable to clinicians seeking to provide excellent care while transitioning to a DSM-5® world.

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New Yorker • The New York Times Book Review • Time • NPR • The Economist • The Paris Review • Toronto Star • GQ • The Times Literary Supplement • The New York Public Library • Kirkus Reviews It is worse, much worse, than you think. If your anxiety about global warming is dominated by fears of sea-level rise, you are barely scratching the surface of what terrors are possible—food shortages, refugee emergencies, climate wars and economic devastation. An “epoch-defining book” (The Guardian) and “this generation’s Silent Spring” (The Washington Post), *The Uninhabitable Earth* is both a travelogue of the near future and a meditation on how that future will look to those living through it—the ways that warming promises to transform global politics, the meaning of technology and nature in the modern world, the sustainability of capitalism and the trajectory of human progress. *The Uninhabitable Earth* is also an impassioned call to action. For just as the world was brought to the brink of catastrophe within the span of a lifetime, the responsibility to avoid it now belongs to a single generation—today’s. **LOGLISTED FOR THE PEN/E.O. WILSON LITERARY SCIENCE WRITING AWARD** “The Uninhabitable Earth is the most terrifying book I have ever read. Its subject is climate change, and its method is scientific, but its mode is Old Testament. The book is a meticulously documented, white-knuckled tour through the cascading catastrophes that will soon engulf our warming planet.”—Farhad Manjoo, The New York Times “Riveting. . . . Some readers will find Mr. Wallace-Wells’s outline of possible futures alarmist. He is indeed alarmed. You should be, too.”—The Economist “Potent and evocative. . . . Wallace-Wells has resolved to offer something other than the standard narrative of climate change. . . . He avoids the ‘eerily banal language of climatology’ in favor of lush, rolling prose.”—Jennifer Szalai, The New York Times “The book has potential to be this generation’s Silent Spring.”—The Washington Post “The Uninhabitable Earth, which has become a best seller, taps into the underlying emotion of the day: fear. . . . I encourage people to read this book.”—Alan Weisman, The New York Review of Books

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