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91922R

NZQA | Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Level 1 Science RAS 2023

91922 Describe features of science that have contributed to the development of a science idea in a local context

Credits: Five

PILOT ASSESSMENT

RESOURCE BOOKLET

Refer to this booklet to answer the questions for Science RAS 91922.

Check that this document has pages 2–8 in the correct order and that none of these pages is blank.

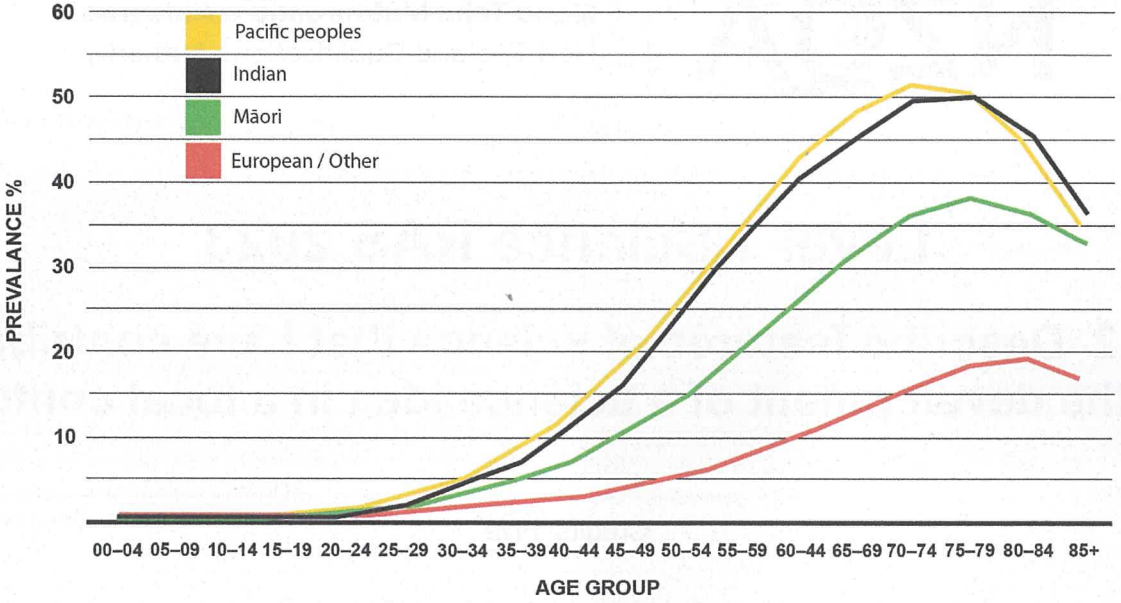
SCIENCE IDEA ONE: Rongoā in the treatment of type 2 diabetes

Diabetes is a disease that prevents people from being able to regulate the sugar levels in their blood. Dr Jonni Koia explored how rongoā could be used to treat diabetes in Māori people.

Rongoā is a traditional Māori way of treating human health. Rākau rongoā is a way to use plants that have medicinal properties for treating diseases and poor health. Traditionally, a tohunga (expert) would make decisions about each person's health needs and follow appropriate tikanga. This could involve choosing the appropriate herbal remedies and using a combination of physical therapies and spiritual healing.

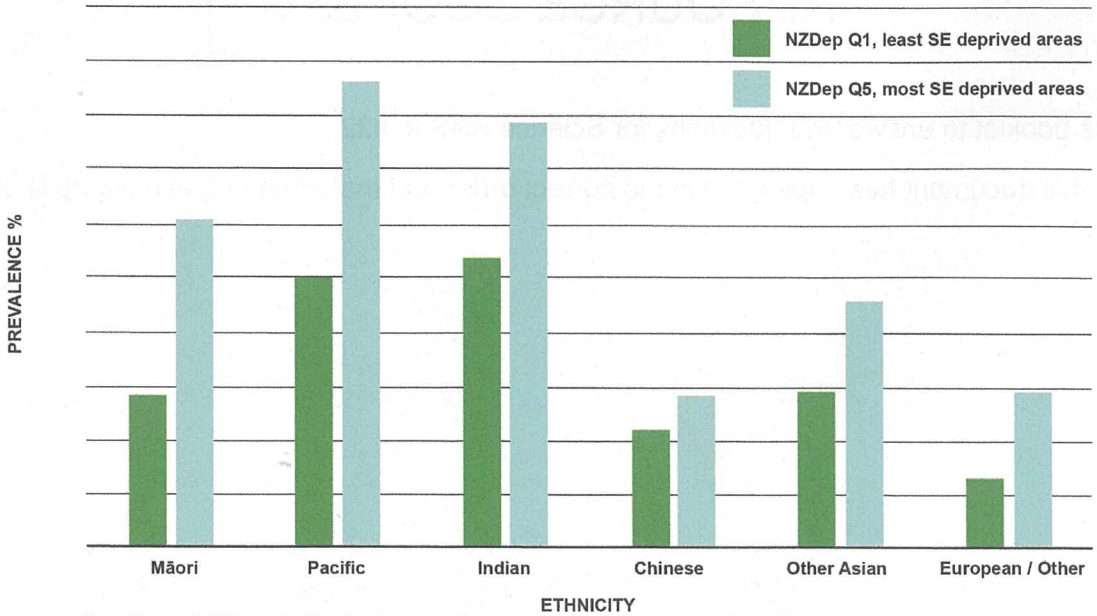
Figures 1 and 2 show the rates of type 2 diabetes in Aotearoa New Zealand by age, ethnicity, and socio-economic deprivation.

Figure 1: Rates of Type 2 Diabetes in Aotearoa New Zealand by age and ethnicity



Prevalence of diabetes in New Zealand in various age groups stratified by ethnicity.
Source: Adapted from Chan WC, Lee A (AW), Papaconstantinou D, (2020). Understanding the heterogeneity of the diabetes population in Metro Auckland in 2018. Auckland: Counties Manukau Health

Figure 2: Rates of Type 2 Diabetes in Aotearoa New Zealand by ethnicity and socio-economic deprivation



Prevalence of diabetes in New Zealand by ethnicity and socio-economic (SE) deprivation.
Source: Adapted from Chan WC, Lee A (AW), Papaconstantinou D, (2020). Understanding the heterogeneity of the diabetes population in Metro Auckland in 2018. Auckland: Counties Manukau Health

Dr Jonni Koia (Waikato-Tainui)

Dr Koia is a researcher working to support and verify mātauranga surrounding rongoā from a molecular science point of view. She is also working with other researchers from the University of Auckland who specialise in how diseases like diabetes are caused by changes in the body.

Dr Koia reviewed many published articles about rongoā. She noted that the number of people with type 2 diabetes is increasing, especially in Māori children under the age of 15. She says, "Adaptation to a Western-style diet and lifestyle is thought to have contributed towards high rates of diabetes among Māori."

She thinks that since Māori have been using rongoā for hundreds of years, it is possible that Māori genetics enable them to process natural rākau rongoā more effectively than synthetic drugs, which could reduce the side effects that Māori patients experience.

Dr Koia studied three taonga plants that she thought may be able to help treat type 2 diabetes. Some of the active chemicals useful in treating diabetes were also found in rākau rongoā.

Figure 3 shows the three taonga plants and the chemicals found in each plant that may be useful to treat diabetes.

Figure 3: Taonga plants with active chemicals useful in treating diabetes

Plant	**Karamū** 	**Kūmarahou** 	**Kawakawa** 
Chemicals found that can be useful to treat diabetes	Asperuloside, $C_{18}H_{22}O_{11}$	Quercetin, $C_{15}H_{10}O_7$ Kaempferol, $C_{15}H_{10}O_6$ Saponins, $C_{55}H_{86}O_{24}$	Isovitexin, $C_{21}H_{20}O_{10}$ Vitexin glycosides, $C_{21}H_{20}O_{10}$

Professor Peter Shepherd

Professor Peter Shepherd is an expert in biotechnology, and he is working with Dr Koia to try to find new prevention strategies and treatments for type 2 diabetes.

One piece of research Professor Shepherd was involved in looked at a gene found in Māori and Pacific peoples that helped prevent diabetes.

Insulin is an important hormone related to diabetes because it helps to move glucose from the bloodstream into muscle and organ cells. People with diabetes have problems making or using insulin effectively.

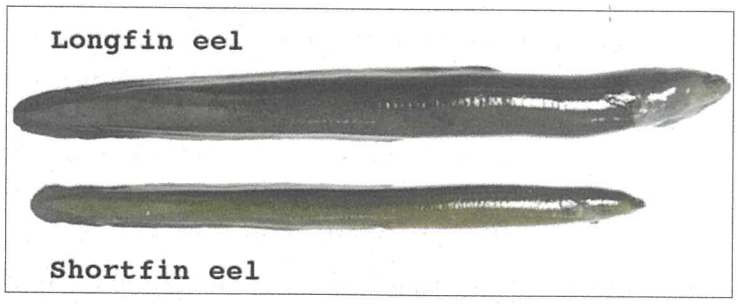
172 Māori and Pacific men were given a meal high in sugar and their body's responses were measured.

They found that while men with the gene produced the same amount of insulin as men without the gene, they had higher levels of insulin in their blood.

Kuputaka	Glossary
rongoā	traditional Māori remedies and healthcare
rākau	trees or plants
tohunga	an expert
tikanga	correct ways of doing things
mātauranga	traditional Māori knowledge
taonga	treasure

SCIENCE IDEA TWO: Sampling eel (tuna) numbers in the environment

Tuna (eels) are highly important to Māori as a source of kai. Important events were often scheduled around the harvesting of eels. Eels are kaitiaki of the streams, rivers, and lakes. Two important eels in Aotearoa New Zealand are the longfin and the shortfin.



Longfin and shortfin eels

Longfin eel: Coloured dark brown and black. Found throughout both the North and South Island, including in high-elevation rivers and lakes.

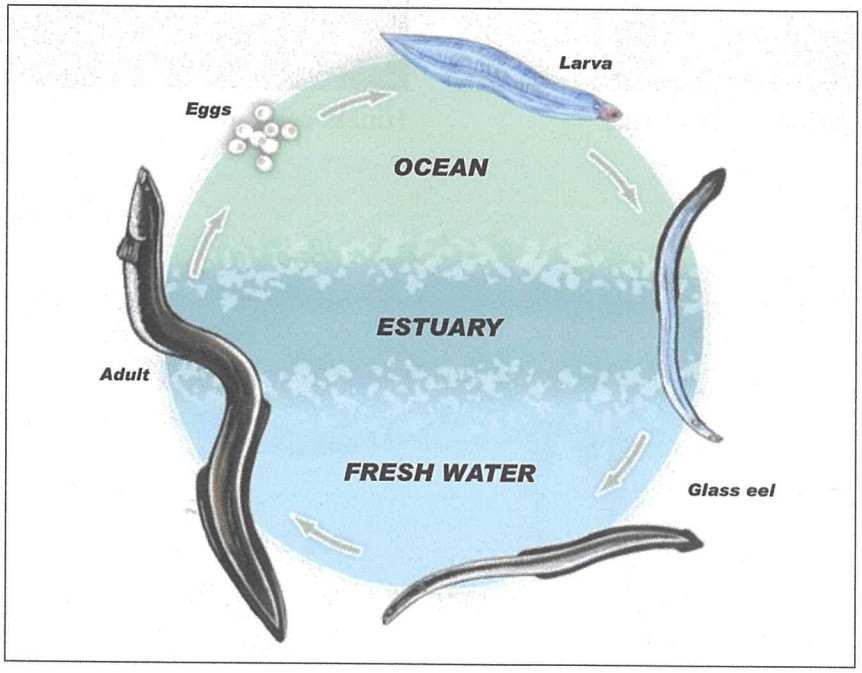
Shortfin eel: Coloured light brown and olive. Found in lowland areas like marshes and wetlands.

