

Question 30 (7 marks)

Geological and biological history of New Zealand

<i>Event</i>	<i>Time</i>
Australia and New Zealand separated	85–65 million years ago
New Zealand drifted east and subsided, its land mostly under seawater (most fossils are marine)	85–22 million years ago
Mammals became abundant worldwide	60 million years ago
Earliest migratory bird fossils	55 million years ago
New land created by volcanoes in New Zealand	22 million years ago to present
Many new, unique species of birds appear in the fossil record	20 million years ago to present
Islands completely devoid of mammals. Birds occupied niches that were usually occupied by mammals	700 years ago

Use this information and other relevant knowledge to demonstrate how the practice of biology has led to the validation of current theories of evolution.

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The practice of biology has led to the discovery of much evidence that supports current theories of evolution. Fossil records are able to show the changes throughout long periods of time of various species. Transitional forms such as Archaeopteryx and the lobe-fin fish show links between both reptiles and birds, and amphibians and fish. The dates of these fossils seem to indicate the date at which animals branched into different types. In the information above, fossils of early migratory birds could suggest the time at which birds first evolved. Likewise,

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The many unique species of birds found imply a constantly changing & evolving environment. Biogeography is another form of evidence supporting evolution theory. Places with similar environments developed flora & fauna with similarities. Also, on islands such as Australia and New Zealand, which are cut off from other continents, unique animals evolved, such as marsupials in Australia & the aforementioned birds in New Zealand. Biochemical analysis of proteins across varying species is able to show how closely 2 species are. The fewer the differences in base sequence of particular genes, the more recent these species branched out in the evolutionary pathway. eg. found that humans are more closely related to chimpanzees than gorillas, so new evolutionary trees show gorillas dividing off from chimps/humans before the latter 2 divided. Comparative anatomy of pentadactyl limbs across many species suggest that these species all share the same ancestor but have adapted these features over time for their respective environments. Comparing embryonic development also shows many life forms passing through similar stages, resulting in the belief that all share a common ancestor. Information in the table about birds occupying niches demonstrates how, as the environment changes, species with characteristics better suited to it survive and thrive, while others ie. mammals, died out. Through all this, biology is a source of evidence which can validate current theories of evolution.

End of Question 30