

BIO 367 Antarctic Ecology
Exam III study guide
Fall 2023

Terms and Concepts: know definitions, significance specifically to Antarctic research and how to explain concepts if asked to do so in an essay question.

Lecture XII: Marine mammals

- Diversity and biomass in southern ocean
- Endemic species of pinnipeds (four seals) plus two other subantarctic to Antarctic species
- Otariidae vs. Phocidae differences
- Antarctic fur seal distribution and breeding cycle
- Elephant seal distribution and breeding cycle
- Four endemic seals and sea ice habitat, characteristics, and breeding cycle
- Weddell seal and why more is known about it than other Antarctic seals
- Leopard seal diet and specializations on penguins
- Krill as a keystone species in the southern ocean
- Antarctic silverfish
- Odontoceti vs. Mysticeti differences
- Major cetacean species in the southern ocean
- Orca types, dietary differences, hunting strategies
- Spy hopping and wave washing
- Weddell seal 'butchering' by orcas
- Humpback whales feeding strategy, baleen
- Humpback migration and feeding zones
- Minke whales and foraging habitat
- Trophic interactions whales, penguins, krill

Lecture XIII: Whaling and the krill surplus hypothesis

- History of exploitation, fur seals, elephant seals, whales
- Spread of exploitation, subantarctic to Antarctic
- Methods and history of whaling
- Land stations and increases in exploitation
- Flensing platforms
- Swivel harpoon cannons and Svend Foyn
- Grytviken, South Georgia
- Deception Island and Whaler's Bay
- Modern factory ships and when first used
- Rate of exploitation after factory ships
- Convention for the Regulation of Whaling 1935
- Whale sanctuary
- 1946 International Whaling Convention
- Krill surplus hypothesis and why proposed
- Dietary shift in Adélie penguins and stable isotopes
- Current status of krill surplus

Lecture XIV: Penguins and other seabirds

Five species of penguins in Antarctica
 Distribution, subantarctic species
 Ecology and breeding cycle of Emperor and Adélie penguins
 Emperor adaptations to dealing with cold: feathers, fat, behavior
 Current threats to Emperor sea ice habitat
 Pygoscelid penguins (3) and distributions, ecological differences
 Porpoising
 Dive profiles—V and U-shaped
 Stomach lavage
 Weigh bridges in penguin foraging studies
 Catastrophic molt
 Population changes in the Antarctic Peninsula of pygoscelids since 1970s
 Three endemic species of seabirds in Antarctica
 Giant petrels and snow petrels
 Tubenoses and salt glands
 Skua ecology and predation on penguins
 Giant petrel ecology and predation on penguins
 American sheathbill ecology, unique niche
 Other seabirds: kelp gull, Wilson's storm-petrel, blue-eyed shag, Antarctic tern

Lecture XV: Adélie penguin paleohistory

Adélie penguin as a bioindicator species
 Four requirements for breeding sites
 Principle of radiocarbon dating, half-life, and decay
 Marine carbon reservoir effect
 Ornithogenic soils and the biological 'archive'
 Adélie penguin paleohistory in the Ross Sea
 Occupation history and the Ross Ice Shelf retreat in the Holocene
 Terra Nova Bay polynya and longest Holocene penguin occupation
 Cape Adare 'supercolony'
 Scott Coast and the penguin 'optimum'

Lecture XVI: Discovery and human history

Ptolemy and Terra Australis Incognita
 Voyages of Diaz, de Gama, and Magellan
 Discovery of Straits of Magellan
 Martin of Bohemia
 Cape of Good Hope and Cape Horn
 Tierra del Fuego
 Sir Frances Drake and voyage, new discoveries
 Antarctica appearing on maps, 1600s and 1700s
 Early possible sightings of the continent
 Discovery of Falklands, South Georgia, and South Shetland Islands
 Jean-Baptiste Bouvet and discoveries
 Yves-Joseph de Kerguelen and discoveries

Captain James Cook, three voyages and discoveries
 Cook's contributions to health and sanitation
 Scurvy and treatment
 Sealers after Captain Cook
 Captains William Smith, Nathaniel Palmer, John Biscoe, and James Weddell
 Captain Davis and first landing on the continent
 First scientific expeditions
 Captain Bellingshausen and Russian Antarctic Expedition
 Alexander Island
 Dumont d'Urville and the French expedition
 Pointe Geologie
 Charles Wilkes and the U.S. Exploring Expedition
 James Clark Ross and the British Expedition to the Ross Sea
 Possession and Franklin Islands, Mt. Erebus, Ross Ice Shelf
HMS Challenger expedition
 Sir John Murray and Father of Modern Oceanography

Lecture XVII: Heroic Age and the first scientist explorers

Genesis of the Heroic Age and how it receives that name
 H. J. Bull and Carsten Borchgrevink
 Cape Adare
 Adrien Victor de Gerlache and the *Belgica* expedition
 Henryk Arctowski, Frederick Cook, and Roald Amundsen
 Scurvy causes and symptoms, how to avoid
 Borchgrevink's 'firsts' in Antarctica and the *Southern Cross* expedition
 Borchgrevink's contributions to future exploration
 Louis Bernacchi and Nicolai Hanson
 Otto Nordenskjold and the 1901 Swedish Expedition
 Snow Hill and Paulet Islands
 Hope Bay, Cape Well-met, and Seymour Island
 Captain Larsen and rescue
 The ships *Antarctic* and *Uruguay*
 Robert Falcon Scott and the *Discovery* expedition
 Ernest Shackleton and Edward Wilson
 Ross Island and Hut Point
 First attempt at the pole and outcome
 Sledges, man-hauling, and use of dogs and skis
 What was learned from Scott's expedition
 Scott and Shackleton rivalry