



# BIOL369

## Vertebrate Evolution

S1 External 2014

*Dept of Biological Sciences*

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## General Information

Unit convenor and teaching staff

Other Staff

Katherine McClellan

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Culum Brown

[culum.brown@mq.edu.au](mailto:culum.brown@mq.edu.au)

Credit points

3

Prerequisites

39cp including BIOL208(P)

Corequisites

Co-badged status

Unit description

Evolution is a dynamic process that has occurred over many millions of years (deep evolution) or in recent times (contemporary evolution). This unit considers the major events in vertebrate evolution: invertebrate chordate to vertebrate; jawless to jawed; water to land; ectothermy to endothermy; and land to air. The newly emerging synthesis of evolutionary and developmental biology is having considerable impact on current vertebrate evolutionary theory, as are molecular techniques for constructing phylogenics. These topics are discussed in relation to deep and contemporary evolution of vertebrate groups. Lecture topics also include current aspects such developments in evolution of vertebrate behaviours, macro-evolution, and human evolution. The practical work focuses on phylogenics, and comparative anatomy and morphology of representative vertebrate groups, to reinforce lecture themes.

## Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

## Learning Outcomes

On successful completion of this unit, you will be able to:

Apply taxonomic nomenclature to vertebrate groups

Relate anatomical traits to the diversity of key vertebrate species

Associate the major steps in vertebrate evolution to body form and physiological function  
Evaluate different methods for determining evolutionary relationships  
Classify vertebrate behaviours to functional roles and interactions at community levels  
Communicate scientific information relevant to vertebrate evolution in oral and in written format

## Assessment Tasks

Name	Weighting	Due
<u>Weekly Activities</u>	15%	Weekly
<u>Debate</u>	15%	April 1
<u>Wildlife Practical Report</u>	20%	May 30
<u>Final exam</u>	50%	TBA

### Weekly Activities

Due: **Weekly**

Weighting: **15%**

**These activities have been designed to expand your knowledge of current evolutionary concepts. They will include quizzes, discussion postings, paper critiques and the odd artistic surprises. The activities will be made available Friday 5pm each week. You will then be required to address questions or tasks by 9pm Thursday unless otherwise specified.**

On successful completion you will be able to:

- Apply taxonomic nomenclature to vertebrate groups
- Relate anatomical traits to the diversity of key vertebrate species
- Associate the major steps in vertebrate evolution to body form and physiological function
- Classify vertebrate behaviours to functional roles and interactions at community levels

### Debate

Due: **April 1**

Weighting: **15%**

You will work within a team to debate a current topic in vertebrate evolution. Your argument will be developed over a series of weeks.

On successful completion you will be able to:

- Evaluate different methods for determining evolutionary relationships
- Communicate scientific information relevant to vertebrate evolution in oral and in written format

## Wildlife Practical Report

Due: **May 30**

Weighting: **20%**

One of the challenges of being a scientist is interpreting your findings. For the most part research is novel so there is unlikely to be that one magic paper that gives you all the answers. Instead a skill that is required, which takes time to become proficient at, is connecting ideas from several papers that may not have been grouped together previously. Inevitably as seen in any good who-dunnit novel the scientist (aka detective) generally has to piece together clues from various sources to provide the answer to the question “*what does it all mean?*”

The practical report requires your utmost attention during both the ‘rat dissection’ and ‘wildlife dissection’ practicals. As a class we will be examining the relationship between an organisms internal morphology and its life history. The work will culminate in you producing an extensive report that places these findings in an evolutionary context. A key concept you will need to address is the potential that your findings represent an example of contemporary evolution.

Finer details on the exact nature of the practical exercises and the report to be submitted will be provided closer to the practical sessions.

On successful completion you will be able to:

- Apply taxonomic nomenclature to vertebrate groups
- Relate anatomical traits to the diversity of key vertebrate species
- Associate the major steps in vertebrate evolution to body form and physiological function
- Classify vertebrate behaviours to functional roles and interactions at community levels

## Final exam

Due: **TBA**

Weighting: **50%**

You will apply terminology and concepts learnt in the lecture and practical components of this unit to answer a variety of questions (Short answer and essay).

On successful completion you will be able to:

- Apply taxonomic nomenclature to vertebrate groups
- Relate anatomical traits to the diversity of key vertebrate species
- Associate the major steps in vertebrate evolution to body form and physiological function
- Evaluate different methods for determining evolutionary relationships

- Classify vertebrate behaviours to functional roles and interactions at community levels

## Delivery and Resources

### CLASSES

#### Timetable

- Lecture 1 Mondays 9 - 10 am W5C 320
- Lecture 2 Tuesdays 5 - 6 pm W5C 320
- Practical classes Tuesdays 10am – 1 pm F7B 102/105 and 2 pm - 5 pm F7B 102/105

### TEXTS AND/OR MATERIALS

#### Requirements for practical classes

##### Dissecting instruments

- 1 pair coarse scissors
- 1 pair fine scissors
- 1 pair coarse forceps
- 1 pair fine forceps
- 1 scalpel handle #4

##### Dress

- You must wear shoes that cover your feet
- You must wear a lab coat to protect your clothes on dissection days.
- Safety glasses are to be worn in laboratories (they will be provided)

PLEASE NOTE: If you do not wear appropriate shoes (covered) you will not be allowed into the laboratory. No FOOD or DRINK is to be brought into the laboratory.

