

a history of greek mathematics

A History of Greek Mathematics: The Birthplace of Logical Thought and Geometry

a history of greek mathematics opens a fascinating window into one of the most influential chapters in the development of human knowledge. Greek mathematics laid the foundation for many modern scientific disciplines, blending rigorous logic with creative problem-solving to shape how we understand numbers, space, and the universe. Unlike the practical arithmetic of earlier civilizations, Greek mathematicians pursued abstract reasoning, seeking universal truths that transcended everyday applications. Let's embark on a journey through this rich history, exploring key figures, groundbreaking ideas, and the lasting legacy of Greek mathematical thought.

The Origins: From Practical Arithmetic to Abstract Thought

Long before the classical period of Greek mathematics, ancient civilizations like the Egyptians and Babylonians had developed arithmetic and geometry mainly for practical purposes—measuring land, constructing buildings, and managing trade. However, the Greeks took a distinctive approach by turning mathematics into a systematic and theoretical discipline.

The Influence of Early Greek Thinkers

Early Greek philosophers such as Thales and Pythagoras heralded a new era where numbers and shapes were not just tools but objects of profound inquiry. Thales, often called the first true mathematician, introduced deductive reasoning and proved several geometric theorems. Meanwhile, Pythagoras and his followers, the Pythagoreans, believed that numbers governed the cosmos, famously associating numerical relationships with musical harmony and cosmic order.

This shift from practical to theoretical mathematics marked a defining moment in the history of Greek mathematics. It introduced the concept of proof, an essential pillar of mathematical rigor that still underpins the discipline today.

Classical Greek Mathematics: The Golden Age

The period from the 5th to the 3rd century BCE is often regarded as the golden age of Greek mathematics. During this time, mathematicians not only expanded existing knowledge but also created entirely new fields, including number theory, geometry, and mathematical logic.

Euclid and the Elements

One cannot discuss the history of Greek mathematics without mentioning Euclid, often dubbed the

“Father of Geometry.” Around 300 BCE, Euclid compiled and synthesized the mathematical knowledge of his time into a comprehensive work known as **Elements**. This monumental text systematically presented definitions, axioms, propositions, and proofs, laying out the foundation of what we now call Euclidean geometry.

Elements was more than a textbook; it was a model of deductive reasoning. The structure of Euclid’s work influenced not only mathematics but also the development of logical systems in philosophy and science for centuries to come.

Archimedes: The Master of Mathematical Ingenuity

Moving into the Hellenistic period, Archimedes stands out as one of the most brilliant minds in the history of Greek mathematics. His work transcended pure mathematics, bridging into physics and engineering. Archimedes made significant contributions to geometry, calculus-like methods, and the understanding of levers and buoyancy.

Notably, Archimedes devised ingenious methods to calculate areas and volumes, anticipating integral calculus by nearly two millennia. His problem-solving techniques and mechanical inventions illustrate how Greek mathematics was not confined to abstract theory but also addressed real-world phenomena.

Apollonius and the Study of Conic Sections

Another towering figure of this era was Apollonius of Perga, known for his in-depth study of conic sections—curves obtained by slicing a cone with a plane. His work laid the groundwork for later developments in algebra and calculus and influenced astronomical models.

Apollonius introduced terminology still used today, such as “ellipse,” “parabola,” and “hyperbola,” demonstrating the enduring impact of Greek mathematical language and concepts.

Philosophy and Mathematics: An Intertwined Journey

Greek mathematics cannot be fully appreciated without recognizing its close relationship with philosophy. Many Greek mathematicians were also philosophers who pondered the nature of knowledge, existence, and reality. This intellectual environment encouraged rigorous logical thinking and abstract reasoning.

Plato and the Academy

Plato, the famous philosopher, regarded mathematics as essential for understanding the universe’s underlying order. In his Academy, he emphasized studying mathematics as a path to philosophical enlightenment. Plato’s insistence on ideal forms and perfect geometric shapes influenced mathematicians to seek pure, abstract truths rather than mere computational techniques.

Aristotle's Logical Framework

Aristotle, a student of Plato, contributed significantly to the development of formal logic, which is foundational to mathematical proof. His systematic approach to syllogisms and deductive reasoning helped shape the way mathematical arguments were constructed and evaluated.

