NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2021

LIFE SCIENCES: PAPER II

SOURCE MATERIAL BOOKLET FOR QUESTIONS 1, 2 AND 3

SECTION A

QUESTION 1

Read the information below. Refer to this information, as well as your own knowledge, to answer Question 1 in the question paper.

The South African Pioneer White Butterfly Migration

1. Habitat

The Pioneer White butterfly (*Belenois aurota*) occurs throughout most of southern Africa and in parts of Asia. This butterfly has white wings with brown patterns on the front wings and brown veins on the hindwings. It has a wingspan (maximum length across the wings) of 50 mm. The main population of Pioneer White butterflies in South Africa is in the Kalahari region.

It is quite difficult to identify different species of butterfly – South Africa alone has over 660 species, and many of them look quite similar to one another. The following photos show four species of butterfly which occur in South Africa – ONE of which is the Pioneer White butterfly.

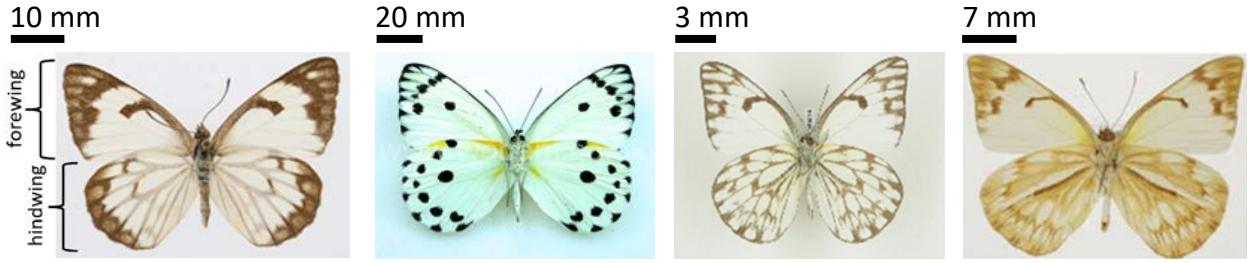


Figure 1.1 – Four different species of South African butterfly (images are NOT drawn to the same scale – note scale bars above each image)

[Adapted: <https://www.v3.boldsystems.org>; <https://www.lh3.googleusercontent.com>]

2. Life Cycle

All butterflies undergo a process called metamorphosis in their life cycle. This means that the adult and the young (called larvae) have completely different body structures. They occupy different ecological niches and require different foods and habitats.

Adult female butterflies mate and lay eggs on the surface of the leaves of the Shepherd Bush (*Boscia albitrunca*). The Shepherd Bush is a medium-sized tree. It occurs most commonly in the drier regions of South Africa where it is a keystone species in the environment. Some characteristics of the tree are shown in Figure 1.2 below. This tree is under threat, however, owing to the use of its branches as food for cattle, particularly in times of drought.

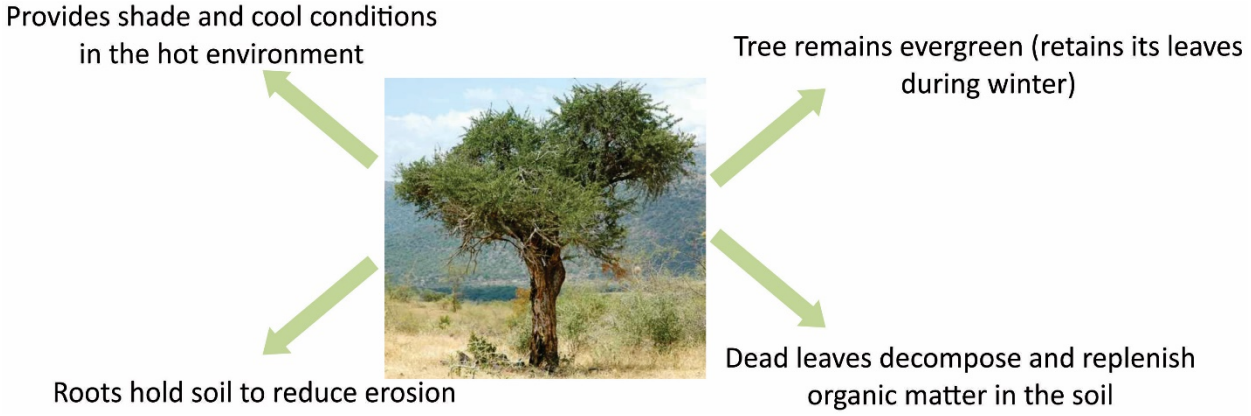


Figure 1.2 – Some characteristics of *Boscia albitrunca* (Shepherd Bush)

[<https://www.gateway-africa.com>]

The eggs hatch into larvae in spring. The larva is a worm-like insect called a caterpillar. The caterpillar eats Shepherd Bush leaves and as it grows larger, it moults (loses) its exoskeleton and grows a new one. (The exoskeleton is the outer layer of the animal.) This occurs because the exoskeleton does not grow with the insect. After several moults, the caterpillar stops eating, hangs upside down from a twig and produces a hard case around itself, called a chrysalis. Within this chrysalis, the caterpillar releases enzymes to dissolve most of its tissues, while other tissues begin to form the specialised organs of an adult butterfly. The chrysalis eventually breaks open and the adult butterfly emerges.

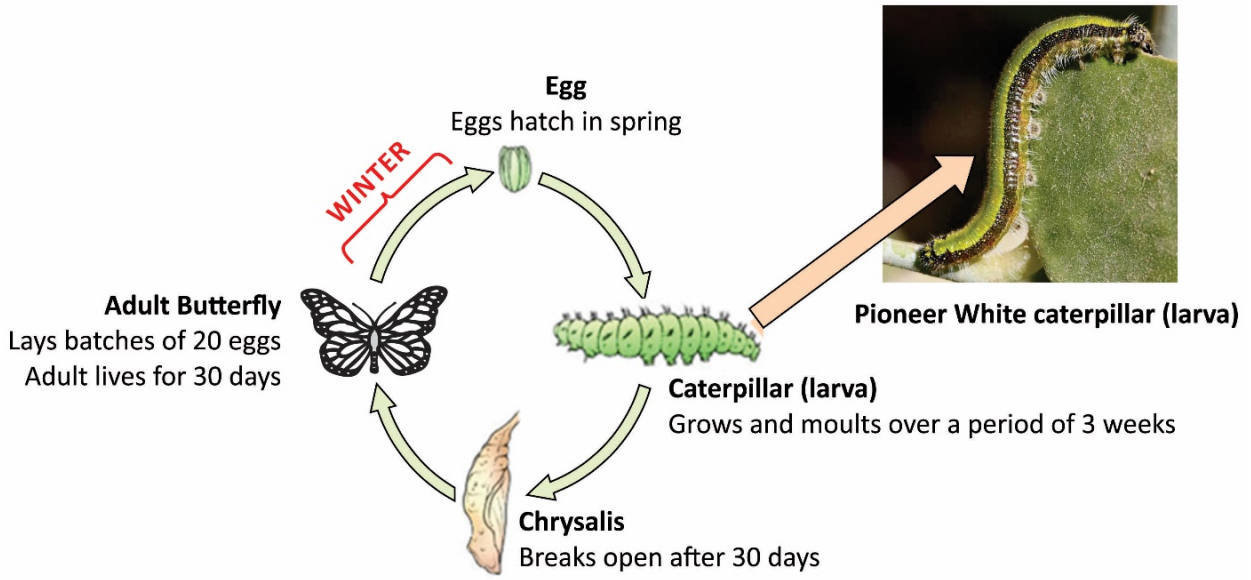


Figure 1.3 – Life Cycle of the Pioneer White butterfly

[Adapted: <https://www.biolib.cz>]
[Adapted: <https://www.buzzle.com>]
[Adapted: <https://www.wanderingthroughwadis.com>]
[Adapted: <https://www.wildlifesouthafrica.com>]

3. Predators of Pioneer White butterflies

The weather plays an important role in the population numbers of these butterflies. Various animals, such as parasitic wasps, robber flies and various spiders and birds, also act as predators of Pioneer Whites.