#### Resources

- Kardong, K. (2011) *Vertebrates, Comparative Anatomy, Function, Evolution*. 6th edition, McGraw Hill. Call Number: QL805 .K35 2008
- Pough, F.H., Janis, C.M. and Heiser, J.B. (2010) *Vertebrate Life* 8th Edition. Pearson International. Call Number: QL607.5 .E93 2006
- Merrick, J.R., Archer, M., Hickey G.M. and Lee M.S.Y. (2006) *Evolution and Biogeography of Australasian Vertebrates*. Auscipub, Oatlands Australia. Call Number: QL607.5 .E93 2006
- Romer, A.S., Parsons, T.S. (1986) *The Vertebrate Body*. 6th Edition. Saunders College Publishers. Call Number: QL805 .R65/1986
- Kent, G.C., Miller, L. (1997) *Comparative Anatomy of the Vertebrates*. 8th Edition.

Wm.C. Brown/McGraw-Hill. Call Number: QL805 .K43/1997

- Colbert, E.H., Morales, M., Minkoff, E.C. (2001) *Colbert's Evolution of the Vertebrates*. 5th Edition Wiley-Liss, New York. Call Number: QE841 .C68/2001
- Long, J.A. (1995) *The rise of fishes: 500 million years of evolution*. Kensington, N.S.W.: New South Wales University Press. Call Number: QE851 .L66

## UNIT WEBPAGE AND TECHNOLOGY USED AND REQUIRED

### Website

Lecture graphics and iLectures will be available on Blackboard <http://ilearn.mq.edu.au> iLearn. is a web-based computer mediated communication package and can be accessed by most web browsers from inside or outside the University. iLearn and email will be the principle method of communication in this subject.

We expect you to use iLearn for:

- Regularly checking subject announcements;
- Downloading lecture materials;
- Downloading laboratory materials;
- Downloading reference materials;
- Checking your grades.

How do you log in? The URL for the iLearn log in page is: <http://ilearn.mq.edu.au/>. You will need to log in to iLearn each time you use it. Your user name is your student number. If you are having trouble accessing your online unit due to a disability or health condition, please go to the Student Services Website at <http://sss.mq.edu.au/equity/about> for information on how to get assistance. If you are having problems logging on, If you cannot log in after ensuring you have entered your username and password correctly, you should contact Student IT Help, Phone: (02) 9850 4357 (in Sydney) or 1 800 063 191 (outside Sydney).

### Emails

If emailing to [drew.allen@mq.edu.au](mailto:drew.allen@mq.edu.au) please ensure BIOL369 is included in the subject. I will regularly check emails on iLearn so it is best to use the iLean emailing system for communications.

## Unit Schedule

### Timetable

#### External Practicals

March 22	9am – 4pm	E8A 120
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April 14-16                      9am – 4pm                      E8A 130  
 May 31                              9am – 4pm                      E8A 130

**Lectures and internal practical schedule:**

Week	Date	Lecture	Lecture Topic	
1	3/03/2014	1	Course details/ What is a vertebrate?	
	4/03/2014	2	Origins of evolutionary theory	NO PRACTICAL
2	10/03/2014	3	Origins of vertebrates 1	
	11/03/2014	4	Origins of vertebrates 2	(1) Tools for Research
3	17/03/2014	5	Jawless to jawed	
	18/03/2014	6	Chondrychthians: Cartilaginous fish	(2) Chordate origins, jawless fish
4	24/03/2014	7	Teleosts: Bony fish	
	25/03/2014	8	Australian Fish	(3) Fish
5	31/03/2014	9	Transition to land	
	1/04/2014	10	Transition to land	(4) Debates
6	7/04/2014	11	Birds and Dinosaurs	
	8/04/2014		NO LECTURE	NO PRACTICAL
	Break April 12-27			
7	28/04/2014	12	Mammals I	(5) Toad Dissection