The Legacy of Greek Mathematics in the Modern World

The achievements of Greek mathematicians did not remain confined to antiquity. Their works were preserved, studied, and expanded upon by later civilizations, including Islamic scholars during the Middle Ages, who translated and commented on Greek texts, thereby preserving this knowledge for the Renaissance and beyond.

Transmission and Transformation Through Time

During the Islamic Golden Age, mathematicians like Al-Khwarizmi and Omar Khayyam built upon Greek foundations, advancing algebra and geometry. Later, European scholars rediscovered Greek mathematical texts, which fueled the scientific revolution.

Enduring Principles and Methods

Today, the axiomatic method formalized by Euclid remains central to how mathematics is taught and developed. The emphasis on proof, logical deduction, and abstraction that Greek mathematicians championed continues to define the discipline.

Moreover, the geometric concepts explored by figures such as Archimedes and Apollonius underpin modern physics, engineering, and computer science, illustrating the timeless relevance of their insights.

Insights from a History of Greek Mathematics

Studying the history of Greek mathematics offers valuable lessons not only about mathematical ideas but also about the nature of human inquiry. The Greeks demonstrated that mathematics is a creative and logical endeavor, driven by curiosity and a quest for certainty.

For students and enthusiasts:

- Embrace the process of proof and logical reasoning; it sharpens critical thinking skills.
- Appreciate the historical context—mathematics evolves through dialogue across cultures and eras.
- Explore geometric intuition alongside algebraic manipulation to gain a fuller understanding.

This rich heritage invites us to view mathematics not just as numbers and formulas but as a

profound intellectual adventure that continues to inspire.

As we reflect on a history of Greek mathematics, it becomes clear that these ancient thinkers laid the groundwork for centuries of discovery. Their blend of rigorous logic, philosophical depth, and inventive problem-solving remains a beacon for learners and scholars alike, illuminating the path toward deeper knowledge and innovation.

Frequently Asked Questions

What is the significance of Greek mathematics in the history of mathematics?

Greek mathematics laid the foundational principles of geometry, number theory, and mathematical rigor, influencing the development of modern mathematics through systematic proofs and logical reasoning.

Who were some of the most prominent Greek mathematicians?

Prominent Greek mathematicians include Euclid, Pythagoras, Archimedes, Apollonius, and Eratosthenes, each contributing significantly to various branches of mathematics.

What contributions did Euclid make to Greek mathematics?

Euclid is known as the 'Father of Geometry' for his work 'Elements,' which systematically compiled and organized the knowledge of geometry using axioms and logical proofs.

How did Pythagoras influence Greek mathematics?

Pythagoras founded the Pythagorean school, which explored number theory and geometry, famously formulating the Pythagorean theorem relating the sides of a right triangle.

What role did Greek mathematics play in the development of geometry?

Greek mathematicians formalized geometry as a deductive science, developing rigorous proofs and axiomatic systems that shaped the discipline for centuries.

How did Archimedes contribute to mathematics and science in ancient Greece?

Archimedes made groundbreaking contributions in geometry, calculus, and mechanics, including methods to calculate areas, volumes, and centers of gravity, influencing both mathematics and engineering.

What is the importance of the work of Apollonius in Greek mathematics?

Apollonius is known for his work on conic sections, which deeply influenced later developments in geometry, astronomy, and calculus through detailed study of ellipses, parabolas, and hyperbolas.

How did Greek mathematicians approach the concept of mathematical proof?

Greek mathematicians emphasized rigorous logical deduction and systematic proofs, establishing mathematics as a discipline based on axioms and theorems rather than empirical observation.

In what ways did Greek mathematics impact subsequent mathematical traditions?

Greek mathematics influenced Islamic, medieval European, and Renaissance scholars by preserving and expanding mathematical knowledge, thus forming the backbone of modern mathematical thought and education.

Additional Resources

A History of Greek Mathematics: Foundations of Western Mathematical Thought

a history of greek mathematics reveals a profound and transformative journey that laid the groundwork for much of modern mathematical science. Emerging from a blend of practical needs and philosophical inquiry, Greek mathematics evolved between the 6th century BCE and the early Byzantine period, influencing disciplines from geometry to number theory. This narrative is not merely a chronology of discoveries but an exploration of how ancient Greek thinkers shaped mathematical rigor, abstraction, and proof—concepts still central to mathematics today.