Eels are able to help iwi assess water quality and habitat diversity. As longfin eels are quite susceptible to pollution, their health is also an indication of the health of the ecosystem in which they live. Eels are examined for disease on the skin, fins, and mouth. In times of very poor water quality, the lips of the eel become completely covered with fungal growth, which may prevent it from feeding.

Eels are also important for the economy. Some businesses catch and sell eels. Eel meat is sold in Aotearoa New Zealand and all over the world as a delicacy.

Eel life cycle

An eel's life cycle starts and ends in the deep ocean near Tonga, with all adult growth occurring in Aotearoa New Zealand rivers. Young eels found in rivers are known as glass eels.



Life cycle of eels

Studying eels

The National Institute of Water and Atmospheric Research (NIWA) has been studying glass eels in several rivers throughout Aotearoa New Zealand to try to get a better understanding of their life cycle. They also want to know what environmental factors cause glass eels to choose which rivers to swim up.

Some of the factors affecting eel numbers include intensive farming, over-fishing, and the building of dams, so it is important to study eels. NIWA provides advice on how to sample eels in their natural environment on their website.

Methods of sampling eels

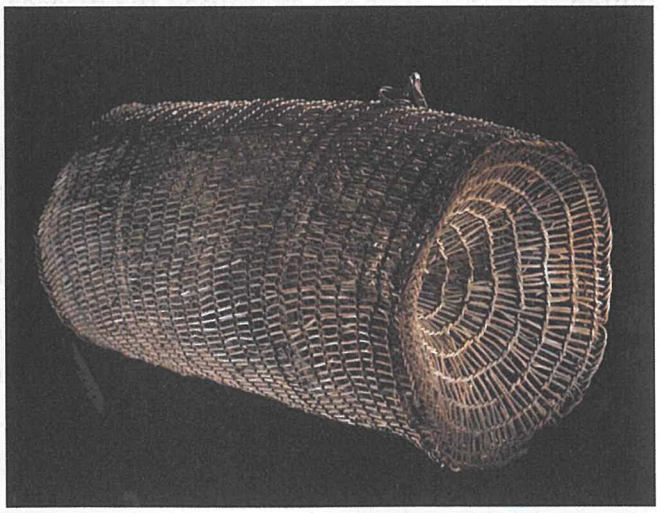
Electric fishing: An eel is temporarily stunned using an electric fishing machine. Stunned fish are anaesthetised, identified and measured, revived, and returned to the water when finished.

Fyke nets: These nets are designed to catch eels of a certain size and let other eels escape.

Hinaki: Traditionally woven basket-like pots made from mangemange, a climbing fern. Bait is added to attract eels and trap them inside. Hinaki come in several different designs.

Observation: Night-time observation can be made using spotlight equipment where there is clear, shallow water.

Fyke nets drying after being used in a lake

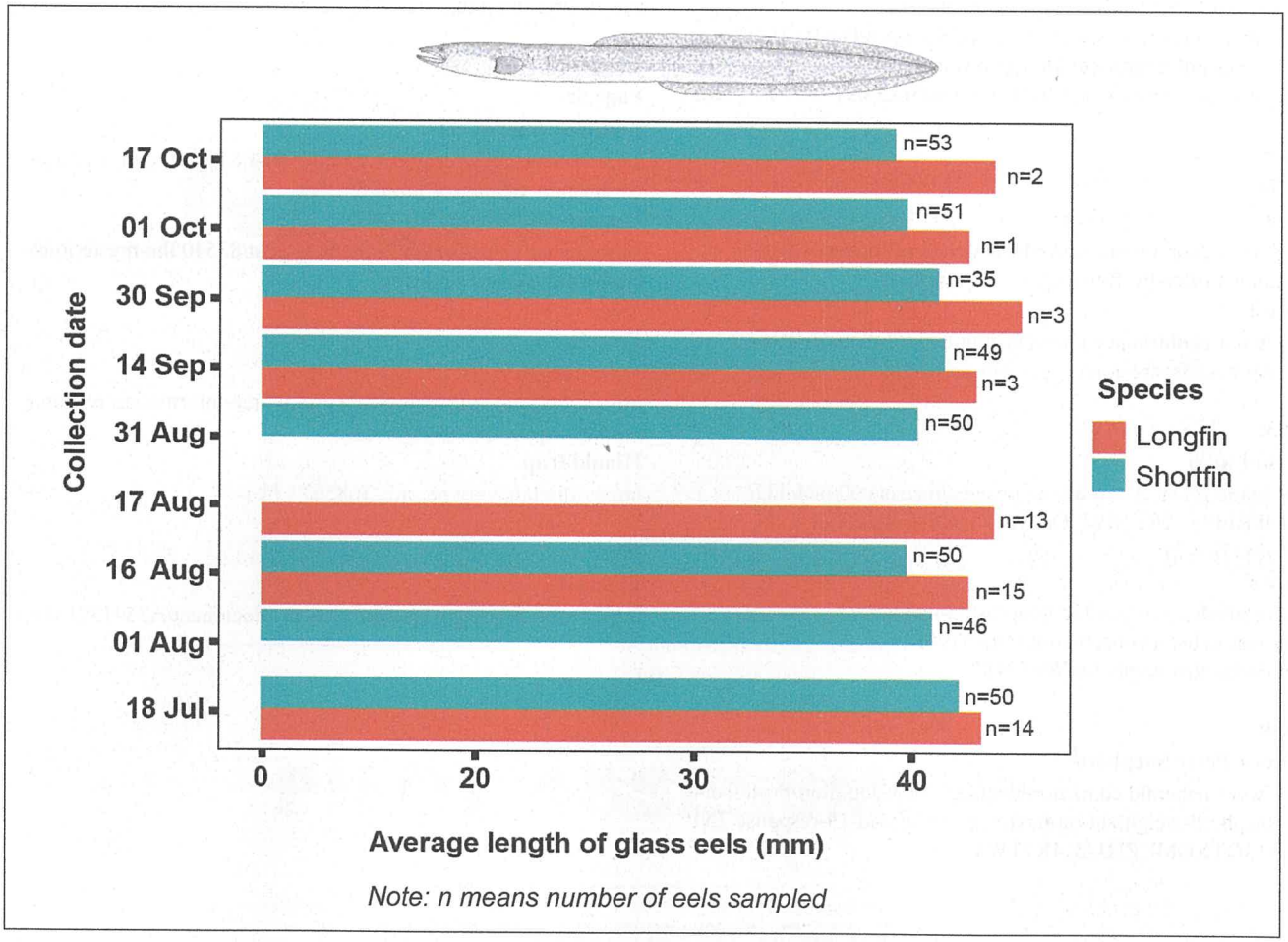


Hinaki eel trap

Eel data

In one study, NIWA aimed to collect 50 longfin and 50 shortfin glass eels at different times through the year. They used fine-mesh fyke nets to catch eels. Researchers wanted to measure the eels' body chemistry and see what they are eating at sea. They also examined the eels' ear bones, which is a way to check the age of an eel, its birth date, and growth rates. Figure 4 shows how many longfin and shortfin eels they collected from July to October 2019.

Figure 4: Average length of glass eels caught using fyke-net sampling in the Rangitaiki River between July and October 2019



Note: n means number of eels sampled

Kuputaka	Glossary
tuna	eel
kai	food
kaitiaki	guardian, caretaker
iwi	major Māori tribe in an area
hinaki	a woven eel trap

Acknowledgements

Material from the following sources has been adapted for use in this assessment:

Rākau rongoā

Text

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https://www.health.govt.nz/publication/tikanga-rongoa
https://teara.govt.nz/en/rongoa-medicinal-use-of-plants/page-3
https://www.frontiersin.org/articles/10.3389/fphar.2020.00935/full
https://www.diabetes.org.nz/blog/rongoa-comes-to-the-fore
https://www.akohiringa.co.nz/education/type-2-diabetes-two-medications-offer-fresh-management-paradigm
https://profiles.auckland.ac.nz/peter-shepherd
https://researchcommons.waikato.ac.nz/bitstream/handle/10289/14551/thesis.pdf?sequence=4&isAllowed=y
https://link.springer.com/article/10.1007/s00125-021-05552-x#Sec3

Images

Page 2:

Figure 1

https://www.akohiringa.co.nz/education/type-2-diabetes-two-medications-offer-fresh-management-paradigm

Figure 2

https://www.akohiringa.co.nz/education/type-2-diabetes-two-medications-offer-fresh-management-paradigm

Page 3:

Dr Jonni Koia

https://static.sciencelearn.org.nz/images/images/000/004/437/original/REPO_ART_R04_DrJonniKoia_DrJonniKoia.jpg?1674174242)

Figure 3

https://nzseeds.co.nz/products/coprosma-lucida
https://inaturalist.nz/observations/96757941
https://inaturalist.nz/photos/70850487

Page 4:

Professor Peter Shepherd

https://www.nzherald.co.nz/northland-age/news/opinion-professor-peter-shepherd-weighs-in-on-next-steps-for-covid-19-response/2NPV22MT3OTXGMUZHJAK4K7TW4/

Sampling eel (tuna) numbers

Text

https://www.doc.govt.nz/nature/native-animals/freshwater-fish/eels/tuna-a-tatou-taonga/
https://waimaori.maori.nz/wp-content/uploads/2020/02/Tuna-species-report.pdf
https://www.aotearoadive.co.nz/blog/post/83540/the-mysterious-freshwater-eels-of-aotearoa/
https://digitalnz.org/records/168567
https://niwa.co.nz/te-k%C5%ABwaha/tuna-information-resource/monitoring/sampling-methods

Images

Page 5:

Longfin/shortfin eel

https://www.aotearoadive.co.nz/blog/post/83540/the-mysterious-freshwater-eels-of-aotearoa/

Longfin/shortfin eel life cycle

https://www.aotearoadive.co.nz/blog/post/83540/the-mysterious-freshwater-eels-of-aotearoa/

Page 6:

Fyke nets

https://niwa.co.nz/te-k%C5%ABwaha/tuna-information-resource/monitoring/sampling-methods

Hinaki trap

https://digitalnz.org/records/168567

Page 7:

Figure 4

https://atlas.boprc.govt.nz/api/v1/edms/document/A3541371/content

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New Zealand Qualifications Authority

Level 1 Science RAS 2023

91922 Describe features of science that have contributed to the development of a science idea in a local context

EXEMPLAR

Achievement

TOTAL 03

Page 1 – Pilot Assessment

Make sure you have the paper Resource Booklet 91922R.

INSTRUCTIONS

This task is made up of three parts. You must answer ALL three parts.

Choose ONE science idea from the Resource Booklet to complete this assessment.

Science Idea Two: Sampling eel (tuna) numbers in the environment

Read the information in the Resource Booklet for your chosen science idea and use it to answer ALL parts of the task.

TASK

For part (a), focus on the following features of science:

- the development of science ideas in response to new evidence or varied perspectives, such as Māori and Pacific knowledge systems
- responding to needs and opportunities.

(a) Using the information from your chosen science idea, discuss the following:

(i) How has new evidence contributed to the science idea?

