Heading

Title

**Introduction**

**Purpose** To investigate food chains and food webs using Antarctic organisms.

**Discussion**

Organisms experience levels of organization including an individual, population, community, ecosystem, biome, and biosphere. An organism’s habitat includes biotic (living) factors and abiotic (non-living) factors [*temperature, soil, light, moisture, wind, nutrients, and climate*].

A **food chain** is a simple model used to show how matter and energy move through an ecosystem. Each organism in a food chain represents a feeding step, or **trophic level**. **A food chain follows one continuous path showing how specific animals obtain food.** E.g.: A hawk eats a snake, which has eaten a frog, which has eaten a grasshopper, which has eaten grass.

Organisms in a food chain can be **producers, consumers** (primary, secondary, tertiary, etc.) or **decomposers**. Food chains always begin with producers (autotrophs). See example below and complete questions “a” through “g”.



a) List the biotic factors:

b) List the abiotic factor: \_\_\_\_\_

c) List the autotrophs: \_\_\_\_\_

d) List the heterotrophs:

e) Which organism is the top predator?

f) What does the primary consumer eat?

g) What does the secondary consumer eat?

A **food web** is used to show ALL the possible feeding relationships at each trophic level. A food web contains many food chains. Just like with a food chain, arrows are drawn to show which organisms are eaten by other organisms. For example, insects are eaten by frogs.

This is shown by drawing an arrow from insects to frogs (insects 🡪 frogs). Each arrow represents a transfer of energy from one organism to another. Organisms must ultimately receive energy from the producers.

Use the food web below to answer questions “h” through “k”.



h. Name the sources of energy for the bear.

i. Name the sources of energy for the red fox.

j. List the organisms of one food chain that has four (4) trophic levels.

k. Which trophic level provides the most energy for the food web?

**Hypothesis**

If the Antarctic organisms and aligned according to trophic levels, then a food web made up of food chains can be identified.

**Materials** Lab Worksheet

**Procedures**

1. Cut out the organisms on the next page.

2. Arrange organisms onto a separate sheet of paper according to feeding (trophic) levels.

3. Create a food web by drawing arrows to show ALL feeding relationships between organisms. There is additional information on page 4.

4. Once complete, glue pictures down to complete Antarctic food web.



Leopard Seal



Squid



Zooplankton



Humpback whale



Ice Fish



Adelie Penguin



Phytoplankton



Crabeater seal



Petrel

**Calculations and Data**

A. Use the following to create the food web.



Killer whale



Emperor Penguin



Krill



Phytoplankton



Crabeater seal



Adelie Penguin



Ice Fish



Humpback whale



Petrel



Squid



Zooplankton



Leopard Seal

B. The chart below gives information regarding organisms and their food source(s). Using the chart and the diagrams in the discussion as guidelines, create a food web according to the directions to show which organisms are eaten by which organisms.

|  |  |
| --- | --- |
| **Organism** | **What it eats** |
| Crabeater seal | Squid, Krill, ice fish |
| Adelie penguin | Krill, ice fish |
| Petrel | Ice fish |
| Ice fish | Squid, Krill |
| Leopard seal | Emperor penguin, Crabeater Seal, Petrel, Adelie Penguin |
| Emperor penguin | Squid, Krill, ice fish |
| Squid | Krill |
| Krill | Zooplankton |
| Humpback whale | Ice fish, Krill |
| Phytoplankton | Nothing (makes own food) |
| Zooplankton | Phytoplankton |
| Killer whale | Emperor Penguin, Crabeater Seal, Adelie Penguin |

1. Which organisms are the producers (autotrophs)? \_\_\_\_\_

2. Which organism is the top predator? \_\_\_\_\_ How can you tell?

3. Which organisms would compete for food? Explain.

 a. crabeater seal and leopard seal c. petrel and humpback whale

 b. squid and krill d. killer whale and humpback whale

4. Which would most likely happen if the ice fish populations decreased rapidly? Explain.

 a. killer whale has more prey c. Adelie penguin population decreases

 b. petrel population rises d. humpback whale population increases

5. Where do the phytoplankton get their food from? \_\_\_\_\_

6. Primary consumers eat the producers. Name the primary consumer(s). \_\_\_\_\_

7. Name the secondary consumer(s). \_\_\_\_\_

8. Name the tertiary consumer(s). \_\_\_\_\_

**Conclusions**

1. What is the interaction in an ecosystem that shows a network of complex interactions called?

2. Define herbivore, carnivore, and omnivore and state which trophic level they each feed on.

3. Distinguish habitat from niche.

**Errors**

For future study, doing an actual food web from our own backyard would be enlightening.

**Bibliography**

Images were taken from the internet.