The Origins and Early Influences of Greek Mathematics

Greek mathematics did not arise in isolation; it was deeply influenced by earlier civilizations such as the Babylonians and Egyptians, who developed practical arithmetic and geometry primarily for commerce, astronomy, and land measurement. However, the Greeks introduced a distinctive approach characterized by logical deduction and systematic proofs.

Pythagoras, often considered one of the earliest Greek mathematicians, founded a school in the 6th century BCE where numbers were not just quantities but elements with intrinsic properties and mystical significance. This philosophical outlook marked a departure from purely utilitarian mathematics and set the stage for more abstract inquiry.

Philosophical Underpinnings and the Role of Geometry

Geometry was central to Greek mathematics, both as a scientific discipline and a philosophical tool. The Greeks viewed geometry as a path to understanding the cosmos and the nature of reality itself. Plato's Academy emphasized the study of geometry as essential preparation for philosophical thought, famously inscribing "Let no one ignorant of geometry enter" at its entrance.

Euclid's "Elements," written around 300 BCE, epitomizes this approach. It is a comprehensive compilation of previous knowledge and original theorems, organized axiomatically with rigorous proofs. This work was instrumental in defining the axiomatic method, a hallmark of Greek mathematics that influenced subsequent generations.

Key Figures and Contributions in Greek Mathematics

The history of Greek mathematics is punctuated by seminal figures whose works remain foundational.

Pythagoras and the Pythagorean School

Pythagoras and his followers made significant strides in number theory and geometry. The Pythagorean theorem, relating the sides of a right triangle, is their most famous legacy, but their contributions also included the study of numerical relationships and the concept of mathematical harmony in music.

Euclid and the Codification of Geometry

Euclid's systematic approach in "Elements" not only organized existing knowledge but also introduced new proofs and concepts, creating a model for mathematical texts that persisted for centuries. His axioms and postulates provided a clear framework from which complex theorems could be derived, emphasizing logical structure and consistency.

Archimedes: The Master of Mathematical Physics

Archimedes of Syracuse (c. 287 BCE - c. 212 BCE) stands as a towering figure in both pure and applied mathematics. His work on the properties of shapes, volumes, and centers of gravity foreshadowed integral calculus. Archimedes also applied mathematical principles to solve practical problems in mechanics and engineering, illustrating the versatility of Greek mathematical methods.

Apollonius and the Study of Conic Sections

Apollonius of Perga extended Greek geometry through his detailed study of conic sections—ellipses, parabolas, and hyperbolas. His treatise "Conics" influenced not only mathematics but also astronomy and physics, where these curves describe planetary orbits and trajectories.

The Methodology and Legacy of Greek Mathematics

Greek mathematics is distinguished by its rigorous methodology, which contrasted with the empirical or algorithmic approaches of other ancient cultures. The emphasis on deductive reasoning and the formulation of proofs established the standards for mathematical rigor.

Characteristics of Greek Mathematical Method

- **Axiomatic Approach:** Starting from self-evident truths (axioms) and building complex theorems through logical deduction.
- **Abstract Reasoning:** Moving beyond numerical calculations to general properties and relationships.
- **Geometric Visualization:** Using geometric constructs as both a tool and a language for mathematical expression.

These features contributed to a body of work that was not only practical but also philosophical, embedding mathematics into a broader intellectual framework.

Pros and Cons of Greek Mathematical Development

The Greek approach brought several advantages:

- Pros:

- Formalization of proofs created a standard of certainty and reliability.
- The axiomatic method influenced diverse fields beyond mathematics.
- Abstract thinking paved the way for future advances, including algebra and calculus.

- Cons:

- The focus on geometry sometimes limited exploration into numerical methods and arithmetic innovations.
- Greek mathematics was primarily theoretical, with less emphasis on computation or algorithmic efficiency.
- The absence of a place-value number system constrained numerical complexity.

Transmission and Influence of Greek Mathematics

Greek mathematical knowledge was preserved and expanded upon by later civilizations. During the Hellenistic period, centers like Alexandria became hubs of learning, where scholars translated and commented on Greek texts. The Arab mathematicians of the medieval Islamic world further developed geometric and algebraic concepts, transmitting them to Europe during the Renaissance.

The Renaissance rediscovery of Greek mathematical works, particularly Euclid's "Elements," reestablished their importance and inspired the scientific revolution. Newton, Leibniz, and others built upon Greek foundations to create modern calculus and physics.