	29/04/2014	13	Mammals II	
8	5/05/2014	14	Reptiles I	(6) Placentals
	6/05/2014	15	Reptiles II	
9	12/05/2014	16	Evolution On Islands	(7) Wildlife dissection
	13/05/2014	17	Skeletal Elements I	
10	19/05/2014	18	Skeletal Elements II	(8) Skeleton and teeth
	20/05/2014	19	Organs I	
11	26/05/2014	20	Organs II	(9) Cranial nerves
	27/05/2014	21	Brain I	
12	2/06/2014	22	Brain II	NO PRACTICAL
	3/06/2014	23	Behavior and Evolution	
13	9/06/2014	24	Molecular Evolution	(10) Unit reflection and revision
	10/06/2014		NO LECTURE	

### External practical schedule

Mar-22	(1) (2)
Apr-14	(3) (4)
Apr-15	(5) (6)
Apr-16	(7) (8)



May-31

(9) (10)

## Requirements for practical classes

### Dissecting instruments

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1 pair fine scissors

1 pair coarse forceps

1 pair fine forceps

1 scalpel handle #4

### Dress

You must wear shoes that cover your feet

You must wear a lab coat to protect your clothes on dissection days.

Safety glasses are to be worn in laboratories (they will be provided)

PLEASE NOTE: If you do not wear appropriate shoes (covered) you will not be allowed into the laboratory. No FOOD or DRINK is to be brought into the laboratory.

## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](#). Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy [http://mq.edu.au/policy/docs/academic\\_honesty/policy.html](http://mq.edu.au/policy/docs/academic_honesty/policy.html)

Assessment Policy <http://mq.edu.au/policy/docs/assessment/policy.html>

Grading Policy <http://mq.edu.au/policy/docs/grading/policy.html>

Grade Appeal Policy <http://mq.edu.au/policy/docs/gradeappeal/policy.html>

Grievance Management Policy [http://mq.edu.au/policy/docs/grievance\\_management/policy.html](http://mq.edu.au/policy/docs/grievance_management/policy.html)

Disruption to Studies Policy [http://www.mq.edu.au/policy/docs/disruption\\_studies/policy.html](http://www.mq.edu.au/policy/docs/disruption_studies/policy.html) *The Disruption to Studies Policy is effective from March 3 2014 and*

*replaces the Special Consideration Policy.*

In addition, a number of other policies can be found in the [Learning and Teaching Category](#) of Policy Central.

## Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: [https://students.mq.edu.au/support/student\\_conduct/](https://students.mq.edu.au/support/student_conduct/)

## Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

## Learning Skills

Learning Skills ([mq.edu.au/learningskills](http://mq.edu.au/learningskills)) provides academic writing resources and study strategies to improve your marks and take control of your study.

- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module for Students](#)
- [Ask a Learning Adviser](#)

## Student Services and Support

Students with a disability are encouraged to contact the [Disability Service](#) who can provide appropriate help with any issues that arise during their studies.

## Student Enquiries

For all student enquiries, visit Student Connect at [ask.mq.edu.au](http://ask.mq.edu.au)

## IT Help

For help with University computer systems and technology, visit <http://informatics.mq.edu.au/help/>.

When using the University's IT, you must adhere to the [Acceptable Use Policy](#). The policy applies to all who connect to the MQ network including students.

## Graduate Capabilities

### Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific

knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

### **Learning outcomes**

- Apply taxonomic nomenclature to vertebrate groups
- Relate anatomical traits to the diversity of key vertebrate species
- Associate the major steps in vertebrate evolution to body form and physiological function
- Evaluate different methods for determining evolutionary relationships

### **Assessment tasks**

- Weekly Activities
- Debate
- Wildlife Practical Report

## **Critical, Analytical and Integrative Thinking**

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

### **Learning outcomes**

- Apply taxonomic nomenclature to vertebrate groups
- Relate anatomical traits to the diversity of key vertebrate species
- Associate the major steps in vertebrate evolution to body form and physiological function
- Evaluate different methods for determining evolutionary relationships
- Classify vertebrate behaviours to functional roles and interactions at community levels
- Communicate scientific information relevant to vertebrate evolution in oral and in written format

### **Assessment tasks**

- Weekly Activities
- Debate
- Wildlife Practical Report

## **Problem Solving and Research Capability**

Our graduates should be capable of researching; of analysing, and interpreting and assessing

data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

## **Learning outcomes**

- Apply taxonomic nomenclature to vertebrate groups
- Classify vertebrate behaviours to functional roles and interactions at community levels

## **Assessment tasks**

- Weekly Activities
- Wildlife Practical Report

## **Creative and Innovative**

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

## **Learning outcomes**

- Evaluate different methods for determining evolutionary relationships
- Classify vertebrate behaviours to functional roles and interactions at community levels
- Communicate scientific information relevant to vertebrate evolution in oral and in written format

## **Assessment task**

- Debate

## **Effective Communication**

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

## **Learning outcomes**

- Evaluate different methods for determining evolutionary relationships
- Communicate scientific information relevant to vertebrate evolution in oral and in written

format

## **Assessment task**

- Debate