



BIOL369

Vertebrate Evolution

S1 Day 2014

Dept of Biological Sciences

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Disclaimer

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General Information

Unit convenor and teaching staff

Other Staff

Katherine McClellan

katherine.mcclellan@mq.edu.au

Contact via katherine.mcclellan@mq.edu.au

Culum Brown

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 please ensure BIOL369 is included in the subject. I will regularly check emails on iLearn so it is best to use the iLearn emailing system for communications.

Unit Schedule

Timetable

Lecture 1	Monday	1pm - 2pm	W5C320
Lecture 2	Tuesday	3pm - 4pm	W5C320

Practicals Friday

9pm – 5pm

E8A 120/160

Lecture Schedule

Wk	Date		Lecture topic	Lecturer	Internal Practicals and dates
1	25/02/13	1	Course details / What is a vertebrate?	Matt Bulbert	01/03/2013 NO PRACTICAL
	26/02/13	2	Origins of evolutionary theory	Matt Bulbert	
2	4/03/13	3	Origins of vertebrates I	Matt Bulbert	08/03/2013 Tools for evolution research
	5/03/13	4	Origins of vertebrates II	Matt Bulbert	
3	11/03/13	5	Jawless to jawed	Matt Bulbert	15/03/2013 Chordate origins, Jawless fish
	12/03/13	6	Chondrychthians: Cartilaginous fish	Pascal Geraghty	
4	18/03/13	7	Teleosts: Bony fish	Culum Brown	22/03/2013 Fish
	19/03/13	8	Transition to land	Matt Bulbert	
5	25/03/13	9	Transition to land	Matt Bulbert	GOOD FRIDAY- NO PRACTICAL
	26/03/13	10	Transition to land	Matt Bulbert	
6	1/04/13	11	EASTER MONDAY	05/04/2013 Debates	
	2/04/13	12	Dinosaurs	James Valentine	
7	8/04/13	13	Reptiles I	Martin Whiting	12/04/2013 Amphibians
	9/04/13	14	Reptiles II	Martin Whiting	
Semester Break 15-26/04/12					
8	29/04/13	13	Mammals I - The placentals	Nansi Richards	03/05/2013 Placentals
	30/04/13	14	Mammals II - The marsupials	Dave Nipperess	
9	6/05/13	15	Human evolution	Kira Westaway	10/05/2013 Wildlife dissection
	7/05/13	16	Skeletal elements I	Dave Nipperess	

10	13/05/13	17	Skeletal elements II	Matt Bulbert	17/05/2013 Skeleton and teeth
	14/05/13	18	Organs I	Matt Bulbert	
11	20/05/13	19	Organs II	Matt Bulbert	24/05/2013 Cranial nerves
	21/05/13	20	Brain I	Culum Brown	
12	27/05/13	21	Brain II	Culum Brown	31/05/2013 NO PRACTICAL
	28/05/13	22	Behaviour and evolution	Matt Bulbert	
13	3/06/13	23	Molecular evolution	Drew Allen	07/06/2013 Unit reflection and revision
	4/06/13	24	NO LECTURE		

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

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

[t/policy.html](#)

Disruption to Studies Policy 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/

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) 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

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