The Enduring Impact on Modern Mathematics

Greek mathematics established fundamental principles that continue to underpin contemporary mathematical practice:

- The axiomatic method remains central to modern mathematics, logic, and computer science.
- Geometric intuition and visualization tools are integral to fields ranging from topology to mathematical physics.
- The spirit of inquiry and logical rigor championed by Greek mathematicians defines the scientific method broadly.

In this sense, the history of Greek mathematics is not just a chapter in the past but an ongoing influence shaping how humanity understands and navigates the world through numbers and space.

[A History Of Greek Mathematics](#)

Find other PDF articles:

<https://lxc.avoicemen.com/archive-top3-10/pdf?ID=msA16-6523&title=electrical-engineering-principles-and-applications-pdf.pdf>

a history of greek mathematics: *A History of Greek Mathematics* T. L. Heath, 2013-11-21 Originally published in 1921, this rigorous two-volume work traces ancient Greek mathematics from Thales of Miletus to Diophantus of Alexandria.

a history of greek mathematics: *A History of Greek Mathematics, Volume II* Sir Thomas Heath, 2013-09-16 Volume 2 of an authoritative two-volume set that covers the essentials of mathematics and features every landmark innovation and every important figure, including Euclid, Apollonius, and others.

a history of greek mathematics: *Classics in the History of Greek Mathematics* Jean Christianidis, 2013-04-18 The twentieth century is the period during which the history of Greek mathematics reached its greatest acme. Indeed, it is by no means exaggerated to say that Greek mathematics represents the unique field from the wider domain of the general history of science which was included in the research agenda of so many and so distinguished scholars, from so varied

scientific communities (historians of science, historians of philosophy, mathematicians, philologists, philosophers of science, archeologists etc.), while new scholarship of the highest quality continues to be produced. This volume includes 19 classic papers on the history of Greek mathematics that were published during the entire 20th century and affected significantly the state of the art of this field. It is divided into six self-contained sections, each one with its own editor, who had the responsibility for the selection of the papers that are republished in the section, and who wrote the introduction of the section. It constitutes a kind of a Reader book which is today, one century after the first publications of Tannery, Zeuthen, Heath and the other outstanding figures of the end of the 19th and the beginning of 20th century, rather timely in many respects.

a history of greek mathematics: A History of Greek Mathematics Thomas Heath, 1965

a history of greek mathematics: *A History of Greek Mathematics: From Aristarchus to Diophantus* Thomas Heath, 1981-01-01 Volume 2 of an authoritative two-volume set that covers the essentials of mathematics and features every landmark innovation and every important figure, including Euclid, Apollonius, and others.

a history of greek mathematics: A History of Greek Mathematics Thomas L. Heath, 1965

a history of greek mathematics: "A" History of Greek Mathematics Thomas L. Heath, Thomas Little Heath, 1921

a history of greek mathematics: A History of Greek Mathematics, Vol. 1 Thomas Little Heath, 2017-11-09 Excerpt from A History of Greek Mathematics, Vol. 1: From Thales to Euclid The idea may seem quixotic, but it is nevertheless the author's confident hope that this book will give a fresh interest to the story of Greek mathematics in the eyes both of mathematicians and of classical scholars. For the mathematician the important consideration is that the foundations of mathematics and a great portion of its content are Greek. The Greeks laid down the first principles, invented the methods *ab initio*, and fixed the terminology. Mathematics in short is a Greek science, whatever new developments modern analysis has brought or may bring. About the Publisher Forgotten Books publishes hundreds of thousands of rare and classic books. Find more at www.forgottenbooks.com This book is a reproduction of an important historical work. Forgotten Books uses state-of-the-art technology to digitally reconstruct the work, preserving the original format whilst repairing imperfections present in the aged copy. In rare cases, an imperfection in the original, such as a blemish or missing page, may be replicated in our edition. We do, however, repair the vast majority of imperfections successfully; any imperfections that remain are intentionally left to preserve the state of such historical works.