Figure 1.4 – Robber fly eating a butterfly

[<https://www.texashighplainsinsects.net>]

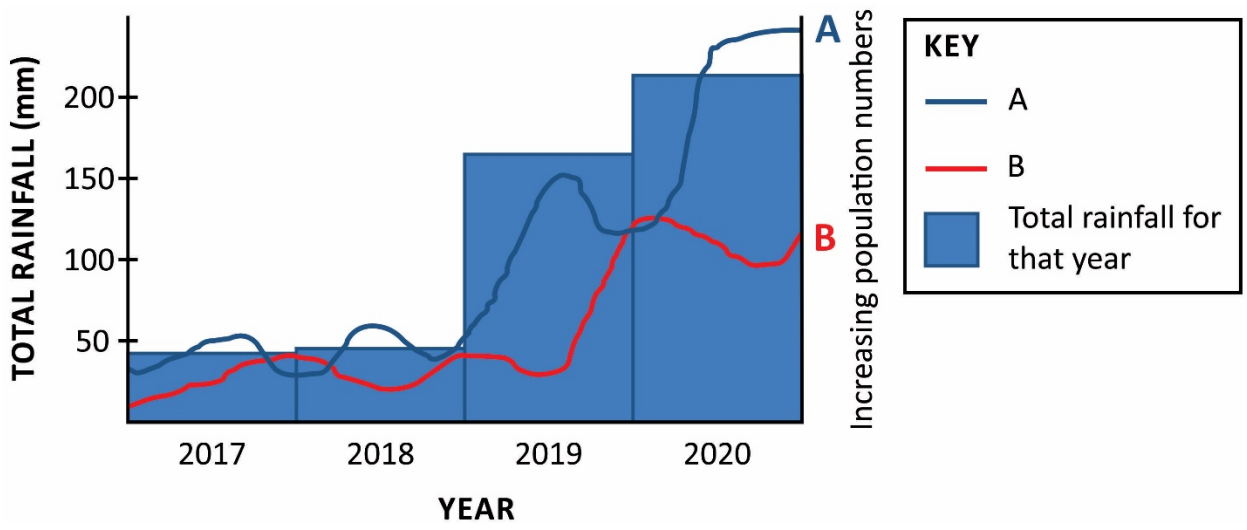


Figure 1.5 – Graph showing total rainfall in the Northern Cape from 2017 to 2020 and population numbers of robber flies and Pioneer White butterflies in the area

4. Migration

When the population numbers of Pioneer White butterflies increase beyond the carrying capacity of the Kalahari, large numbers of them start leaving the area to find other resources. This migration tends to occur every year.

Migration is defined as the seasonal movement of animals from one region to another and back again.

The butterflies fly in a general north-easterly direction as seen in Figure 1.6. A single butterfly will probably only fly about 200 km before it is either eaten or killed. Following them and preying on them, are hundreds of predators. As these butterflies fly northeast, others join the migration. Along the route, the female butterflies lay eggs, which begin the life cycle of the next generation.

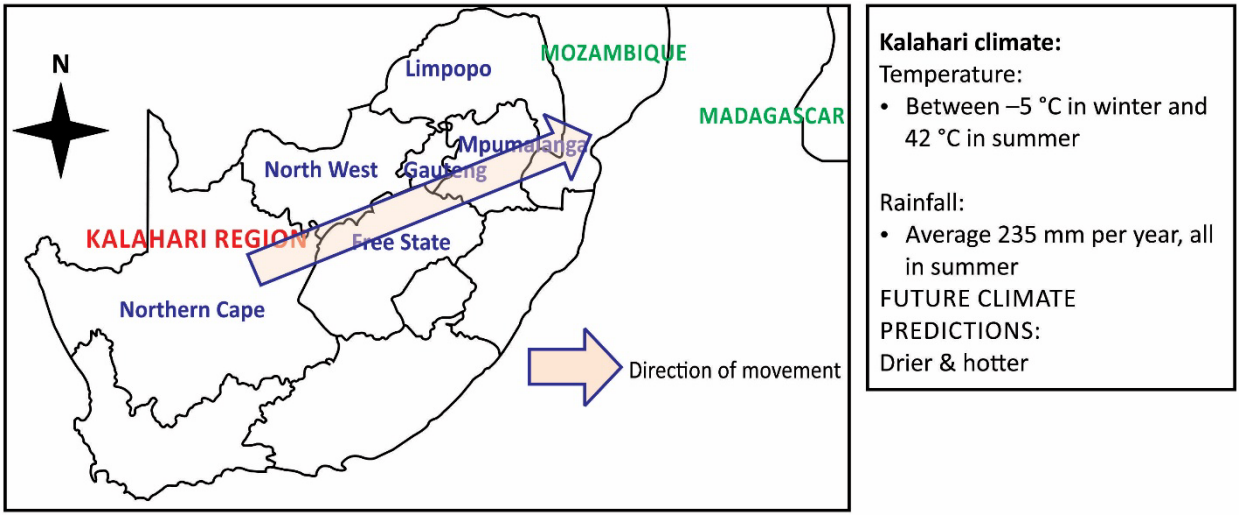


Figure 1.6 – Map showing direction of migration of Pioneer White butterflies in South Africa

[Adapted: <https://www.zookeys.pensoft.net>]
[Adapted: <https://www.timeanddate.com>]

The migration of these butterflies is an extremely impressive sight. Millions of them fly through Gauteng in December/January. They tend to mostly fly at least 3 metres above the ground, but as they fly through inhabited areas, some are still killed by collisions with cars.

Little research has been done with regard to where the migration of the butterflies ends. They have been noticed flying above the ocean near the Mozambique coast. However, it is likely that the ones that fly off the coast eventually fall into the sea and die.

Figure 1.7 – Migrating butterflies

[<https://www.indochinapioneer.com>]

The numbers of butterflies in the migration varies from year to year – estimates are that the numbers extended into the billions in 2019/2020. The 2019/2020 migration of the butterflies seems to be the largest since 1966. Climate change is predicted to affect the timing and size of future migrations.

5. Two investigations into Pioneer White butterfly numbers

Investigation 1

Mokala National Park is a reserve situated in the Northern Cape. It was only established in 2007 and therefore there is much research being conducted into the biodiversity and species' composition of the reserve.

Due to concerns around the conservation of the Shepherd Bush, population ecologist, Dr M Lever, conducted an indirect sampling method using quadrats at three sites in the reserve (see Figure 1.8).

- Each site measured 200 m × 200 m.
- Each 200 m × 200 m site was split into quadrats of 20 m × 20 m.

Dr Lever used three groups of students (at sites A, B and C) to conduct each survey. The patterns of distribution of Shepherd Bushes were different in each site. The distribution of Shepherd Bushes and the quadrats sampled are shown in Figure 1.9 on the next page.