New evidence has contributed a "better understanding of their life cycle", different methods of researching, and perspectives to the science idea (Sampling eel numbers in the environment).

(ii) What are the varied perspectives considered in the science idea?

Maori perspectives and scientists perspectives both are different. Maori perspectives are considered in the science idea as eel's are highly important to Maori as they have been an important food source to their culture. Eel's are also considered kaitiaki to the streams, rivers and lakes so it is important they are safe and healthy. Science perspectives have an environmental and knowledge perspective as they carry out studies to better New Zealand's knowledge of the Eels life cycle. Also considering enviromental facotrs to learn more about the eel.

(iii) How has a need OR opportunity led to the development of the science idea?

The National Institute of Water and Atmospheric Research seen a opportunity to learn and build a better understanding about the long fin and short fin eels. This developed the science idea as many more studies were taking place to build more accurate knowledge on eel's and learn more about their life-cycle and immigration.

(iv) Give reasons why the new evidence OR varied perspectives responded to the need or opportunity in the development of the science idea.

The new evidence from studies by NIWA responded to their opportunity by answering their questions and helped achieve the opportunity to get a better understanding of their life cycle and immigration.

For part (b), focus on the following features of science:

- replicable, verifiable data collection
- the attributes of the people who carry out the science such as collaboration, creativity, critical thinking, and curiosity.

(b) Using the information from your chosen science idea, discuss the following:

(i) How has the data information shown in the resource helped in the development of the science idea?

The data shown in the resource (Figure 4) helped the development of the science idea by providing more information and understanding to sampling eel. The data showed the average length of glass eels using fyke-net sampling in the Rangitiaki river between July and October 2019, this is relevant to the science idea of sampling eels as it demonstrates more understanding of eel and data of average lengths.

(ii) Choose one of the following attributes that people who carry out science use:

- (●) collaboration
- ( ) creativity
- ( ) critical thinking
- ( ) curiosity

State with a reason how this attribute has played a significant part in the development of the science idea.

Collabortation is a significant part in the development of the science idea as it considers different perspectives and thoughts.m

(iii) Choose ANOTHER attribute that people who carry out science use:

○ collaboration ○ creativity ○ critical thinking ● curiosity

How has this attribute and the data collection shown in the resource interacted in the development of the science idea?

The attribute of curiosity played a significant part in the development of the science idea as 'curiosity' is the first initial thoughts before carrying out any studies or research. The studies and research created by curiosity is what builds the science idea and provides new methods, perspectives and opportunities to learn more. Curiosity interacted in the development showed in the resource when NIWA wanted to know what enviromental factors caused glass eels to choose which rivers to swim up.

For part (c), focus on the following features of science:

- using specific language, symbols, and conventions
- the development of science ideas in response to new evidence or varied perspectives, such as Māori and Pacific knowledge systems.

(c) Using the information from your chosen science idea, discuss the following:

(i) What are the specific language, symbols, and conventions that have been used in the development of the science idea?

Maori language (Tuna, Kai, Kaitiaki, Iwi and Hinaki)
Units (mm for average lengths)
Dates (17 Oct, etc.)

(ii) Why are specific language, symbols, and conventions important in the development of the science idea?

They are being used as they are relevant to the science idea and needed to explain or understand.

(iii) In what ways has new evidence OR varied perspectives interacted with specific language, symbols, and conventions in the development of the science idea?

New evidence has interacted with specific language, symbols and conventions because they are needed in data and specific language such as the Maori language in needed to consider different perspectives and understand theirs.

Achievement

Subject: Science

Standard: 91922

Total score: 03

Q	Grade score	Marker commentary
1	A3	The candidate has chosen Science Idea Two: Sampling eel (tuna) numbers in the environment. An Achieved grade has been awarded for the candidate's awareness of the science features of replicable, verifiable data collection and the attributes of the people who carry out science. The candidate has outlined how the data around the measurement of eels contributed to the science idea. The candidate has also identified that the attribute of curiosity was involved in this science idea and how it developed the science idea. If the candidate had described how these features of science contributed to the development of the science idea in more detail, they would have obtained an A4.

Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Level 1 Science RAS 2023

91922 Describe features of science that have contributed to the development of a science idea in a local context

EXEMPLAR

Merit

TOTAL 06

Page 1 – Pilot Assessment

Make sure you have the paper Resource Booklet 91922R.

INSTRUCTIONS

This task is made up of three parts. You must answer ALL three parts.

Choose ONE science idea from the Resource Booklet to complete this assessment.

Science Idea One: Rongoā in the treatment of type 2 diabetes

Read the information in the Resource Booklet for your chosen science idea and use it to answer ALL parts of the task.

TASK

For part (a), focus on the following features of science:

- the development of science ideas in response to new evidence or varied perspectives, such as Māori and Pacific knowledge systems
- responding to needs and opportunities.

(a) Using the information from your chosen science idea, discuss the following:

(i) How has new evidence contributed to the science idea?

New evidence has contributed to the science idea that rongoa in the treatment of type 2 diabetes is possible as over time traditional medical procedures have been slowly removed from choices for treatment. New evidence has shown that it is possible Maori genetics process natural rakau rongoa more effectively than synthetic drugs. This new evidence shows that natural rakau rongoa (taonga plants) also hold active chemicals that are useful for treatment for diabetes. Dr Jonni Koias idea has been developed from the research in chemicals that are used for diabetes treatment, she has developed it as those synthetic drug chemicals are proving to be difficult for Maori genetics to process. Her new evidence shows that previous idea could have multiple sources as taonga plants hold the same chemicals but just in a way that is more benefical for maori peoples health.

(ii) What are the varied perspectives considered in the science idea?

There are 2 varied perspectives for rongoa in the treatment of type 2 diabetes. Dr Jonni Koia (Waikato-Tainui) believes that Maori are more vulnerable to type 2 diabetes as they cannot process synthetic drugs as well as they could process rakau rongoa (plants with medicinal properties) , she believes this could reduce the side effects that her Maori paitents experince. She also believes that diet has a role to play in the increasing type 2 diabetes cases in Maori children under the age of 15. Dr Jonni Koia states "Adaption to a Western style diet and lifestyle is thought to have contributed towards high rates of diabetes among Maori." Another Perspective is from Professor Peter Shepard (expert in biotechnology). Professor Peter Shepard is working with Dr Koia. Together they are trying to find new prevention strategies and treatments for type 2 diabetes. However it is clear that the two are focusing on different aspects of the science idea. Professor Peter Shepard is mainly looking at a gene found in Maori and Pacific people that helped prevent diabetes. Professor Peter Shepard is looking at the cause, and Dr Jonni at the treatment.

(iii) How has a need OR opportunity led to the development of the science idea?

A need arose when Dr Jonni Koia noted that the number of people with type 2 diabetes is increasing, especially in Maori children under the age of 15. The need led to the development of the science idea as i believe Dr Jonni was thinking about the future generaions of Maori people, which made her put more research into the idea. She discovered that diet and lifestyle is thought to have contributed towards the high rates amongst maori. Her and Professor Peter Shepard had also done research into a gene found in Maori Males which helped prevent diabetes. All this led to the final development of the science idea that plants/taonga were a treatment course.

(iv) Give reasons why the new evidence OR varied perspectives responded to the need or opportunity in the development of the science idea.

New evidence responded to the need as showed that future generations would be effected by type 2 diabetes. The new evidence showed that Rongoa holds the same chemicals as the synthetic drugs but the Maori people would benefit more from the Rongoa as they can effectively process it. It has led to the development as she has done more research around the cause of diabetes in the first place. such a diet, lifestyles, and genes.

For part (b), focus on the following features of science:

- replicable, verifiable data collection
- the attributes of the people who carry out the science such as collaboration, creativity, critical thinking, and curiosity.

(b) Using the information from your chosen science idea, discuss the following:

(i) How has the data information shown in the resource helped in the development of the science idea?

The data shown in the resource helps the development that Rongoa can be used in the treatment of type 2 diabetes as it shows from ages 65-80 People who are Indian, Pacific, and Maori have a higher rate of type 2 diabetes than Europeans. It helps confirm Dr Jonni's theory that Maori cannot process synthetic drugs effectively. It also develops her idea as maybe Pacific people also have the same gene is Maori people which would explain why the graph shows similar high rates.

(ii) Choose one of the following attributes that people who carry out science use:

(●) collaboration ( ) creativity ( ) critical thinking ( ) curiosity

State with a reason how this attribute has played a significant part in the development of the science idea.

Collaboration has played a significant part in the development of the idea that Rongoa can help treat type 2 diabetes. This is as Dr Jonni has collaborated with Professor Peter Shepard. He has the same goal as Dr Jonni, to find new prevention strategies and treatments for type 2 diabetes. Putting the research together has played a significant part as he has a different perspective to Dr Jonni. He is focused on the gene that helps prevent diabetes and insulin in the blood in relation to that, compared to Dr Jonni who is focused on Natural treatment of type 2 diabetes and why Maori people cannot effectively process the synthetic drugs. Putting both of their research and ideas together significantly extends their research and could potentially prevent bias.

(iii) Choose ANOTHER attribute that people who carry out science use:

( ) collaboration (●) creativity ( ) critical thinking ( ) curiosity

How has this attribute and the data collection shown in the resource interacted in the development of the science idea?

Dr Jonni displayed creativity as she had a need and was creative to think about possible treatment causes. Her treatment cause (rongoa) interacts with the data as it explains her idea that Maori people cannot process the synthetic drug as effectivly as rongoa which explains their high rate in figure 1 & 2. The data collection helped her develop her idea as you can clearly compare the rate for European to Maori and see a large difference in the rates, which yet again proves her science idea.

For part (c), focus on the following features of science:

- using specific language, symbols, and conventions
- the development of science ideas in response to new evidence or varied perspectives, such as Māori and Pacific knowledge systems.

(c) Using the information from your chosen science idea, discuss the following:

(i) What are the specific language, symbols, and conventions that have been used in the development of the science idea?

Specific language, symbols, and conventions that have been used in the development of the science idea. Some examples of specific language used in the science idea are when Dr Jonni talks about Maori peoples genes enable them to process natural rongoa better than synthetic drugs. She has used symbols in figure 3 to show chemical elements that are found in plants that are useful in treating diabetes.

(ii) Why are specific language, symbols, and conventions important in the development of the science idea?

Specific language, symbols, and conventions are important in the development of the science idea. Symbols are important as the periodic table of elements has been used for years and years and has had little to no altercations. They are important as they show the scientist has understanding over what they are studying, and show that the research information provided is reliable. Specific Language is important as is shows that Dr Jonni shows she has carried out statistical research to reliably back up her science idea, Some examples of specific language used in the science idea are when Dr Jossi talks about Maori peoples genes enable them to process natural rongoa better than synthetic drugs.

(iii) In what ways has new evidence OR varied perspectives interacted with specific language, symbols, and conventions in the development of the science idea?

Varied perspectives interacted with specific language and symbols in the development of the science idea as Dr Jonni and Professor Peter Shepard had different perspectives when carrying out their research about type 2 diabetes. It interacts with specific language as what Dr Jonni says, she has carried out statistical research to reliably back up her science idea, Some examples of specific language used in the science idea are when Dr Jossi talks about Maori peoples genes enable them to process natural rongoa better than synthetic drugs. Professor Peter Shepard could disagree with her research as her result is different to hers. It also interacts with symbols as Dr Jonni has used chemical symbols/elements and Professor Peter Shepard is a expert in biotechnology which im sure he would agree with her use of chemical elements as it is a reliable way to show understanding. It has helped develop the science idea as varied perspectives have to come to an agreement so the original idea from Dr Jonni would be developed until both perspectives are in agreeance.