a history of greek mathematics: A History of Greek Mathematics Thomas Little Heath, 2015-06-24 Excerpt from A History of Greek Mathematics, Vol. 1 The idea may seem quixotic, but it is nevertheless the author's confident hope that this book will give a fresh interest to the story of Greek mathematics in the eyes both of mathematicians and of classical scholars. For the mathematician the important consideration is that the foundations of mathematics and a great portion of its content are Greek. The Greeks laid down the first principles, invented the methods *ab initio*, and fixed the terminology. Mathematics in short is a Greek science, whatever new developments modern analysis has brought or may bring. The interest of the subject for the classical scholar is no doubt of a different kind. Greek mathematics reveals an important aspect of the Greek genius of which the student of Greek culture is apt to lose sight. Most people, when they think of the Greek genius, naturally call to mind its masterpieces in literature and art with their notes of beauty, truth, freedom and humanism. But the Greek, with his insatiable desire to know the true meaning of everything in the universe and to be able to give a rational explanation of it, was just as irresistibly driven to natural science, mathematics, and exact reasoning in general or logic. This austere side of the Greek genius found perhaps its most complete expression in Aristotle. Aristotle would, however, by no means admit that mathematics was divorced from aesthetic; he could conceive, he said, of nothing more beautiful than the objects of mathematics. Euclid was a no less typical Greek. About the Publisher Forgotten Books publishes hundreds of thousands of rare and classic books. Find more at www.forgottenbooks.com This book is a reproduction of an important historical work. Forgotten

Books uses state-of-the-art technology to digitally reconstruct the work, preserving the original format whilst repairing imperfections present in the aged copy. In rare cases, an imperfection in the original, such as a blemish or missing page, may be replicated in our edition. We do, however, repair the vast majority of imperfections successfully; any imperfections that remain are intentionally left to preserve the state of such historical works.

a history of greek mathematics: [A History of Greek Mathematics, Volume I](#) Sir Thomas Heath, 2012-02-10 Volume 1 of an authoritative two-volume set that covers the essentials of mathematics and features every landmark innovation and every important figure, including Euclid, Apollonius, Archimedes, and others.

a history of greek mathematics: **A History of Greek Mathematics** Thomas Little Heath, 1960

a history of greek mathematics: *A History of Greek Mathematics* Sir Thomas L. Heath, 1921

a history of greek mathematics: [A History of Greek Mathematics](#) Sir Thomas Little Heath, Thomas Little Heath, 1981-01-01 Volume 1 of an authoritative two-volume set that covers the essentials of mathematics and includes every landmark innovation and every important figure. This volume features Euclid, Apollonius, others.

a history of greek mathematics: **A history of Greek mathematics. 1. From Thales to Euclid** Thomas Little Heath, 1993

a history of greek mathematics: [A History of Greek Mathematics](#) Thomas Heath, 1965

a history of greek mathematics: *A History of Greek Mathematics* Sir Thomas Heath, 1960

a history of greek mathematics: **A History of Greek Mathematics. Volume II** , 1921

a history of greek mathematics: **Selections Illustrating the History of Greek Mathematics** Ivor Bulmer-Thomas, 1941 Elemental learning. The splendid achievement of Greek mathematics is here illustrated in two volumes of selected mathematical works. Volume I (LCL 335) contains the divisions of mathematics; mathematics in Greek education; calculation; arithmetical notation and operations, including square root and cube root; Pythagorean arithmetic, including properties of numbers; the square root of 2; proportion and means; algebraic equations; Proclus; Thales; Pythagorean geometry; Democritus; Hippocrates of Chios; duplicating the cube and squaring the circle; trisecting angles; Theaetetus; Plato; Eudoxus of Cnidus (pyramid, cone); Aristotle (the infinite, the lever); Euclid. Volume II (LCL 362) contains Aristarchus (distances of sun and moon); Archimedes (cylinder, sphere, cubic equations; conoids; spheroids; spiral; expression of large numbers; mechanics; hydrostatics); Eratosthenes (measurement of the earth); Apollonius (conic sections and other works); later development of geometry; trigonometry (including Ptolemy's table of sines); mensuration: Heron of Alexandria (mensuration); Diophantus (algebra, determinate and indeterminate equations); Pappus (the revival of geometry).

a history of greek mathematics: **A New History of Greek Mathematics** Reviel Netz, 2022-09-01 The ancient Greeks played a fundamental role in the history of mathematics and their ideas were reused and developed in subsequent periods all the way down to the scientific revolution and beyond. In this, the first complete history for a century. Reviel Netz offers a panoramic view of the rise and influence of Greek mathematics and its significance in world history. He explores the Near Eastern antecedents and the social and intellectual developments underlying the subject's beginnings in Greece in the fifth century BCE. He leads the reader through the proofs and arguments of key figures like Archytas, Euclid and Archimedes, and considers the totality of the Greek mathematical achievement which also includes, in addition to pure mathematics, such applied fields as optics, music, mechanics and, above all, astronomy. This is the story not only of a major historical development, but of some of the finest mathematics ever created.

a history of greek mathematics: **A Short History of Greek Mathematics** James Gow, 2010-06-24 The complete history of Greek mathematics, from the origins of arithmetic to the key works of Pythagorus, Euclid, and Archimedes.