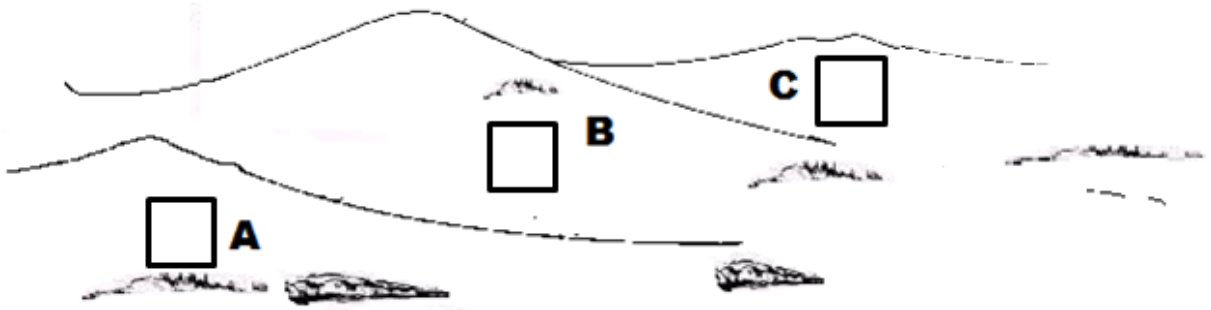


Figure 1.8 – Three sites sampled in Mokala National Park

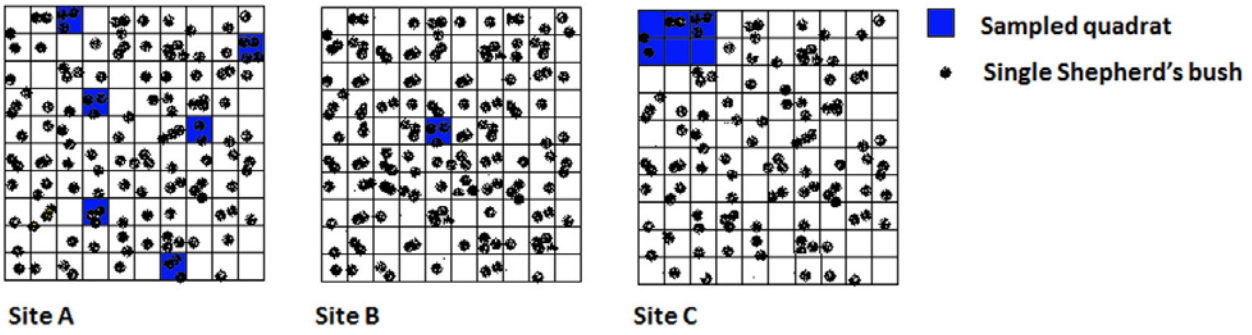


Figure 1.9 – Three sites A, B and C, showing the quadrats sampled and location of Shepherd Bushes

Investigation 2

At the same time, a separate study was conducted by Prof Ari Ben Zvi at an Israeli university to obtain an estimate of the abundance of Pioneer White butterflies migrating through Gauteng over the last 3 years. He posted the following advertisement on a social media website:

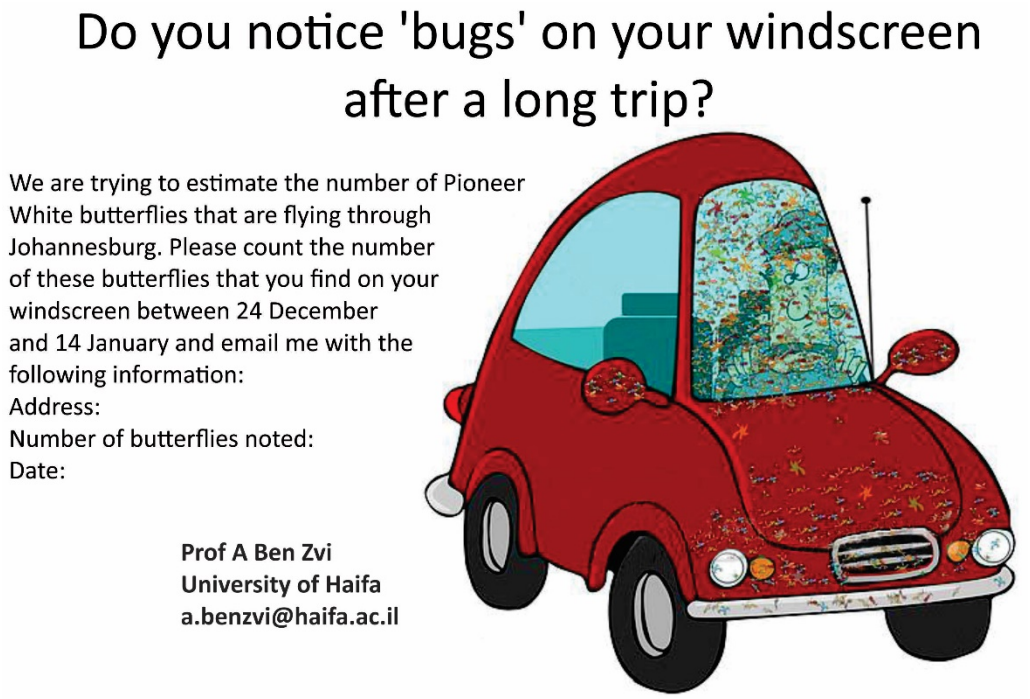


Figure 1.10 – Advertisement on social media requesting data on the numbers of Pioneer White butterflies killed on windscreens

[Adapted: <https://www.dreamstime.com>]
[Adapted: Alias, D. & Milton, S. 2003. A collation and overview of research information on *Boscia albitrunca* (Shepherd Bush). Department of Water Affairs and Forestry, Pretoria, South Africa]
[Adapted: Bega, S. 2020. Mystery surrounds White Butterflies fluttering through Johannesburg.]
[Adapted: Coates Palgrave, K. 1983. *Trees of Southern Africa*. 2nd ed. Struik Publishers, Cape Town]
[Adapted: Kenyi, J. M. 2008. *African Journal of Ecology* 18(1): 123 – 126]
[Adapted: Oldroyd, H. 1974. *Annals of the Natal Museum* 22:1 – 171.]
[Adapted: Pelser, J. J. 2017. MSc Thesis. University of the North West]
[Adapted: Terblanche, L. *Butterfly Migration over Southern Africa.* PhD Thesis, Stellenbosch University]
[Adapted: van der Walt, J. 2016. *Butterfly Migration in South Africa*. Wildlife South Africa]
[Adapted: Butterfly Institute of South Africa <https://www.cbisa.co.za>]
[Adapted: Experts dispel myths on White Butterfly sightings across SA. African News Agency. 2020.]
[Adapted: <https://www.sanparks.co.za>]
[Adapted: <https://www.scientificamerican.com>]
[Adapted: <https://www.wildlifesouthafrica.com>]

QUESTION 2

Read the information below. Refer to this information, as well as your own knowledge, to answer Question 2 in the question paper.

Behold the Beautiful Dung Beetle

The Scarabaeidae are a family of tens of thousands of beetle species, 5 000 of which are dung beetles. Dung beetles are found on practically every continent and thrive in all climates except where there is extreme cold. These little beetles are some of the most fascinating insects. They use the dung (faeces), mostly from herbivores, as food, as well as for a place in which to lay their eggs. Herbivore dung, such as that from elephants, is composed mostly of partly digested grass and leaves and a range of bacteria. It has little to no unpleasant odour and is highly nutritious. Dung beetles also go through a metamorphosis – the young (larvae) are caterpillar-like organisms. When the eggs hatch into larvae, the larvae eat the dung surrounding them as they grow. The adults drink the liquid nutrients that are present in the dung. Adult dung beetles range in size from 5 mm to 50 mm.