Merit

Subject: Science

Standard: 91922

Total score: 06

Q	Grade score	Marker commentary
1	M6	The candidate has chosen Science Idea One: Rongoā in the treatment of type 2 diabetes. A Merit grade has been awarded for the candidates awareness of the science features around responding to needs, new evidence, and attributes of people who carry out science. The candidate has examined the new evidence around genes found in Māori and Pacific peoples, and active chemicals being found in plants traditionally used for Rongoā. They have also explained the need that the researchers responded to and how collaboration was an important feature in this research. The candidate has given reasons why each of these features were significant to the development of this science idea. To gain an excellence, the candidate needed to discuss how these features of science interact to develop the science idea.

Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Level 1 Science RAS 2023

91922 Describe features of science that have contributed to the development of a science idea in a local context

EXEMPLAR

Excellence

TOTAL 08

Page 1 – Pilot Assessment

Make sure you have the paper Resource Booklet 91922R.

INSTRUCTIONS

This task is made up of three parts. You must answer ALL three parts.

Choose ONE science idea from the Resource Booklet to complete this assessment.

Science Idea One: Rongoā in the treatment of type 2 diabetes

Read the information in the Resource Booklet for your chosen science idea and use it to answer ALL parts of the task.

TASK

For part (a), focus on the following features of science:

- the development of science ideas in response to new evidence or varied perspectives, such as Māori and Pacific knowledge systems
- responding to needs and opportunities.

(a) Using the information from your chosen science idea, discuss the following:

(i) How has new evidence contributed to the science idea?

The science idea of using rongoa in the treatment of type 2 diabetes has been contributed to by new evidence supporting that Maori might respond better to rongoa treatments compared to synthetic drugs. Scientists are aware of the increased rates of diabetes in Maori people compared to European people and have found evidence to support this claim. Figures 1 and 2 provide us with evidence of the increased rates of type 2 diabetes in Maori compared to Europeans. This led to new evidence being found to "support and verify matauranga surrounding rongoa from a molecular science point of view," Dr Koia believes that Maori could benefit from using rongoa because "it is possible that Maori genetics could process natural rakau rongoa more effectively than synthetic drugs." This is significant because the contribution of new evidence surrounding validating the use of rongoa further supports using these traditional methods to benefit Maori patients and possibly reduce the side effects they experience.

(ii) What are the varied perspectives considered in the science idea?

The varied perspective considered in the idea of using rongoa in the treatment of type 2 diabetes was the perspective of Maori. Maori have used the process of rongoa for hundreds of years to treat human health, traditionally a tohunga would decide the appropriate tikanga based of each person's health needs. Rakau rongoa uses plants with medicinal properties to treat health needs surrounding diseases and poor health. This concept of rongoa and rakau rongoa was taken into consideration when exploring new ways to reduce type 2 diabetes in Maori people as their "adaptation to a Western-style diet and lifestyle is thought to have contributed towards the higher rates of diabetes" this led to the consideration of traditional methods Maori have used for hundreds of years as their genetics allow these treatments to be more effective than synthetic drugs. Scientist are taking three different toanga plants into consideration as a result of this varied perspective because of the chemicals found in each plant may be useful to treat diabetes. This varied perspective was significant because it provided scientists with another view on a possible solution to reduce the increasing diabetes in Maori people, by taking into consideration the genetic history of Maori rongoa scientists were able to explore possible solutions that directly target Maori people and will hopefully reduce the increasing amount of type 2 diabetes in these people as a result.

(iii) How has a need OR opportunity led to the development of the science idea?

The development of using rongoa in the treatment of type 2 diabetes has been further developed by the need of a solution to reduce type 2 diabetes in Maori people. This need to reduce the increasing rate of diabetes in Maori, "especially in Maori children under the age of 15," has led to scientists further developing this idea of using rongoa to specifically support Maori people. This idea directly supports the genetic makeup of Maori people as their bodies process natural rakau rongoa more effectively than synthetic drugs. This is significant because if the need for a solution to increasing type 2 diabetes wasn't specifically for Maori people then scientists wouldn't use rongoa in the treatment and the idea would not develop further.

(iv) Give reasons why the new evidence OR varied perspectives responded to the need or opportunity in the development of the science idea.

The new evidence supporting that rongoa might be a better method of treating Maori patients for diabetes responded to the need for a solution to the increasing rate of diabetes in Maori people through the new evidence providing a possible solution to this need. The new evidence was found through exploring the genetics of Maori people. This exploration happened because there was a need for it and the need for a solution was directly connected to Maori people. This direct connection led to new evidence found surrounding the use of rakau rongoa as a more effective method of treating Maori, this concept was considered because Maori have been using these traditional methods for hundreds of years, which led scientists to look into their genetics to find evidence supporting the matauranga surrounding rongoa. This is significant to the development of the idea to use rongoa when treating diabetes because if the need for a solution to specifically decrease the type 2 diabetes rate in Maori wasn't there scientists wouldn't bother to find new evidence in order to come up with a solution for it as there would be no need to.

For part (b), focus on the following features of science:

- replicable, verifiable data collection
- the attributes of the people who carry out the science such as collaboration, creativity, critical thinking, and curiosity.

(b) Using the information from your chosen science idea, discuss the following:

(i) How has the data information shown in the resource helped in the development of the science idea?

The data information shown in the resource has helped to develop the idea of using rongoa in the treatment of type 2 diabetes through the information shown providing statistical evidence of the increase in type 2 diabetes. Both figures 1 and 2 provide us with graphs showing the rates of type 2 diabetes in Aotearoa based on age and ethnicity or ethnicity and socio-economic deprivation. Through this collected information shown in the resource scientists where able to identify the increasing rate of Maori with type 2 diabetes. This visual representation allowed scientists to develop the idea of using rongoa further through identifying that Maori was the ethnic group with a significant increase in type 2 diabetes. This is significant because if scientists did not show this information like they did it would've prevented a proper comparison being made to identify the increase in diabetes in Maori therefore stopping the development of using rongoa to treat type 2 diabetes.

(ii) Choose one of the following attributes that people who carry out science use:

○ collaboration ○ creativity ● critical thinking ○ curiosity

State with a reason how this attribute has played a significant part in the development of the science idea.

The attribute of critical thinking has played a significant part in the development of using rongoa in the treatment of type 2 diabetes through scientists proving to be think critically in order to develop the idea further and come up with a solution. Dr Koia shows this critical thinking through her concern towards the high levels of diabetes, specifically in Maori people. This concern made her think outside of what would normally would be provided as a solution to this problem, which would be to develop a new synthetic drug, and look into what has worked specifically for Maori. This use of critical thinking on Dr Koia's behalf played a significant part in the development of using rongoa in treatment because it provided a direct solution to treating diabetes in Maori people further developing the idea of adopting these traditional or rongoa methods to better Maori patients. This attribute was significant because if Dr Koia had not used critical thinking scientists today would be trying to develop a new synthetic drug that might not be as effect for Maori and therefore will not decrease the type 2 diabetes rates.

(iii) Choose ANOTHER attribute that people who carry out science use:

● collaboration ○ creativity ○ critical thinking ○ curiosity

How has this attribute and the data collection shown in the resource interacted in the development of the science idea?

The attribute of collaboration has interacted with the data collection shown in the resource in the development of using rongoa in the treatment of type 2 diabetes through scientists using work and collection of data from other scientists to further develop and validify their own collection of data. This can be seen in the resource when Professor Shepard collabs with Dr Koia to further develop the idea of Maori genetics contributing to why rongoa treatments might work better for Maori. Professor Shepard looks into the ideas the Dr Koia had surrounding Maori genetics and conducts his own to test to see if genetics truly is a factor for finding a treatment for type 2 diabetes. As a result he found, based on Dr Koia's original theory, that Maori and Pacific men have a gene that creates more insulin in their blood. This interaction between the attribute of collaboration and the data collection shown was significant because it allowed the idea to develop further through the research of multiple people. If this interaction did not happen Professor Shepard might not have made this discovery and Dr Koia wouldn't have been able to see the development of the idea from a deeper genetic point of view therefore limiting the results that could provide them with a solution.

For part (c), focus on the following features of science:

- using specific language, symbols, and conventions
- the development of science ideas in response to new evidence or varied perspectives, such as Māori and Pacific knowledge systems.

(c) Using the information from your chosen science idea, discuss the following:

(i) What are the specific language, symbols, and conventions that have been used in the development of the science idea?

The specific language used in the development of using rongoa in the treatment of type 2 diabetes includes, the use of and consideration of Maori concepts and language including; rongoa, rakau rongoa, matauranga and taonga
Specific language used to correctly name chemicals found the can be useful to treat diabetes; Asperuloside, Quercetin, Kaempferol, etc.
Symbols such as the chemical formulas provided with the names of the chemicals eg. C18 H22 O11
and Conventions used such as the graphs provided for figures 1 and 2.

(ii) Why are specific language, symbols, and conventions important in the development of the science idea?

The use of specific language to was important in the development of using rongoa in the treatment of type 2 diabetes because it allowed scientist to correctly name and explore the Maori concepts and language listed above. The use of specific language when identifying chemicals such as "Asperuloside" allowed scientists to correctly identify the chemicals found in the taonga plants tested allowing these chemicals to be used to develop the idea further. This paired with the symbols provided gives the scientists the chemical formula to the tested chemicals that could contribute to the development of the use of rongoa. The conventions used were also important as they provided scientists with visible evidence that supported the need for a solution to increasing diabetes in Maori people when was important to the development because it allowed scientists to identify the problem that was being faced. Overall the use of specific language, symbols and conventions was significant because it allowed scientists to name and symbolise different things in a proper scientific way and through contentions allowed a visual representation of data. If these were not used the development of using rongoa in the treatment of type 2 diabetes would be slower and limited because of the lack of knowledge surrounding Maori concepts if the specific language was not used, the lack of knowledge surrounding the chemical make up of possible helpful chemicals for treating diabetes and the lack of visual representation making it harder to identify the increasing rate of diabetes in Maori people.

(iii) In what ways has new evidence OR varied perspectives interacted with specific language, symbols, and conventions in the development of the science idea?

The varied perspectives of Maori interacted with the use of specific language, symbols and conventions in the development of using rongoa in the treatment of type 2 diabetes through, the Maori language and concepts used in conjunction with the symbols relating to taonga plants and the influence of increased rates of diabetes in Maori people being shown through conventions used. This direct contribution from the perspective of Maori can be seen through the use of Maori concepts in the resource such as, matauranga, rongoa and rakau rongoa. If these concepts weren't specifically used in relation to Maori perspectives scientists could've lacked the knowledge surrounding the exploration of rongoa and the traditional methods might not have been accurate therefore limiting the development of the idea. The symbols used provided the scientists with a way to correctly identify the chemical make-up of the taonga plants Maori have used for hundreds of years therefore identifying the chemicals that worked as rongoa for Maori. The conventions used connects the problem directly to Maori people as they have an increasing rate of diabetes compared to Europeans. The conventions used in figures 1 and 2 provides scientists with a visual connection to Maori and allows then to apply a Maori perspective to the problem portrayed by the graphs, therefore allowing scientists to create a solution based of Maori perspectives. Overall the varied perspective of Maori interacting with the specific language, symbols and conventions used was important because if these did not interact scientists would've lacked the consideration of Maori perspective when developing the idea of using rongoa in the treatment of type 2 diabetes which would limit how helpful the the development of this idea would actually be help to Maori people decrease the rate of type 2 diabetes.

