

4

IN THEIR OWN WORDS

Charles Lyell

1210L

By Charles Lyell, adapted by Newsela

Charles Lyell (1797 – 1875) was a British lawyer and the foremost geologist of his day. He is best known as the author of *Principles of Geology*. It popularized geologist James Hutton’s concept of “uniformitarianism” — the idea that the Earth was shaped by slow-moving forces still in operation today. Uniformitarian ideas opposed the common belief among many geologists that unique catastrophes or supernatural events, like the biblical flood in the story of Noah, shaped Earth’s surface. The motto of uniformitarianism was “the present is the key to the past.” Lyell’s friend, Charles Darwin, took that idea and extended it to biology.

In fact, Lyell’s *Principles of Geology* was one of the few books that Darwin carried on his famous voyage on the HMS Beagle — a voyage that led him to write *The Origin of the Species*. What follows is a summarized version of the original text.

1 Geology defined — Compared to History — Its relation to other Physical
Sciences

5 Geology is the science which investigates the successive changes
that have taken place in the organic and inorganic kingdoms of nature.
It inquires into the causes of these changes. And it describes the
influence which they have exerted in modifying the surface and external
structure of our planet.

10 By this research into the state of the Earth and its inhabitants at former
periods, we acquire a more perfect knowledge of its present condition.
Our views concerning the laws governing its animate and inanimate
productions become more comprehensive. When we study history, we
obtain a more profound insight into human nature. We can draw com-
15 parisons between the present and former states of society. We trace
the long series of events which have gradually led to the current state
of affairs.

20 By connecting effects with their causes, we are enabled to classify and
retain in the memory a multitude of complicated relations — the vari-
ous peculiarities of national character. More deeply can we understand
the different degrees of moral and intellectual refinement, and numer-
ous other circumstances. Without historical associations, these would
be uninteresting or imperfectly understood.

25 The present condition of nations is the result of many previous changes.
Some are extremely remote, and others recent, some gradual, others
sudden and violent. In a similar way, the state of the natural world
is the result of a long succession of events. If we seek to enlarge our
30 experience of the present inner workings of nature, we must investi-
gate the effects of her operations in past eras.

35 On looking back into the history of nations, we often discover with
surprise how the outcome of some battle has influenced the fate of mil-
lions today. This remote event may be connected to the current geo-
graphical boundaries of a great state, the language now spoken by the
inhabitants, their peculiar manners, laws, and religious opinions.
But far more astonishing and unexpected are the connections brought
to light when we dig deeper into the history of nature.

40 The form of a coast, the layout of the interior of a country, the existence
and extent of lakes, valleys, and mountains, can often be traced to
earthquakes and volcanoes in regions which are now tranquil. These
ancient upheavals are the reason why some lands are fertile, and
45 others are sterile. They determine the elevation of land above the sea,

46 the climate, and various peculiarities.

On the other hand, much of the Earth's surface was formed by slow operations such as the the gradual depositing of sediment in a lake or
50 in the ocean, or to a great increase of testacea and corals.

To select another example, we find in certain areas underground deposits of coal, consisting of vegetable matter which drifted into what were formerly seas and lakes. These seas and lakes have since been
55 filled up. The lands the forests once grew upon have disappeared or changed their form, the rivers and currents which floated the vegetable masses can no longer be traced. And the plants belonged to species which have passed away from the surface of our planet ages ago. Yet the wealth and numerical strength of a nation may now be mainly
65 dependent on the distribution of fuel determined by that ancient state of things.

Geology is closely related to almost all the physical sciences, as history is to the moral. A historian should, if possible, be at once profoundly
70 acquainted with ethics, politics, jurisprudence, the military art, theology; in a word, with all branches of knowledge by which any insight into human affairs, or into the moral and intellectual nature of man, can be obtained. Likewise, a geologist should be well versed in chemistry, natural philosophy, mineralogy, zoology, comparative anatomy, botany;
75 in short, in every science relating to organic and inorganic nature.

With these accomplishments, the historian and geologist would rarely fail to draw correct and philosophical conclusions from the various monuments brought to them by former events. They would know
80 what combination of causes similar effects were relatable to. And they would often be enabled infer information concerning many events unrecorded in the archives of former ages.

But since no one individual can be expert in so many subjects, it
85 is necessary that men who have devoted their lives to different departments should unite their efforts. The historian receives assistance from experts on ancient times and from scholars of moral and political science. In the same way, the geologist should avail himself of the aid of many naturalists. He should particularly gain the help of those who
90 have studied the fossil remains of lost species of animals and plants.

To be fair, we can only compare one class of historical monuments to the records studied in geology — those which unintentionally mark past events. The canoes, for example, and stone hatchets found in our peat
95 bogs, inform us about the arts and manners of the earliest inhabitants

96 of our island; the buried coin fixes the date of the reign of some Roman
emperor; the ancient military camp indicates the districts once
occupied by invading armies, and the former method of constructing
military defenses; the Egyptian mummies throw light on the art of
100 embalming, burial customs, or the height of humans in ancient Egypt.

No other class of artifacts is more authentic. But it's just one of
the resources on which the historian relies. In geology, however, it is
the only evidence we can draw from. For this reason, we must not
105 expect to obtain a full and connected account of any series of events
beyond the reach of history.

Geological monuments are frequently imperfect recorders of the past.
Yet, at least their clues can't be intentionally misrepresented. We
110 may be deceived in the inferences which we draw, in the same manner
as we often mistake the nature and significance of phenomena
observed in nature. Yet, our risk of making an error is confined to the
interpretation, and, if this be correct, our information is certain.

NEWSELA

Articles leveled by Newsela have been adjusted along several dimensions of text complexity including sentence structure, vocabulary and organization. The number followed by L indicates the Lexile measure of the article. For more information on Lexile measures and how they correspond to grade levels: <http://www.lexile.com/about-lexile/lexile-overview/>

To learn more about Newsela, visit www.newsela.com/about.



The Lexile® Framework for Reading

The Lexile® Framework for Reading evaluates reading ability and text complexity on the same developmental scale. Unlike other measurement systems, the Lexile Framework determines reading ability based on actual assessments, rather than generalized age or grade levels. Recognized as the standard for matching readers with texts, tens of millions of students worldwide receive a Lexile measure that helps them find targeted readings from the more than 100 million articles, books and websites that have been measured. Lexile measures connect learners of all ages with resources at the right level of challenge and monitors their progress toward state and national proficiency standards. More information about the Lexile® Framework can be found at www.Lexile.com.