Figure 2.1 – *Scarabeus satyrus*

[Adapted: <https://upload.wikimedia.org>]

After a large herbivore (like an elephant) has defaecated, thousands of beetles descend upon the fresh pile of dung. The beetles are attracted by the odour of the dung. Dung beetles are divided into four groups according to how they use the dung. This is summarised in Figure 2.2.

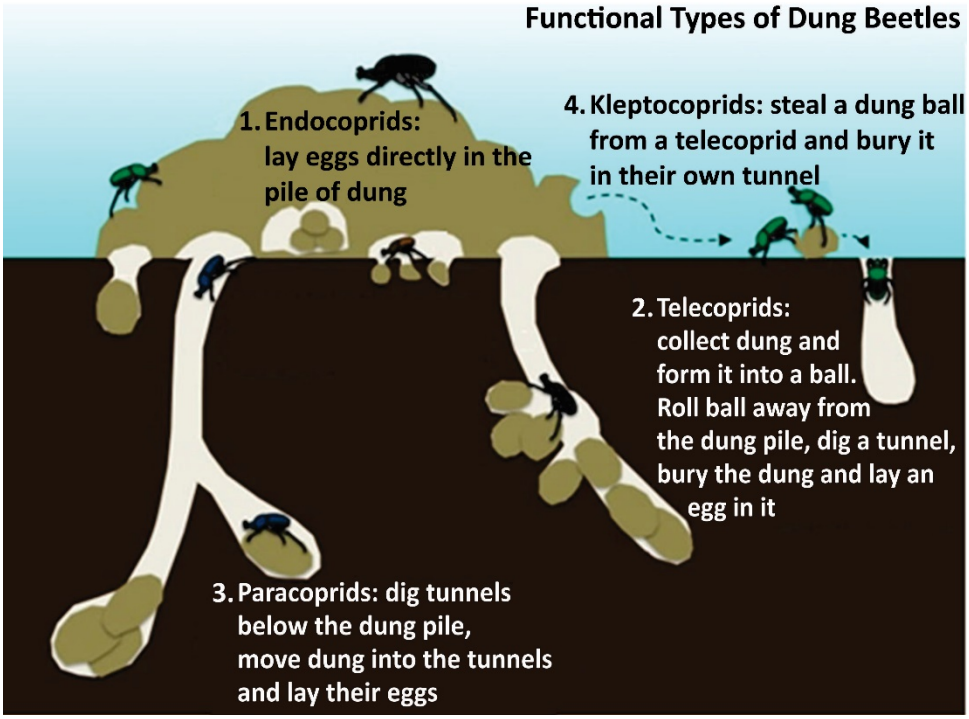


Figure 2.2 – Dung usage in dung beetles

[Adapted: <https://www.indigosafaris.com>]

Telecoprids are usually larger dung beetles, with a mass of 12 g. Male telecoprids push the dung ball backwards with their back feet. The front legs are armed with large ridges to grip the ground for stability. The ball is up to 50 times his weight. The beetle attempts to push the ball in as straight a line as possible and as quickly as possible to avoid theft by a kleptocoprid dung beetle.

The male releases a hormone to attract a female. She will cling to the ball as the male continues to roll it in search of soft soil. When appropriate soil is located, the pair use a shovel-shaped structure on their heads to dig away beneath the ball, slowly burying it. The female lays her eggs in the dung ball and the larvae are left to develop using the dung as nutrients during the metamorphic process.

While rolling, the beetles move away from the dung pile in a straight line, which is remarkable given that they do this facing backwards with their head pointing towards the ground. Dung beetles have light-sensitive cells in their eyes that allow them to detect the angle of light rays coming from the sun. After sunset, they use the Moon and even the Milky Way galaxy of stars for orientation. If obstacles throw a beetle off his path, he will climb on top of the ball and do a 'dance', turning in a circle and taking a 'snapshot' of the sky for reorientation, and then continue rolling. It is important that the beetles keep rolling their dung balls in a straight line and do not circle back to the dung pile. "The dung beetles don't 'care' which direction they're going in; they just need to get away from the dung pile," says Professor Marcus Byrne from Wits University.

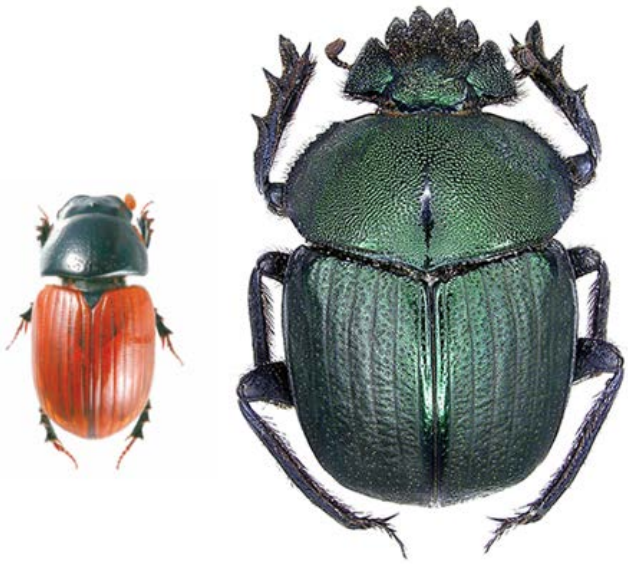


Figure 2.3 – Two species of dung beetles that differ in their dung usage.
Left: *Aphodius*. Right: *Kheper*. (Both images are life size)

[Adapted: <https://www.researchgate.net>]
[Adapted: <http://www.coleoptera-atlas.com>]

Figure 2.4 – Different species of dung beetles at a dung pile

[Adapted: <https://www.thumbs-prod.si-cdn.com>]