Excellence

Subject: Science

Standard: 91922

Total score: 08

Q	Grade score	Marker commentary
1	E8	The candidate has chosen Science Idea One: Rongoā in the treatment of type 2 diabetes. The candidate has securely examined how the new evidence around rongoā and genes found in Māori has responded to the need to develop new treatment for Māori due to the increasing type 2 diabetes rate. The candidate has then justified how the interaction of these two features of science had furthered the development of the science idea.

1

91923Q

Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Level 1 Science RAS 2023

91923 Demonstrate understanding of science-related claims in communicated information

Credits: Five

PILOT ASSESSMENT

ASSESSMENT TASK

Check that this booklet has pages 3–10 in the correct order and that none of these pages is blank.

CANDIDATE GUIDANCE

For this standard you will need to:

- select only ONE science-related claim to use from this report guide

  Tick the claim you will write about in the report:

  ☐ organic meat benefits

  ☐ astrology

  ☐ climate change

- write a digital report on the selected claim using your science knowledge and language, and science critical thinking skills.

In your report consider including discussions on:

- what science-related claim is made in the resource
- who or what the source of the claim is, and the intended purpose of the communicated information
- how science language and conventions are used to support the claim
- how science language and conventions represent or mis-represent the science ideas in the claim.

Report format and submission requirements

The digital report must:

- be one document file that is no longer than 5 A4 single-sided pages including pictures, diagrams, and visuals
- use size 12pt Times New Roman font
- have no file links that take the assessor out of the document
- the file size should not be greater than 200MB.

Your work must be authentic to you. You will need to confirm a notification of authenticity as part of the digital submission upload process.

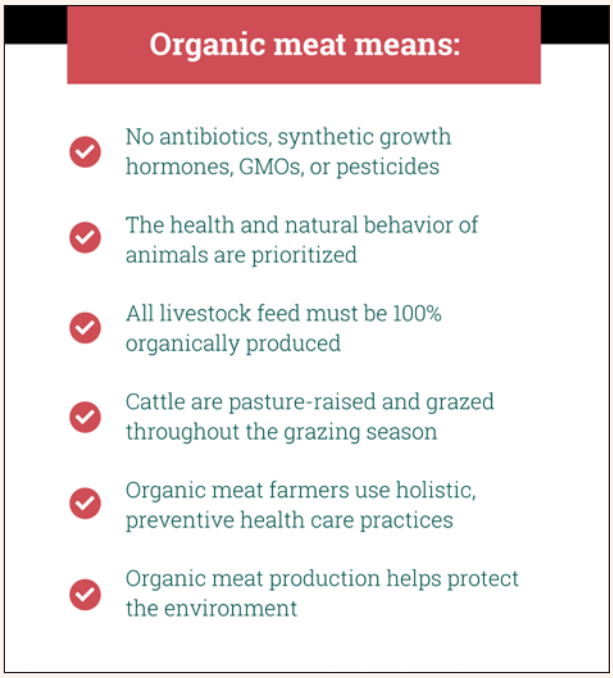
SCIENCE-RELATED CLAIM: ORGANIC MEAT BENEFITS

Content for the scientific claim:

Dr Amber Sciligo and Dr Jessica Shade published a report called "The Benefits of Organic Meat." They suggest that organic meat is better for the environment. The report can be found here: https://www.organic-center.org/sites/default/files/MeatReport/meatstudy-final_05_14_1.pdf

Some ideas from the report:

The diagram "Organic meat means" shows how the researchers define what organic meat is. Other claims from the report include:



- Organic farming doesn't use artificial growth hormones so it's better for the environment. In non-organic farming, animals might be fed artificial growth hormones (e.g. ractopamine) and steroids (e.g. beta-antagonists) to quickly grow more muscle. However, these chemicals don't always stay in the organisms. Artificial growth hormones can end up in the environment and in wastewater.
- Bees, birds, and other wildlife benefit when there are no pesticides being used. Some harmful pesticides in non-organic meat are organophosphates, neonicotinoids, and pyrethroids which can build up in the human body. Organic meat doesn't contain pesticides like a lot of non-organic meat.

The researchers were paid to write this report by The Organic Center and Applegate, two American companies:

The Organic Center is a non-profit research and education organisation. Their aim is to conduct credible, evidence-based science on the environmental and health effects of organic food and farming and communicate the findings to the public.

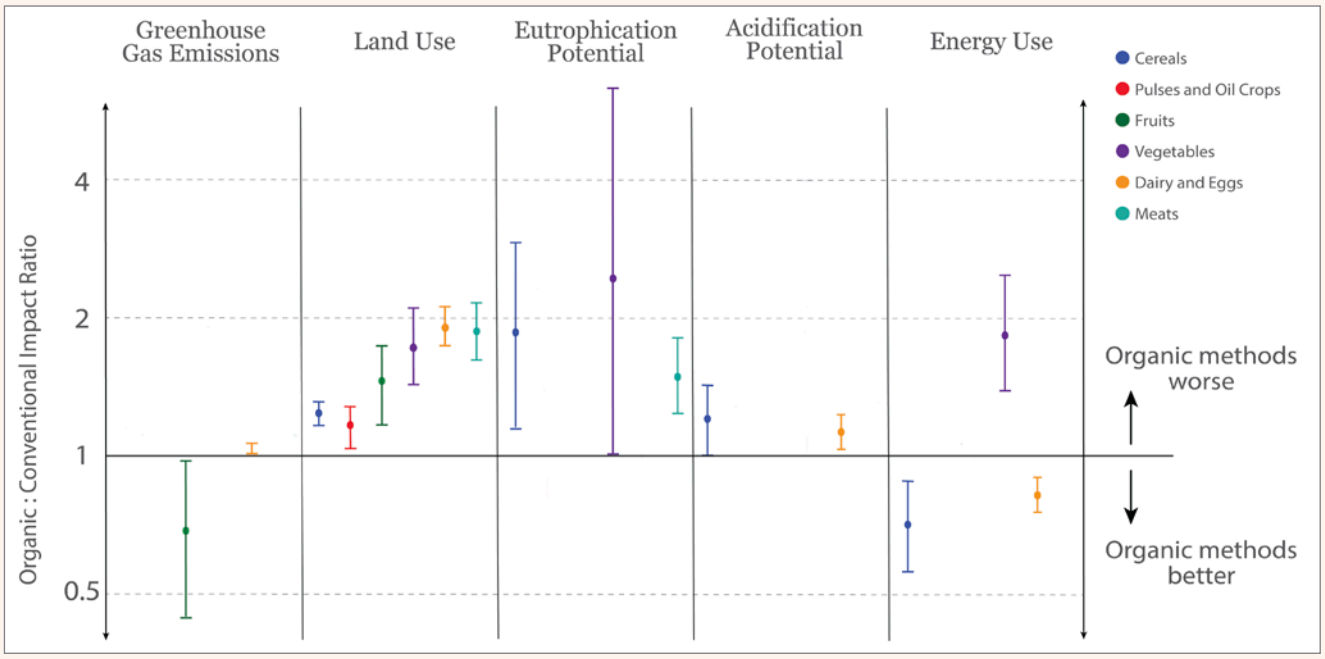
Applegate have been producing a range of organic meat products for over 30 years. They say their meat products are made without genetically modified organism ingredients. Their foods have no added nitrites, nitrates, phosphates, or artificial ingredients or preservatives.

Source: https://www.organic-center.org/sites/default/files/MeatReport/meatstudy-final_05_14_1.pdf

Supporting content to help examine the claim:
In 2017 researchers named Michael Clark and David Tilman (2017) examined everything that happens to food right up until it leaves a farm. They compared different food types grown organically and non-organically. Some of their results are shown in the graph "Environmental impacts of organic vs. conventional agriculture".

Environmental impacts of organic vs. conventional agriculture

Each food in the graph has a vertical bar. The smaller the bar, the more confident the researchers are that their findings are correct.



Source: https://ourworldindata.org/is-organic-agriculture-better-for-the-environment

In a different study, four researchers from English universities studied 71 other research articles on organic farms.

They found that organic farms usually have more good microbes in the soil and don't lose as many important nutrients like nitrogen, nitrous oxide, and ammonia, compared to other farms.

But when you look at each thing they make, like a kilogram of beef, the organic farms actually have more nitrogen, nitrous oxide, and ammonia leaking into the environment.

Organic farms need less energy, but they use more land and could cause more pollution, depending on the food being grown.

Source: Tuomisto, H. L., Hodge, I. D., Riordan, P., & Macdonald, D. W. (2012). Does organic farming reduce environmental impacts? – A meta-analysis of European research. Journal of Environmental Management, 112, 309–320. https://doi.org/10.1016/j.jenvman.2012.08.018

Sources

https://www.organic-center.org/sites/default/files/MeatReport/meatstudy-final_05_14_1.pdf

Tuomisto, H. L., Hodge, I. D., Riordan, P., & Macdonald, D. W. (2012). Does organic farming reduce environmental impacts? – A meta-analysis of European research. Journal of Environmental Management, 112, 309–320. https://doi.org/10.1016/j.jenvman.2012.08.018

SCIENCE-RELATED CLAIM: ASTROLOGY

Aliza Kelly

The popular astrologer Aliza Kelly makes the following statement:

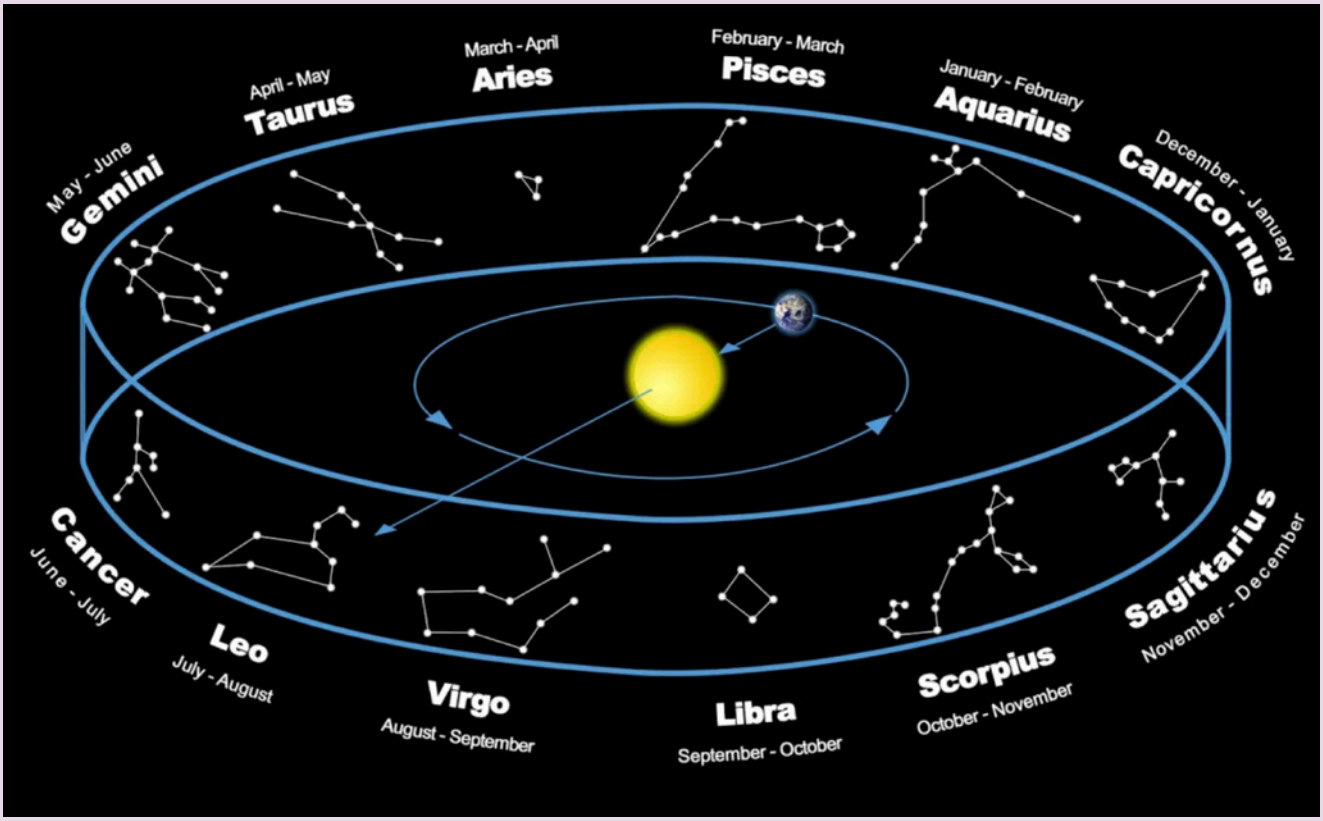
> Your birth chart reveals the location of the planets in the sky at the time of your birth. An analysis of this chart, also called a natal chart, can provide deep insight into your personality.