Related to a history of greek mathematics

Check or delete your Chrome browsing history Your History lists the pages you've visited on Chrome in the last 90 days. It doesn't store: If you're signed in to Chrome and sync your history, then your History also shows pages you've visited

Delete your activity - Computer - Google Account Help Delete your activity automatically You can automatically delete some of the activity in your Google Account. On your computer, go to your Google Account. At the left, click Data & privacy. Under

Find & erase your Google Search history Your Search history can also be saved to your computer or phone. This happens when you use the Google app while you're signed out of your Google Account. Learn how to manage Search

Manage your Google data with My Activity Customize privacy settings to best meet your needs. Devices that use Google's services when you're signed in to a Google Account Access and manage your search history and activity in

Check or delete your Chrome browsing history Your History lists the pages you've visited on Chrome in the last 90 days. It doesn't store: Tip: If you're signed in to Chrome and sync your history, then your History also shows pages you've

Access & control activity in your account - Google Help Under "History settings," click My Activity. To access your activity: Browse your activity, organized by day and time. To find specific activity, at the top, use the search bar and filters. Manage

Chrome-Browserverlauf ansehen und löschen Von Ihnen besuchte Websites werden in Ihrem Browserverlauf gespeichert. Sie können in Chrome Ihren Browserverlauf einsehen oder löschen und ähnliche Suchanfragen finden. Sie

Check or delete your Chrome browsing history Your history lists the pages that you've visited on Chrome in the last 90 days. It doesn't store: Pages that you've visited while you browse privately in Incognito mode Pages that have been

Je Chrome-browsegeschiedenis checken of verwijderen Websites die je hebt bezocht, worden geregistreerd in je browsegeschiedenis. Je kunt je browsegeschiedenis checken of verwijderen en gerelateerde zoekopdrachten vinden in

View or delete your YouTube search history - Google Help You can manage your search history by deleting individual searches or clearing or pausing search history. Learn more about your data in YouTube and managing your YouTube activity

Related to a history of greek mathematics

Daniel Sage explains the history of pi (Medicine Buffalo6mon) March 14 — a day you're more likely than most others to eat — or throw — a pie and get a reduced price on your pizza. It's all in celebration of pi (Greek letter π), the mathematical constant and

Daniel Sage explains the history of pi (Medicine Buffalo6mon) March 14 — a day you're more likely than most others to eat — or throw — a pie and get a reduced price on your pizza. It's all in celebration of pi (Greek letter π), the mathematical constant and

A Manual of Greek Mathematics (Nature11mon) IT is scarcely necessary to introduce the reader to an author so well known and so distinguished for his writings upon Greek mathematics. Among those who are fortunate enough to have learnt something

A Manual of Greek Mathematics (Nature11mon) IT is scarcely necessary to introduce the reader to an author so well known and so distinguished for his writings upon Greek mathematics. Among those who are fortunate enough to have learnt something

ChatGPT appears to improvise when put through ancient Greek math puzzle (12don MSN) The Artificial Intelligence chatbot, ChatGPT, appeared to improvise ideas and make mistakes like a student in a study that

ChatGPT appears to improvise when put through ancient Greek math puzzle (12don MSN) The Artificial Intelligence chatbot, ChatGPT, appeared to improvise ideas and make mistakes like a

student in a study that

Greek Geometry from Thales to Euclid (Nature3mon) THE subject-matter of this work has at different times been brought under the notice of the readers of NATURE, for it is very little more than a collected and corrected reproduction of papers which

Greek Geometry from Thales to Euclid (Nature3mon) THE subject-matter of this work has at different times been brought under the notice of the readers of NATURE, for it is very little more than a collected and corrected reproduction of papers which

Back to Home: <https://lxc.avoicemen.com>