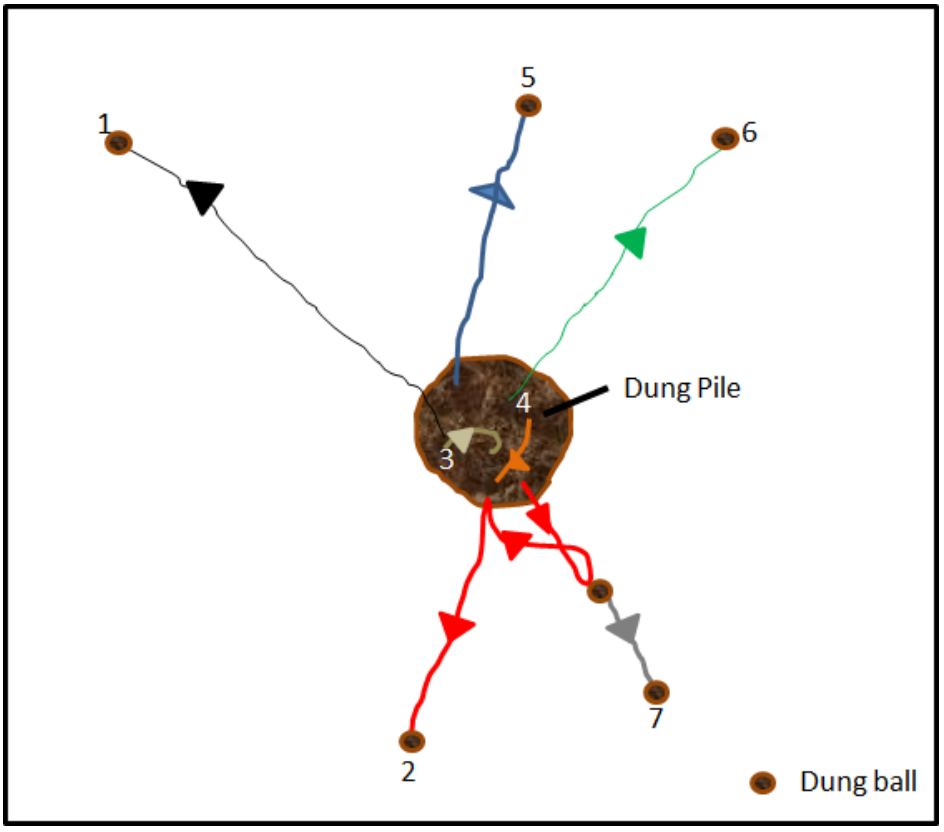


Figure 2.5 – A map showing the tracks of 7 dung beetles from and on a cow dung pile

Biological/environmental importance

Dung beetles are vitally important to the environment as they are responsible for disposing of most of the dung during the summer season. When the dung is buried, it decomposes and provides nutrients to the soil. This means that the nutrients are recycled by being used for plant growth. When decomposition occurs, carbon dioxide is given off. By burying the dung underground, the carbon dioxide is not released into the atmosphere, therefore helping prevent global warming and climate change. The removal of dung also minimises the number of flies that breed in the dung, so these beetles are extremely useful in maintaining a healthy environment. Dung beetles also play a major role in the ecosystem in burying seeds that are in the dung. In addition, their tunnels help to aerate the soil.

When the dung beetles hibernate in winter, termites take over the job of cleaning. Amazingly, termites are able to locate dung piles, communicate this information to other termites in the colony and transport it to the colony. Termites are able to remove huge amounts of dung over a very short time period.

Australia – covered in dung!

Australia is a major cattle and sheep farming country. However, their native dung beetles have evolved to deal only with the dung of indigenous Australian mammals – usually marsupials (e.g., kangaroos). Marsupials are mammals that carry their young around in a pouch on their abdomen. They only produce small quantities of small, dry pellets of dung. When European settlers arrived in Australia, they brought cattle and sheep with them, which today number in the millions. The indigenous beetles were not adapted to use and disperse cattle dung effectively. The average adult cow defaecates 12 times per day – if the dung is not recycled, it may cover most of the grazing area, smothering plants and obstructing new plant growth.

Figure 2.6 – A = An example of a marsupial (a kangaroo)
B = A field in Australia covered in dung
C = Cow dung
D = Kangaroo dung

[Adapted: <https://www.gannett-cdn.com>
[Adapted: <https://www.agric.wa.gov.au>]
[Adapted: <https://www.i.ytimg.com>]
[Adapted: <https://www.previews.123rf.com>]

When this indigenous dung eventually decomposes, fast-growing plants are the first to colonise the area. These are often weedy or alien invasive species. As the plants grow, they make conditions favourable for the further growth of other species. This change from one plant community to a different plant community continues. Due to the fact that the natural seeds in the soil were smothered by the layer of dung above, the final species present in the area are often not the same as the original community in the area. The result is therefore a change in the final ecosystem, meaning that the previous grassy fields, ideal for the grazing of cattle, cease to exist.

In the late 1950s an entomologist (a biologist specialising in the study of insects), George Bornemissza, suggested that foreign dung beetles could successfully be imported into Australia to assist with this problem. Hundreds of species of dung beetles (mainly from South Africa) were considered for possible release in Australia to help control the dung. Eventually, 29 species were released into Australia. These dung beetles have managed to breed in Australia and have been successful in clearing the fields of dung. Dung-covered fields are no longer a problem in Australia.

[Adapted: Baird, E., Byrne, M., Smolka, J., Warrant, E. J. & Dacke, M. 2012. The Dung Beetle Dance. *Plos One*]
[Bardoe, C. 2018. *Behold the Beautiful Dung Beetle*. Charlesbridge]
[Adapted: Coe, M. 2008. The role of termites in the removal of elephant dung in the Tsavo (East) National Park, Kenya.
[Adapted: Dacke, M. et al. Dung Beetles use the Milky Way for orientation**.** *Current Biology* 2013]
[Adapted: Heinrich, B. & Bartholomew, G. A. 2010. *Phys. Zool.* 52(4)]
[Adapted: 2013. *Journal of Ecology* 15(1): 49–55.]
[Adapted: <https://www.csiropedia.csiro.au/dung-beetle-program>]
[Adapted: <https://www.sabisabi.com>]
[Adapted: <https://www.epod.usra.edu>]