According to her website, "Aliza Kelly is a celebrity astrologer, columnist, bestselling author, and host. Referred to as a 'rising star" in modern spirituality, Aliza has been featured in *The New York Times*, *The New Yorker*, *Vogue*, *InStyle*, *The Cut*, and numerous other publications. She's the author of three popular books about astrology."

Source: http://alizakelly.com/)

Astrology and the zodiac

The zodiac is a belt shaped region of the sky that extends approximately 8° north and south of the ecliptic (the plane of the Earth's orbit). In Western astrology the zodiac is divided into twelve signs, each occupying about 30° of celestial longitude, starting with Aries in March and ending in Pisces twelve months later. Astrologers use the position of the Sun, Moon and planets relative to these twelve signs at your birth to predict your personality.



The signs of the zodiac are determined by the constellation that the Sun is aligned with when you are born

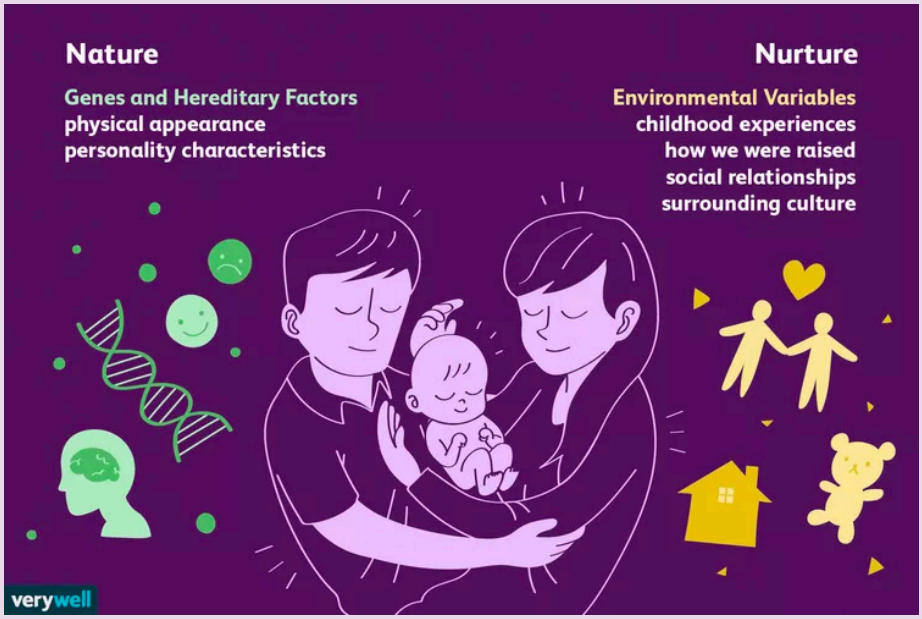
Source: https://asztronauta.com/en/24-constellations-that-will-show-you-your-true/

Personality

According to the American Psychological Association (APA), personality is made up of special characteristics, "including major traits, interests, drives, values, self-concept, abilities, and emotional patterns".

According to psychology, personality is determined by interactions between your genes and your environment, but not astrology. One way psychologists study personality is using the California Personality Inventory (CPI). A CPI uses reliable and scientifically measured values about a person to create a list that describes that person's personality.

Sources: https://www.apa.org/topics/personality
https://www.verywellmind.com/what-is-nature-versus-nurture-2795392

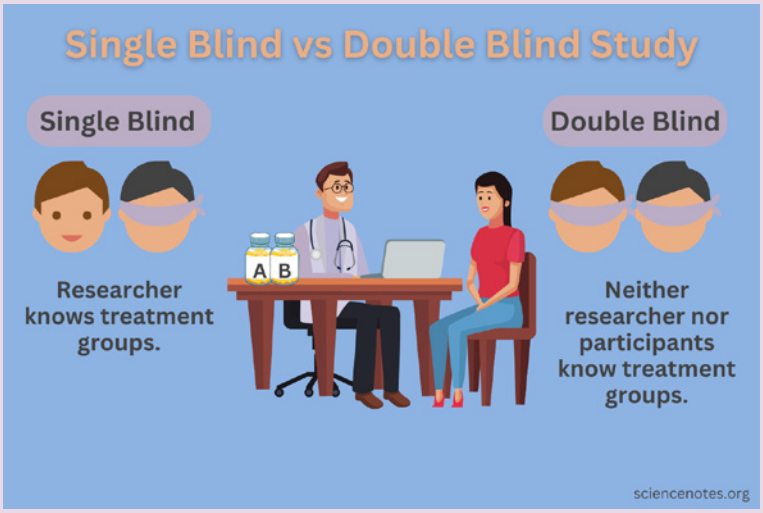


Double blind trial

American physicist Shawn Carlson concluded in a unique double-blind test of astrology, the results of which were published in *Nature* (December 5, 1985). The controlled study was designed to test whether astrologers could predict someone's personality from their birth chart.

A single blind trial is a trial carried out where the test group don't know whether something is real or a "fake" substitute. Carlson ensured that his trial was double blinded. This means that not only the astrologers didn't know which birth chart was real, but neither did the people carrying out the research.

Source: https://sciencenotes.org/double-blind-study-blinded-experiments/)



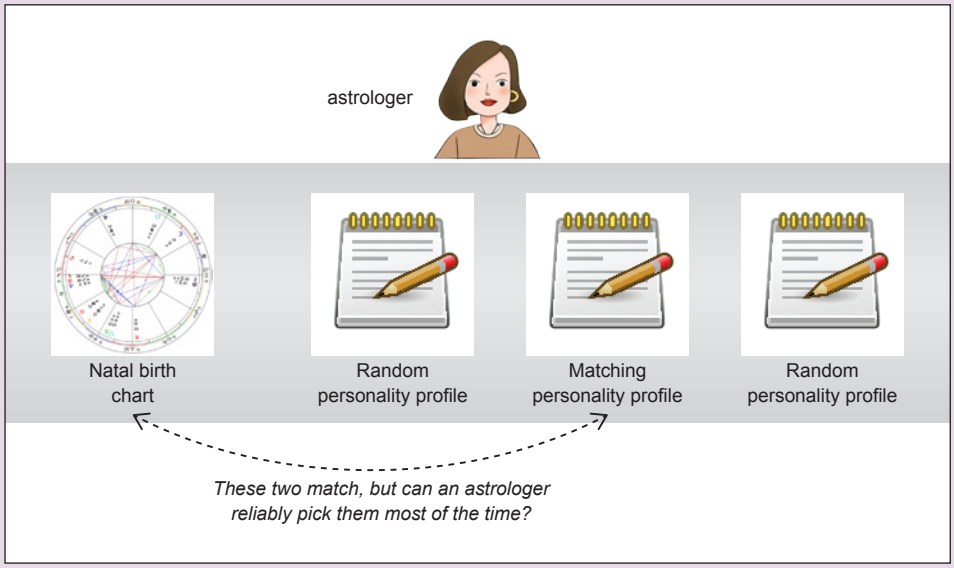
Carlson's Study

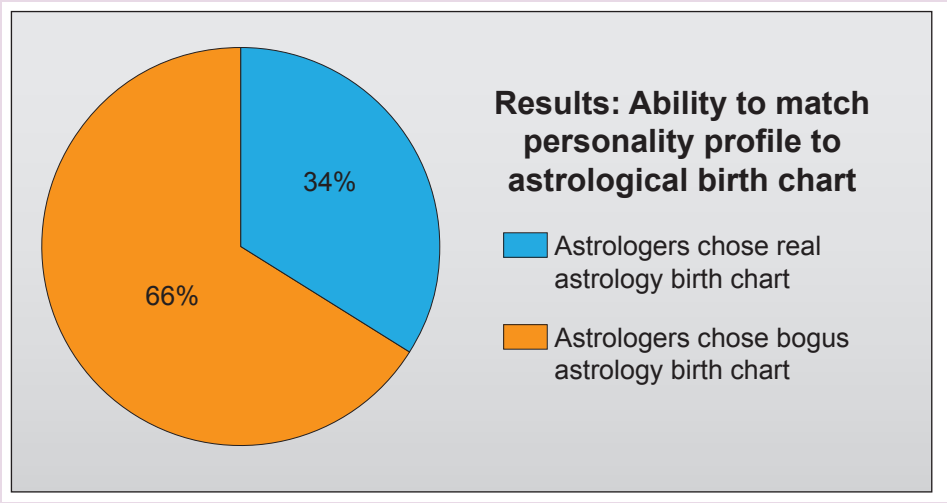
Carlson's study produced a real personality profile and a birth chart for 116 different people.

The experiment: an astrologer was given a random person's birth chart and three personality profiles, but only one of the personality profiles actually matched the birth chart. The other two personality profiles were for different people.

The astrologer had to judge which of the three personality profiles best matched the birth chart.

Thirty different astrologers completed this test, and each astrologer completed around 30 different trials. Overall, the test was completed about 900 times in total.





Sources

https://www.astrology.com/us/home.aspx

http://alizakelly.com/

https://earthsky.org/astronomy-essentials/what-is-the-zodiac/

https://www.apa.org/topics/personality

Hartmann, P., Reuter, P., Nyborga, H. (2006) "The relationship between date of birth and individual differences in personality and general intelligence: A large-scale study" (PDF), *Personality and Individual Differences* 40 (7): 1349–1362

Carlson, S. A double-blind test of astrology.*Nature* 318, 419–425 (1985).

https://home.ifa.hawaii.edu/users/wynnwill/pdf/Astrology%20test.pdf

SCIENCE-RELATED CLAIM: CLIMATE CHANGE

Dr Sam Dean

Dr Sam Dean is a Principal Scientist at the National Institute of Water and Atmospheric Research (NIWA). NIWA's mission is to conduct leading environmental science to enable sustainable management of natural resources for New Zealand.