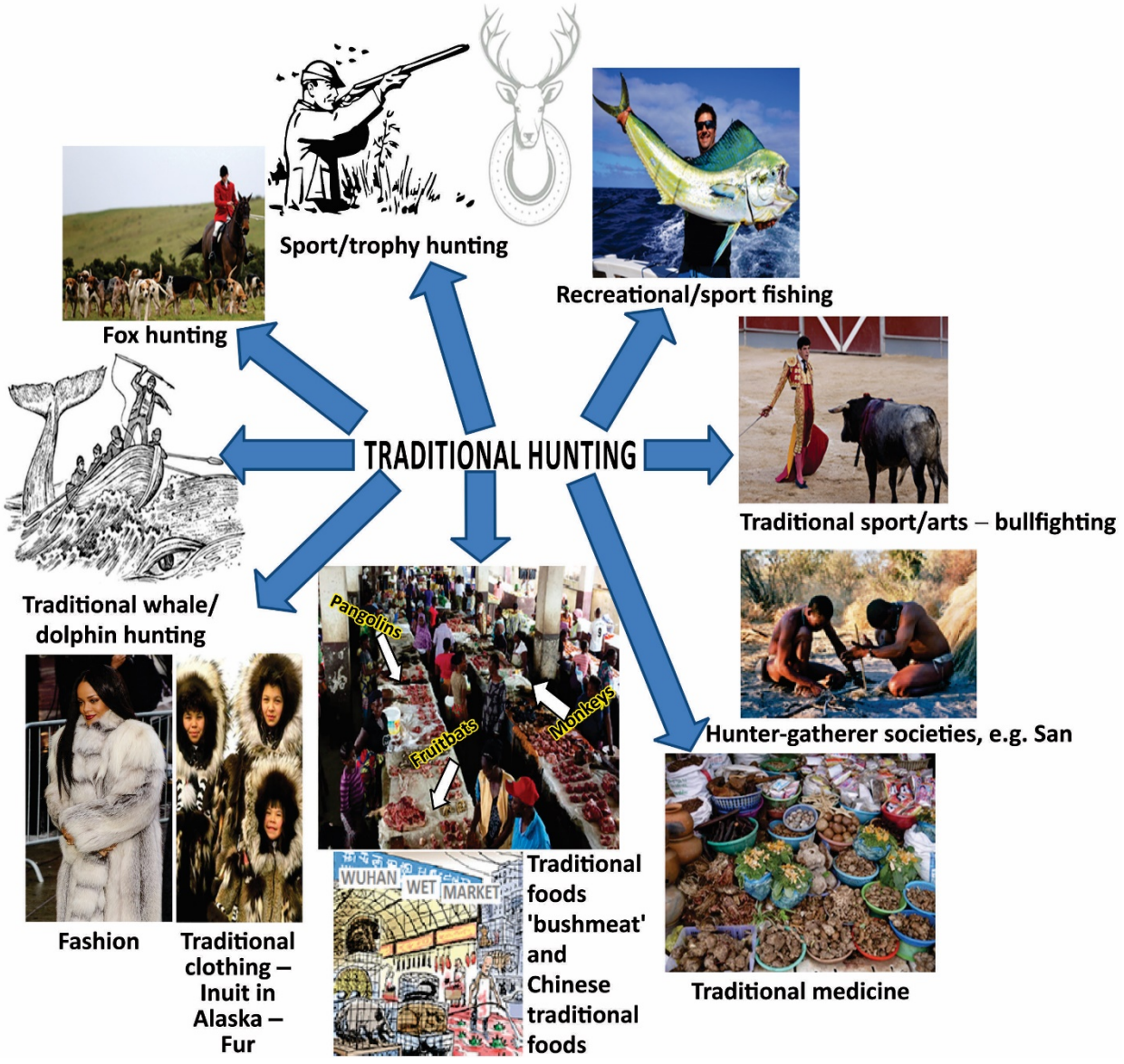
SECTION B

QUESTION 3

Read the information below. Use this information, as well as your own knowledge, to answer Question 3 in the question paper.

SOURCE A WHAT IS TRADITIONAL HUNTING?

Traditional hunting is defined as any activity present in the culture of a specific group of people that involves killing animals. These methods of hunting are often at odds with modern ideas of animal rights and could be regarded as being cruel and savage.



[Adapted: https://www.s3.amazonaws.com>]
[Adapted: <https://www.rodfishingclub.com>]
[Adapted: <https://www.image.shutterstock.com>]
[Adapted: <https://www.i.pinimg.com>]
[Adapted: <https://www.cdn.shopify.com>]
[Adapted: <https://www.oneworldonehealth.wcs.org>]
[Adapted: <https://www.ethnopharmacology.org>]
[Adapted: < https://www.c8.alamy.com>]

South African hunting magazines and an advertisement for a South African hunting lodge

[Adapted: <https://www.game4africa.co.za>]
[Adapted: <https://www.worldofmagazine.com>]

Traditions – Pros and Cons

FOR	AGAINST
Represent the values of a society	'Values' by definition should not include killing
Holds society together	No single tradition holds societies together – traditions can be reformed
Provide individuals with a feeling of belonging to a larger social group	Wrong that cruel practices are justified just because they are 'traditions'

[Adapted: <https://www.britannica.com>]

An example of a cruel practice sometimes classed as a tradition

One example of a 'tradition' in certain cultures is female genital mutilation (FGM). Globally, 200 million women and girls have undergone FGM.

Waris Dirie – former supermodel campaigning against FGM

[<https://www.desertflowerfoundation.org>]

FGM refers to all procedures involving removal of the female external genitalia. It has no medical benefits and often causes great harm, pain and increased risk of new-born and maternal death.

FGM is culturally and often religiously important to the people who practise it. Cutting is considered an important occasion in a girl's life that marks the changeover to womanhood.

[Adapted: 2018. Changing culture to end FGM. *The Lancet* 391(10119)]

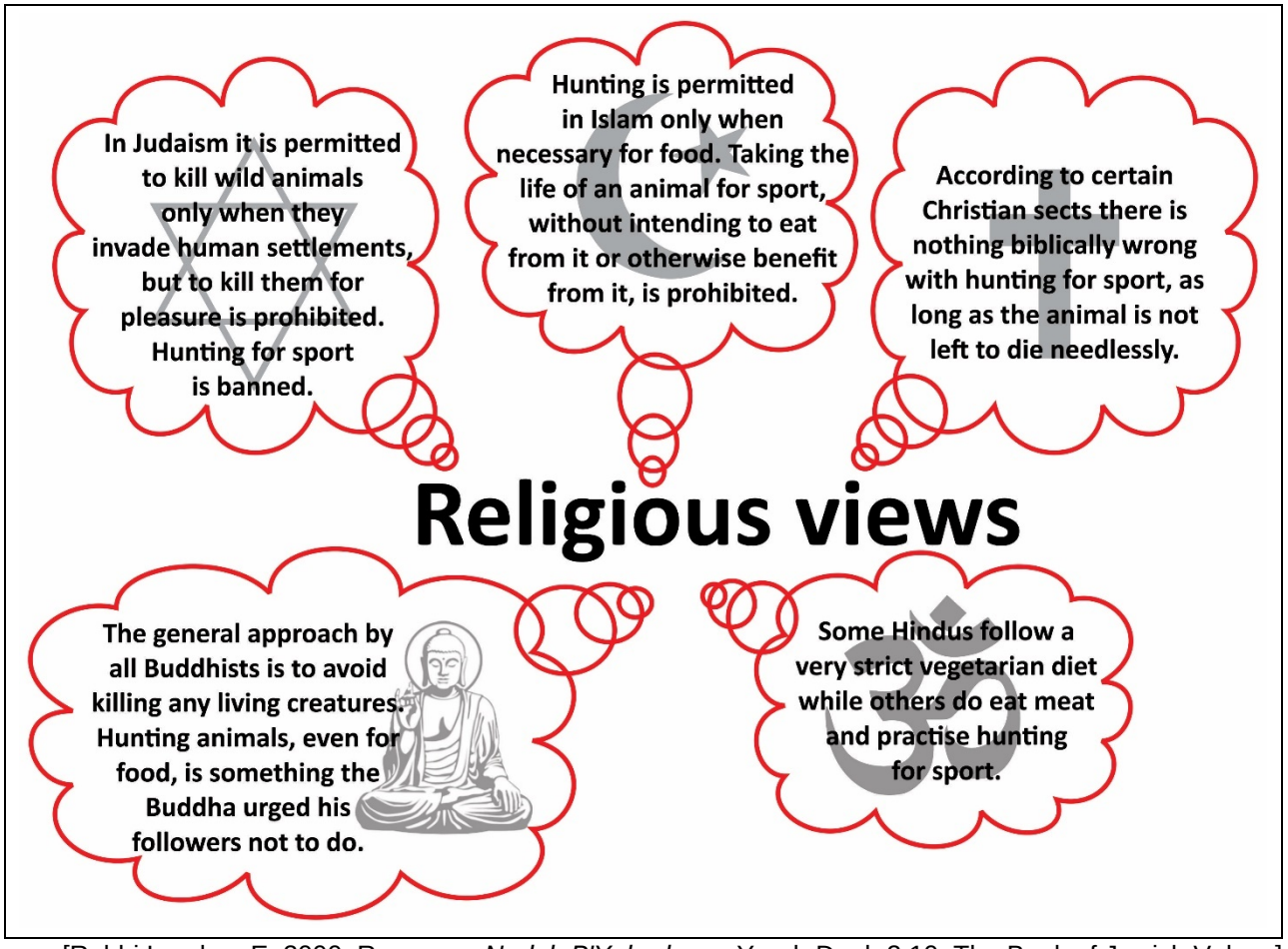
SOURCE B LAWS & RELIGION

United Nations Human Rights Council: "… to respect, promote and protect the right of everyone to take part in cultural life, including the ability to access and enjoy cultural heritage …"

"… condemns intentional destruction of cultural heritage … reinforcing the relation between the protection of cultural heritage and human rights …"

Constitution of South Africa: "Persons belonging to a cultural, religious or language-based community may not be denied the right … to enjoy their culture, practise their religion … to form, join and maintain cultural associations".

[Adapted: Hild, S. & Schweitzer, L. 2019. *Animal Welfare: From Science to Law.* pp.103–107]
[Adapted: Silverman, H., & Ruggles, D. F. 2007. *Cultural heritage and human rights*. pp. 3–22]

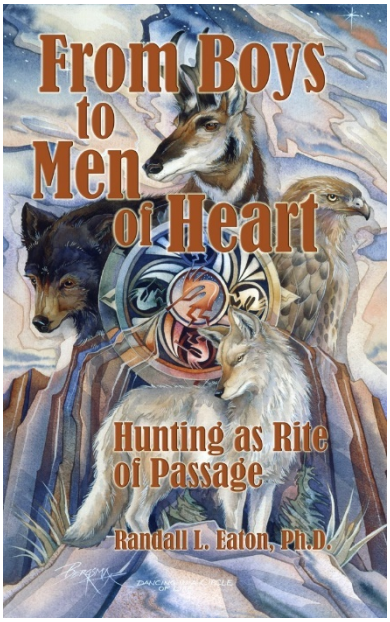


[Rabbi Landau. E. 2000. Responsa *Nodeh B'Yehuda*, on Yoreh Deah 2:10. The Book of Jewish Values]
[Adapted: <https://www.islam.stackexchange.com>]
[Adapted: <https://www.openbible.info>]

SOURCE C HUNTING IS A 'RITE OF PASSAGE'*

*ceremony or event marking an important stage in a person's life

BOOK REVIEW: *From Boys to Men of Heart – Hunting as a Rite of Passage* by Randall Eaton



Eaton says that hunting is fundamental in the maturing process of a male. Historically, societies placed value on the hunter. Men earned manhood by hunting or being a warrior. The original rite of passage was hunting because it proved that a male could provide food and qualify for manhood and marriage. Society is becoming increasingly violent as boys no longer experience hunting as part of the maturing process to adulthood.

Dr Eaton is a best-selling author. He has held positions in a number of universities. He is internationally recognised for his work in animal behaviour, wildlife conservation, human evolution and the ethics of hunting. Michael Gurian, a family therapist agrees that hunting does teach men compassion, and that it would be a more peaceful world if more men hunted. University Psychology lecturer, Dr Jim Rose, says that shooting and hunting teach kids self-control, self-restraint and sound judgement.

[Adapted: <www.buckeyefirearms.org>]
[Adapted: <https://www.waynedalenews.com>]
[Adapted: LeManuel, L. B. 2014. Book Review. *The American Indian Quarterly* 38(4):541–543]

For centuries, the Maasai community in Kenya has practised a traditional rite of passage that required males to hunt and kill lions. This tradition has been largely blamed for the decreasing number of lions.

In order to end this destructive practice, the community has come up with other ways to celebrate the traditional rite of passage. One of these is the Maasai Olympics competition.

The event involves numerous games, including rungu (club) throwing for accuracy, running, javelin throwing, and the high jump. Lion hunting therefore does not occur anymore.

[Adapted: <https://www.maasaiolympics.com>]

SOURCE D HUNTING IN AMERICAN CULTURE

"I hunted squirrels a good bit from my youth. I have a lot of good memories of hunting with my grandpa and Uncle Steve and squirrel hunting is a good way to get kids interested in hunting."

"I love to share my passion with my seven-year-old daughter, Harper. She has been accompanying me hunting since she was three. This is her first year carrying a gun."

[Adapted: <https://art.ebsqart.com>]
[Adapted: <https://www.ocj.com>]

[Adapted: <https://www.oakcreekwhitetailranch.com>]

SOURCE E FOX HUNTING IN THE UNITED KINGDOM

Fox hunting is a traditional 'sport' practised in the United Kingdom (a country consisting of England, Scotland, Northern Ireland and Wales). Foxes were widely regarded as vermin (pests) and farmers have hunted the animals for many years as a form of pest control to decrease their attacks on farm animals.

The hunt involves the chase of a fox by horsemen with a pack of dogs. A breed of dogs – the English Foxhound, has been developed especially for this purpose. Foxhunting dates from at least the 15th century.

[<https://www.guardian.co.uk>]

Foxhunting developed in the 19th century and eventually became a national upper-class sport. Traditional procedure is still observed, and the proper kit (clothing) must be worn.

[Adapted: Itzkowitz, D. 1977. *Peculiar privilege: A social history of English foxhunting 1753–1885*. Hassocks, Sussex: Harvester Press]
[Adapted: Marvin, G. 2007. Hunting as Heritage. *International Journal of Cultural Property* 14(3): 339–360]
[Adapted: <https://www.britannica.com>]
[Adapted: <http://news.bbc.co.uk/cbbcnews>]

Fox hunting in England has remained popular even though it was banned in Scotland in 2002. There is a partial ban in England on fox hunting. The *Countryside Alliance* is an organisation promoting fox hunting in England. The following reasons are provided by the Countryside Alliance to not ban hunting:

Foxes are a nuisance and kill large numbers of chickens and lambs. Hunting is an effective method of pest control.

Police resources would be wasted on trying to enforce anti-hunting laws.

Hunts are needed to keep fox numbers below carrying capacity.

Only old and sick foxes are killed in the hunt.

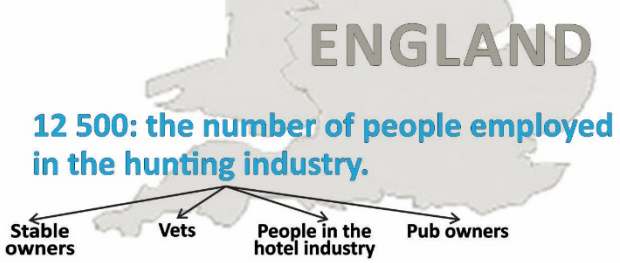
Fox hunting is part of the nation's cultural heritage.

Jobs in the countryside are scarce.

If you eat meat, you have no right to argue against hunting.

Hunting is a culture contributing to literature, art and music, going back centuries. Losing hunting would be like losing a language.

Painting: 'Tally-ho' by Henry Alken
(Adapted: <https://lh3.googleusercontent.com)



People have the right to preserve a collective way of life and to live their own lives in their own way, rather than have a set of values imposed on them.

Hunting promotes biodiversity conservation.

Hunting is one of the last remaining traditions of the British countryside – so many have disappeared due to modern life.

'Personally, I've always been in favour of fox hunting'.
Ex-Prime Minister, Theresa May 2017

Countryside Alliance March
[Adapted: <https://www.gettyimages.co.uk>]

Fox hunting with dogs has been banned in Scotland since 2002. The following reasons are provided by the Scottish Parliament to keep the ban:

Only 1%–3% of chicken and lamb deaths can be blamed on fox predation.

Fox numbers are nowhere near carrying capacity in the UK. In fact, many hunting societies breed foxes to hunt.

A shortage of foxes has also led to the importation of foxes from other areas. 40% fall in fox numbers between 1996 and 2020.

80: Percentage of public opposing fox hunting.

The number of foxes killed by hunting is too small to contribute to controlling their population.

Hounds are trained to kill foxes by allowing them to hunt fox cubs.

Even if fox numbers exceeded carrying capacity, their numbers can be controlled by hormonal contraception.

Rabbits are a major farming pest – destroying many vegetable crops. Foxes are their predators.