After Cyclone Gabrielle, he said that it "was a gigantic, gargantuan event and I have no doubt … that climate change has influenced that event." (RNZ, March 2023)

According to NIWA, changes to our rainfall and temperature will increase the likelihood of extreme events like Cyclone Gabrielle.

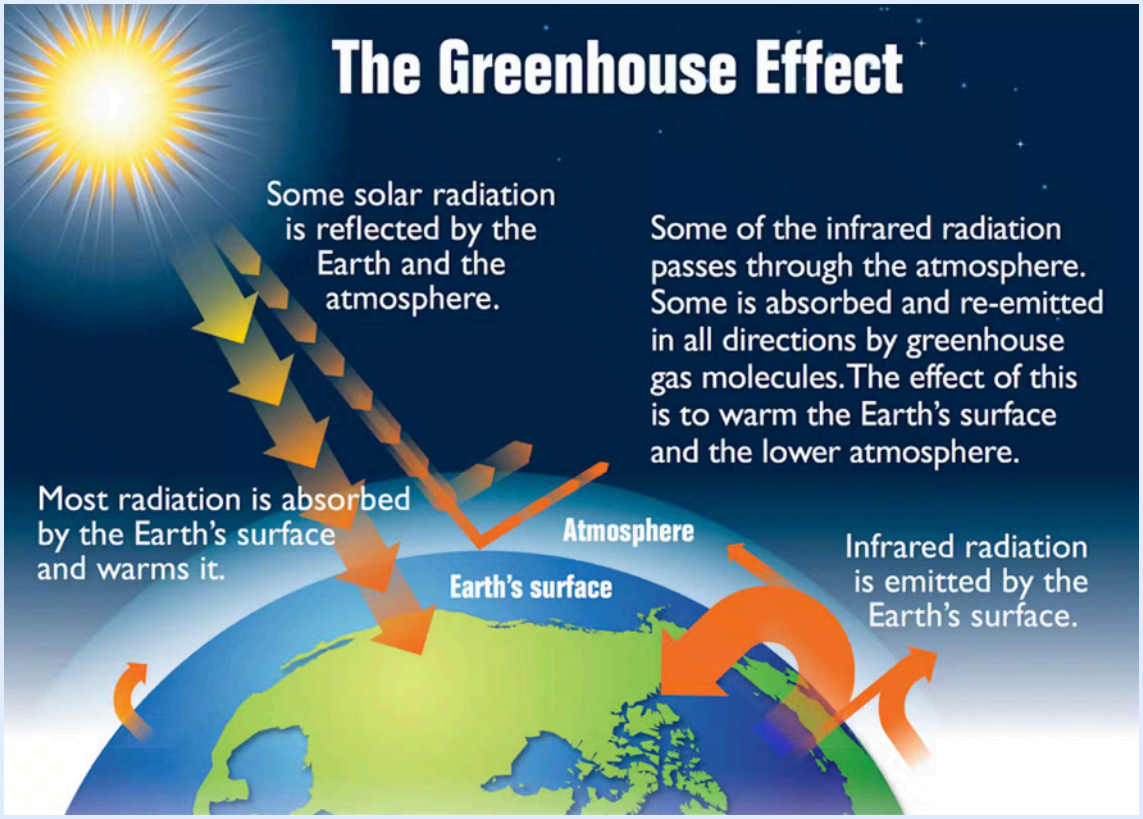
This is because a warmer atmosphere can hold more energy and moisture, leading to heavier and more intense rain.

For the same reason, ex-tropical cyclones (cyclones that originate in the Pacific) may be stronger and more intense when they reach New Zealand, say NIWA.

The greenhouse effect

The greenhouse effect is an atmospheric process where greenhouse gases like carbon dioxide, methane, and water vapour trap outgoing infrared radiation in the Earth's atmosphere.

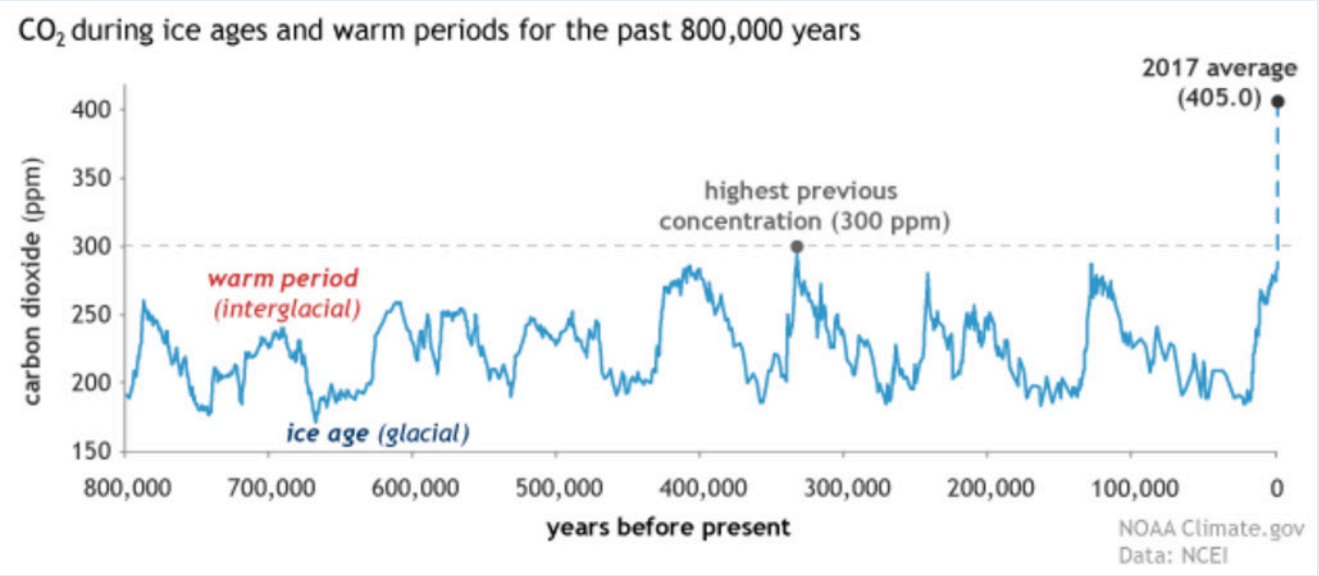
This process helps to keep the Earth warm and habitable.



https://theconversation.com/how-not-to-solve-the-climate-change-problem-187222

Carbon dioxide levels

The graph below shows the change in CO_2 levels over the past 800 000 years which has been measured in ice core samples. Current CO_2 levels are approximately 415 parts per million (ppm).



Source: https://www.zmescience.com/ecology/climate/carbon-dioxide-global-warming-05042019/

Most scientists agree that there have been 11 interglacial periods in the last 800 000 years. An interglacial period is when the global temperature is warmer than average. An interglacial period can last for approximately 10 000 years. The peaks on the graph above show these interglacial periods.

Sources

https://www.rnz.co.nz/news/national/485990/niwa-scientist-in-no-doubt-climate-change-behind-cyclone-gabrielle-s-intensity

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https://energyeducation.ca/encyclopedia/Greenhouse_effect

Parrenin, Frédéric; Masson-Delmotte, Valerie; Köhler, Peter; Raynaud, Dominique; Paillard, Didier; Schwander, Jakob; Barbante, Carlo; Landais, Amaelle; Wegner, Anna; Jouzel, Jean (2013): Atmospheric carbon dioxide, methane, deuterium, and calculated Antarctic temperature of EPICA Dome C ice core. PANGAEA, https://doi.org/10.1594/PANGAEA.810199, Supplement to: Parrenin, F et al. (2013): Synchronous change of atmospheric CO_2 and Antarctic temperature during the last deglacial warming. *Science*, 339(6123), 1060-1063, https://doi.org/10.1126/science.1226368

Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Level 1 Science RAS 2023

91923 Demonstrate understanding of science-related claims in communicated information

EXEMPLAR

Achievement

TOTAL 04

Science 1.4 AS 91923 v3
Demonstrate understanding of science-related claims in communicated information

Science claim chosen:
Organic meat benefits

The science-related claim made by Dr. Amber Sciligo and Dr. Jessica Shade said that organic meat is better for the environment than non-organic meat, they named their report “The Benefits of Organic Meat”.This report actively talks about the benefits of organic meat and how the environment can benefit from it.

The Organic Center is a non-profit research and education organization that sourced the majority of the information in the report, including the first graph about what organic meat means, Both of the graphs are infographics that provide a visual representation of the data available so that people can compare the effects of non-organic meat can have on the environment compared to organic meat. The second graph is sourced from Our World in Data, Our World in Data has been cited in academic scientific journals, medicine, and global health journals, This site is also peer-reviewed though there's no evidence that back in 2017 this site was peer-reviewed. The information at the bottom of the report was sourced from four researchers who studied at English universities, the researchers studied 71 articles, a few sources being Tuomisto, H.L Hodge. I.D, Riodan, and Mcdonald these sources date back to 2012,2016, and 2017 which is outdated; These sources won't have the updated resources that we currently possess in 2023.

Throughout the claim, there are multiple scientific terms used words like organophosphates, neonicotinoids, pyrethroids, nitrates, nitrogen, and nitrous oxide, although the language is used within context so as to not confuse or mislead the reader it may be confusing to those reading who have no prior knowledge in the science space. It was helpful when the report gave a little bit of context to the words like “growth hormones (e.g.beta-antagonists)” although this did not stay consistent throughout the entire claim. These high-level literacy words are aimed at an audience who have a general understanding of sciences like chemistry ect beforehand.

There are two infographics in the report, the first graph is a list of what organic meat means. This small graph supports the claim and explains why organic meat is better. Along with the red heading, there is an added checklist of six different reasons why organic meat is great. This first serves to clearly emphasize the point of why organic meat is better for the environment than non-organic meat and is an added list for the readers to compare organic meat to non-organic meat.

The second infographic was sourced from two researchers named Micheal Clark and David Tilman, this graph is named “Environmental impacts of organic vs conventional agriculture”. There is a key underneath the graph title that states “ Each food in the graph has a vertical bar. The smaller the bar, the more confident the researchers are that their findings are correct”. Confidence is a strange thing to measure, The reader's

would expect the researchers to be 100% confident that their findings are correct to assure that everything they have researched is accurate, There is another key on the side of the graph to show the readers that each different color on the graph correlates to each different food used in the experiment this key is easy to follow. There are words on the side pointing up to organic worst methods and down for organic better methods, This is misleading since the graph is supposed to compare different food types grown organically and inorganically, but instead, it's comparing the “better organic method, and the worse organic method”, there are also titles at the top of the graph with a lot of big scientific terms which are hard to understand (Eutrophication Potential and Acidification Potential) which are tricky to follow, the Y-axis title causes a lot of confusion to those who don't have prior context on what an organic: Conventional Impact Ratio is, This second graph doesn't show the comparison of organic vs. conventional agriculture the graph is hard to comprehend without context.

There was not enough information to be satisfied with the claim that organic meat is better for the environment than non-organic meat, although the report does emphasize some important points as to why organic farming is better for the environment. In the last paragraphs it compares their claim to a different study done by four researchers, They agreed with the original claim saying “Yes organic farms usually have more good microbes in the soil and don't lose as many important nutrients” but then continued on explaining if you look more into organic farming that organic farms actually can cause more pollution depending on the food being grown and how organic farms actually have more nitrogen, nitrous oxide, and ammonia leaking into the environment. At the end of the report, the claim that organic meat is better for the environment was lost.