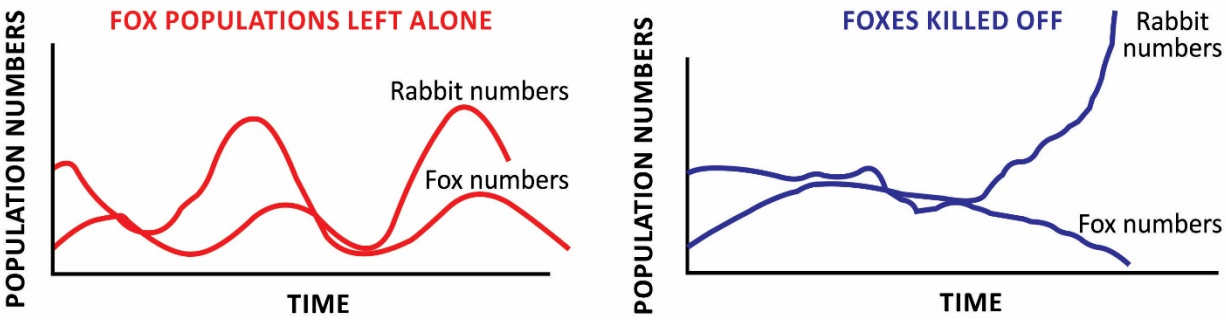
People have the right to criticise the morals of other people's traditions.

Caring for the countryside should mean caring for wildlife populations.

Just because the tradition is old, does not mean that it is morally justified.

Anti-hunting laws have resulted in the prosecution of 150 cases in 2010 alone.

GRAPH SHOWING NUMBERS OF FOXES AND RABBITS IN SCOTLAND



[Adapted: <https://www.i.pinimg.com>]
[Adapted: <https://www.squidoo.com>]
[Adapted: <https://www.guardian.co.uk>]
[Adapted: <https://www.lh3.googleusercontent.com>]
[Adapted: Anderson, A. 2006. The Countryside Alliance. *International Journal of Policy Research*]
[Adapted: Church, B. M. et al. 2007. Rabbit damage to wheat in England. *Plant Pathology* 2(4): 107–112]
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[Adapted: Marcström, V. et al. 1989. *Canadian Journal of Zoology* 67:658–668]
[Adapted: Pech, R. E., et al. 1992. Predator regulation of rabbits. *Oecologia* 89:102–112., 1950–52]
[Adapted: <https://www.foxproject.org>]
[<https://www.guardian.co.uk>]
[Adapted: <https://www.historic-uk.com>]
[Adapted: <https://www.ruralsports.co.uk>]
[Adapted: <https://www.theconversation.com>]

SOURCE F QUOTES

(vermin = pests) [Adapted: <https://www.azquotes.com>]

SOURCE G DANISH WHALE HUNT, THE JAPANESE DOLPHIN HUNT AND SPORT FISHING IN SOUTH AFRICA

Every year, during July, several hundred whales are killed for their meat by inhabitants of the Faroe Islands (part of Denmark). This whale hunt, called *the grind*, is more than 1 200 years old, dating to settlement of the islands by Vikings in about 800 CE. This hunting was conducted for food. Very small numbers of people lived on the islands at that time, so very small numbers of whales were hunted.

The Hunt

They are killed with traditional knives.

Whale Behaviour

Whales are highly social, living in groups called pods, numbering several dozen to more than 200 animals and including extended-family social groups. Whales also suffer stress during the hunt.

Danish Government's View

The killing method used in the hunt is humane and the hunt is an important part of traditional culture and a valuable source of food for the islands. The practice is sustainable, as there are an estimated 778 000 whales in the Atlantic Ocean. The Faroese hunt only about 800 whales annually. All hunters also need a hunting licence.

Charity

Each hunter's family is entitled to an equal portion of the meat.

Criticisms

The hunt is unnecessary – in modern times whale meat can be replaced with other food. Many people in the country do not eat whale meat. Although whale meat is high in protein there are concerns that the high mercury levels in the ocean can make the whale meat dangerous to eat.

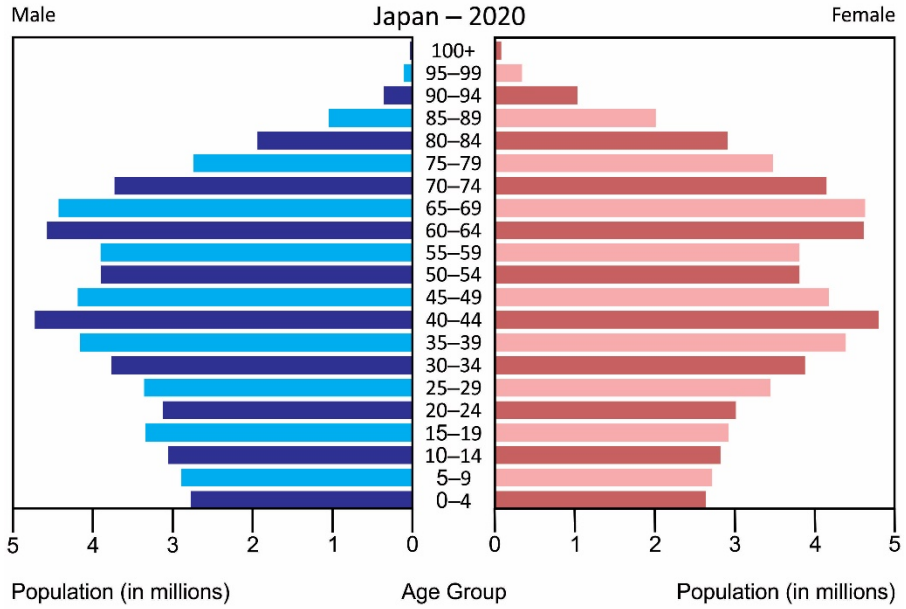
[Adapted: <https://www.britannica.com>]
[Adapted: <https://www.nationalgeographic.com>]
[Adapted: <https://www.visitfaroeislands.com>]

Similarly, Japan also has its traditional dolphin and whale hunt.

Many species of dolphin and whale are hunted. Three of the species are shown in the table below. Not all of the animals are killed – many are also sold to aquariums.

Table showing number of dolphins taken in the Japanese dolphin hunt in 2018, the number of each species in the world and their conservation status

	Number taken	Number in world	Status
Melon-headed whale	300	45 000	Not endangered
Rough-toothed dolphin	27	150 000	Not endangered
Bottlenose dolphin	25	40 000	Threatened



Population pyramid for Japan

[Braulik, G et al. *Tursiops aduncus*. The IUCN Red List of Threatened Species
[Kiszka, J. & Brownell, R. 2019. The melon-headed whale. The IUCN Red List of Threatened Species]
[Kiszka, J. et al. 2019. The IUCN Red List of Threatened Species]
[Adapted: <https://www.open.edu/openlearncreate/pluginfile.php>]
[Adapted: <https://www.uk.whales.org>]
[Adapted: <https://www.bbc.com>]

Big Ones and Winners at the 20th Mapelane Billfish Invitational

The Mapelane Billfish Invitational Fishing competitions took place 16–22 February 2020 in St Lucia, KZN.

This is one of the first marlin competitions that's 100% tag and release from when it was started in 2000 to today. Marlin numbers have decreased substantially over the years and we therefore cannot have justified hunting the fish for sport.

The Mapelane Billfish Invitational organisers have over 20 years of experience in ensuring billfish safety and conservation.

[Adapted: <https://nautitechsuzuki.com/mapelane-billfish>]