Achievement

Subject: Science

Standard: 91923

Total score: 04

Q	Grade score	Marker commentary
1	A4	The candidate has described the science-related claim regarding organic meat. They have described the individuals and the organisation who are the source of the claim. The purpose of the communicated information has been described. The candidate has identified science language and described the science conventions around currency of information and graphing. If the candidate had explained how the science language or conventions had supported / not supported the claim, they would have attained a merit.

Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Level 1 Science RAS 2023

91923 Demonstrate understanding of science-related claims in communicated information

EXEMPLAR

Merit

TOTAL 05

Organic Meat

In this article by Dr Amber Sciglio and Dr Jessica Shade, they make the claim that “Organic meat benefits" and that organic meat is much healthier and better for the environment than non-organic meat.

One of the first things I noticed was that this article was published only 3 years ago, in 2020, so this article is relatively current which is good for them because it helps with their validity. But as I read through the article I found that, other than informative pieces within the article, there is no real evidence I found to back it up and the only places that have any evidence or statistics, have a link that doesn't work. Majority of the information in this article is just descriptions of what could possibly happen to you if you do / don't eat organic meat without any evidence of it happening before. They haven't provided a sample size that they have gathered their information on, they could have done a study with people's blood after eating organic meat, non-organic meat and see what it looks like but they didn't, this could've been a blind test or not, they don't provide any charts, graphs or diagrams. But we do know that this article is relevant to the topic they are trying to discuss, they haven't made any simple mistakes like inaccuracies in punctuation or spelling and they cover the same ideas throughout the article. They also have an seemingly unbiased report and it doesn't look like they have a strong opinion throughout the article.

Both of the authors of this article have legitimate PHD’s. Dr Shade being national program leader at USDA NIFA (United States Department of Agriculture, National Institute of Food and Agriculture) which works to helping US citizens and to “ensure a safe, nutritious, and secure food supply while also developing, delivering, and disseminating evidence-based nutrition education and promotion to prevent chronic diseases, improve health, and prioritise nutrition security.”, she was given her PHD at the university of California in Berkeley. Dr Sciglio on the other hand was awarded her PHD at Lincoln university in New Zealand for her study in “ecology and evolution with a specialty in plant/insect interactions.”, so both have definitive and authentic backgrounds that are based in this field of research.

But it says that both of our authors, Dr Shade and Dr Sciglio, were paid to write this, which could show a bias towards the ideas of the companies who published the article, these companies are The Organic Center and Applegate. Both companies originate from the United States, The Organic Center is a not for profit organisation with the aim to educate the public. Applegate in comparison is a company which has been “producing a range of organic meat products for over 30 years”, this does show there could be a bias. Firstly, Hormel Foods (the company which owns Applegate), states on their website that Applegate is the No.1 natural and organic meat producer, now if this fact is actually true then it can show a bias towards Applegate as it is not only a

informative article but it presents organic food in a very good light and advertises Applegate. On top of this, they don't mention any organic meat producer throughout this article and the only one you see is Applegate, this would have been vested interest apart from the fact that they aren't rating Applegate or other companies. The purpose of this article as stated is to inform people about the benefits of organic meat, but the underlying purpose could be for Applegate to gain coverage, popularity, money, etc.

This graph below, created by Michael Clark and David Tillman in 2017, is a combination of information provided by 164 different results “across 742 agricultural systems”, each colour representing a different organic industry, each line representing the impacts. The definitive lines are the lines which have a clear impact area e.g whether or not the organic method is better or worse than the non-organic method. The more faded lines mean that information provided shows less of a clear answer on whether the organic method is better or worse and it usually doesn't differ too much from the non-organic method. If the line is bold and higher than 1, the organic method has a worse environmental impact, if it is bold and lower than 1, it has a smaller environmental impact. The colour line we are focusing on is the more turquoise/light blue colour as this represents the organic meat industry.

In this graph it shows that for each individual category, organic meat is either worse or similar to the impact that non-organic meat has on the environment. For both ‘Land use’ and ‘Eutrophication Potential’, the organic meat ratio ranks higher than the non-organic meat, meaning that organic meat uses much more land and it has the potential to over-fertilise the water and land around the organic meat farms than non-organic meat farms, with this ratio we can see that this is the case for all of the organic meat farms whose information was recorded in this study. For ‘greenhouse gas emissions’, ‘acidification potential’ and ‘energy use’ all of the recorded information on the organic farms, have all similar results, the ratio is in between better and worse than, meaning that it is a bit of a mixed bag and some organic farms in the ratio have a worse environmental impact and some have a better impact but the overall is not clear. Overall from this study we can conclude that (at least in 2017) organic meat farming has worse environmental impacts than non-organic meat farming, this may not still be the case as the study was conducted 6 years ago. But both Clark and Tillman have strong backgrounds, Michael Clark focusing on “the impact that food systems have on environmental sustainability and human health.” at the University of Oxford and David Tillman who is “Regents' Professor and McKnight Presidential Chair in Ecology at the University of Minnesota, where he also serves as Director of the Cedar Creek Ecosystem Science Reserve.”. This graph gives us a different view on organic meat because this is not about how it benefits us, but how it benefits the environment and it shows that organic farming in meat does not benefit the environment.

Other Sources:
https://www.nifa.usda.gov/topics/food-nutrition-security#:~:text=NIFA%20works%20to%20ensure%20a,health%2C%20and%20prioritize%20nutrition%20security.
https://www.organic-center.org/meet-our-scientists
https://www.ox.ac.uk
https://cbs.umn.edu/tilman-lab/people/david-tilman

Merit

Subject: Science

Standard: 91923

Total score: 05

Q	Grade score	Marker commentary
1	M5	The candidate has explained how there is potential for bias in the science-related claim that organic meat is better for the environment. To gain an excellence, the candidate needed to examine how science language or conventions impacted the support for the claim.

Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Level 1 Science RAS 2023

91923 Demonstrate understanding of science-related claims in communicated information

EXEMPLAR

Excellence

TOTAL 08

Report on the Selected Claim

1196 / 800 words, soft limit - Max points: 0

Write a digital report on the selected claim using your science knowledge and language, and science critical thinking skills.

In your report consider including discussions on:

- what science-related claim is made in the resource
- who or what the source of the claim is, and the intended purpose of the communicated information
- how science language and conventions are used to support the claim
- how science language and conventions represent or mis-represent the science ideas in the claim.

Answer

In the resource, there are two main science-related claims that are being made about the link between astrology and personality. The first claim in the resource is that your personality is determined by which zodiac constellation is aligned with the sun, moon, and planets during your birth date. The second claim in the resource is that personality is determined by a combination of your genes and upbringing, and that it has nothing to do with astrology.

The claim for astrology is made by astrologers, with one of the more popular ones being Aliza Kelly. In her website, Kelly has been described as, among other things, a best-selling author and a rising star in modern spirituality. She has published her claim in various ways, including magazines and the three books she has made about astrology, and the sources I'm using for this report are astrology.com and her website. However, Kelly, as a source of this claim, is unreliable, as she doesn't back her claim up with any scientific evidence, presumably because astrology is rooted is spirituality. I think that the intended purpose of Kelly's claim is to inform people about her belief that astrology is linked to personality. It is likely that Kelly has no alterer motive for this claim, and that she believes what she is saying is true. She is targeting this claim at those who believe more in spirituality than science, as they are more likely to believe something that is very disconnected from science. The claim against astrology is made by psychologists in general, as well as the American Psychological Association (APA), and American physicist Shawn Carlson. This claim has been published in various websites, such as verywellmind.com. These sources are reliable, as the verywellmind.com website uses evidence from psychologists, and Carlson has done a double blind study on if astrologists can correctly match a personality to a birth chart. The intended purpose of these sources was to debunk the theory of astrology being linked to personality. In the case of verywellmind.com and the APA, they also wanted inform people about how personality actually works. They want this because they want people to know the actual science behind personality so that they can be better informed about how it works. These sources are aimed at those who are more inclined to look at the science behind how something works, as they are more likely to believe this over astrology.

Kelly has used scientific language in her statement to support her claim that astrology links to personality, which is, *"Your birth chart reveals the location of the planets in the sky at the time of your birth. An analysis of this chart, also called a natal chart, can provide deep insight into your personality."*. An example of the scientific language that Kelly uses in this statement is *'analysis'*. I think that Kelly used this scientific language to make her statement sound more based in logic than it actually is, making it seem that she has put a lot of thought into her statement. The scientific language supports the claim because it has more logical connotations, which adds a bit more sense to the spiritual idea. The sources against astrology have used both scientific language and scientific conventions to support their claim that astrology doesn't link to personality. The verywellmind.com website uses scientific language such as *'reliable and scientifically measured'* and *'psychologists study'*. I think that this website used this scientific language to emphasize that the California Personality Inventory (CPI), which is a test that is used to describe a person's personality, is based in scientific fact. This scientific language supports the claim by informing the reader that the information they are giving is backed up by a test used by trained professionals. Carlson has used the scientific convention of a double blind study to support this claim. I think that he used this test to scientifically study if astrologists can accurately guess someone's personality based on their birth chart to see if astrology is based in fact. This supports the claim because it provides scientific evidence from a study that debunks the claim that astrology is linked to personality, as it states that most astrologers can't accurately guess someone's personality based on their birth chart.

I think that the scientific language misrepresents the scientific ideas in the claim made by Kelly. Kelly did do a few things well, as she has provided just enough information to convince those who believe

in spirituality that astrology is linked to personality. However, she has done a lot more wrong. The scientific language she used does very little to link her claim to science, as it is more rooted in spirituality, and science directly opposes spirituality. Also, apart from this scientific language, Kelly has done nothing to scientifically prove her claim. She hasn't conducted any studies, and she isn't even going off results from any test at all. The only proof she has that astrology is linked to personality is that many people find that they do share characteristics of their star sign. However, this is actually just a result of correlation as oposed to causation. What's even worse about this is that this correlation is a result of confirmation bias, as the personality traits of each star sign are broad traits held by everyone. This means that the confirmation bias causes people to think that their star sign defines them because they fit the traits of their star sign, creating a false correlation that leads to an even more false belief that it is causation instead of correlation. I think that the scientific language and conventions represents the scientific ideas of the claim against astrology. The verywellmind.com website uses evidence from psychologists, and the scientific language represents this well, as it conveys that this information was gathered in a professional manner. Carlson's test represents the ideas behind the claim as well, as it provides the claim with results that support it. The test is reliable because it is a double blind study, meaning that both the participants and the researchers didn't know which personality files were real and which ones were fake. This means that there was less bias in the study as the researchers couldn't skew the investigation to their advantage. This study was also not funded by another company, meaning that there is very little room for vested interest or conflict of interest. However, the sample size was rather small, as there were only 30 astrologers involved, but each one did 30 trials, meaning that there were 900 trials done in total. Despite this huge number, there's still the case that 30 might not be representative of the entire population.

In conclusion, I think that the claim against astrology is valid and the claim for astrology isn't valid. The claim against astrology is valid because it is backed up by scientific evidence from professionals and an investigation that had very little room for any sort of bias. The claim for astrology isn't valid as it is rooted in spirituality, and the proof it does have is the result of a case of confusing causation with correlation, with this correlation being a result of confirmation bias.

Excellence

Subject: Science

Standard: 91923

Total score: 08

Q	Grade score	Marker commentary
1	E8	The candidate has securely examined the science-related claim of the impact of astrology on personality. The candidate has evaluated the use of science language and conventions around sample size, bias, conflict of interest, and correlation vs causation used to support (or lack thereof) for this claim.