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Collegiate Learning Assessment Instructors' Reports
Academic Affairs – Quality Enhancement Plan

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CLA Project Report

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CLA Project Report: Phil Senter

I administered the CLA performance task in ZOOL 350 (Comparative Anatomy), in which most students are juniors. The task was to read short statements by three individuals, read seven short documents (abstracts of articles from primary scientific literature), and tell (1) which individual's statement was supported by the documents and (2) what information in the documents supported the statement. Students were instructed to ignore documents that were irrelevant to the statements made by the three individuals. Documents B, C, D, and F were relevant to the statements made by the three individuals, but Documents A , E, and G were not. I included the latter three documents to determine whether the students were capable of assessing relevance.

The performance task was administered in January, 2009. The task was posted as a document on Blackboard, and students were required to complete it and turn in their answers by January 28. Each student's participation was calculated into the final semester grade. Of 522 possible points that could be collected over the course of the semester, 5 (1%) were awarded for completion of the performance task. These 5 points were awarded regardless of the student's score on the task.

Most of the students correctly identified the statement that was correct, most correctly identified the documents that supported the correct statement, and most ignored the irrelevant documents. A consistent weakness in performance was that about half of the students neglected to cite the details in the documents that supported the correct statement.

CLA Performance Task: Scores

Student	Banner ID	Score on performance task (maximum score = 11)
Student 1	830_________	9
Student 2	830_________	7
Student 1	830_________	11
Student 4	830_________	9
Student 5	830_________	1
Student 6	830_________	2
Student 7	830_________	4
Student 8	830_________	3
Student 9	830_________	9
Student 10	830_________	1
Student 11	830_________	11
Student 12	830_________	9
Student 13	830_________	6
Student 14	830_________	1
Student 15	830_________	3
Student 16	830_________	9
Student 17	830_________	4
Student 18	830_________	8
Student 19	830_________	3
Student 20	830_________	6
Student 21	830_________	9
Student 22	830_________	5

Rubric: CLA Performance Task

There are 11 possible points. A check in each blank in the left column adds one point. A check in each blank in the right column subtracts one point.

Question 1:

1. Student agrees with Professor B (correct) _______
2. Student agrees with Professor A (incorrect) _______
3. Student agrees with Professor C (incorrect) _______

Question 2:

1. Document A: mentioned in student response (incorrect) _______
2. Document E: mentioned in student response (incorrect) _______
3. Document G: mentioned in student response (incorrect) _______
4. Document B:
    a. cited by student as example of microevolution _______
    b. student cites details of the microevolutionary change _______
        (increased toxin resistance and decreased preference for toads as prey)
5. Document C:
    a. cited by student as example of microevolution _______
    b. student cites details of the microevolutionary change _______
        (inducible increase in shell thickness in response to predator's presence)
6. Document D:
    a. cited by student as example of microevolution _______
    b. student cites details of the microevolutionary change _______
        (appearance of Type L: elongated cell size)
7. Document F:
    a. cited by student as example of microevolution _______
    b. student cites details of the microevolutionary change _______
        (racial differentiation according to geography)
8. Student incorporates definition of microevolution into answer, to show that the documents support answer to question 1 _______
9. Student incorporates definition of macroevolution into answer, to show that the documents support student's answer to question 1 _______

Score:__________

CLA Performance Task

Procedure:

1. Read the statements below by the three professors.
2. Read the definitions below of microevolution and macroevolution.
3. Read the documents shown on the following pages. (Incidentally, none of them are made up. The documents are the actual abstracts (summaries) of scientific research that was published in real scientific journals.)
4. Based only on the documents, answer these two questions:
   (1) Which professor's statement is correct?
   (2) What information from the documents supports that professor's statement?

In your written answer, you must use only the professors' statements below, the definitions of microevolution and macroevolution below, and the documents on the following pages. You may not draw from your own personal opinions and experiences, nor may you draw from any information that comes from outside this exercise.

For concision, in your written answer you may refer to the documents as "Document A," "Document B," etc.

Some of the documents are irrelevant. Ignore them in your written answer. Do not even mention them.

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Statement by Professor A: The documents on the following pages reveal that both microevolution and macroevolution have been observed and documented.

Statement by Professor B: The documents on the following pages reveal observation and documentation of microevolution but not macroevolution.

Statement by Professor C: The documents on the following pages do not reveal observation and documentation of microevolution, nor do they reveal observation and documentation of macroevolution.

Microevolution is heritable change that occurs within a species.
Macroevolution is the production of one or more new species from preexisting species.

Document A

Naturwissenschaften (2002) 89:361-365
Gerald Mayr · D. Stefan Peters · Gerhard Plodowski
Olaf Vogel

Bristle-like integumentary structures at the tail of the horned dinosaur *Psittacosaurus*

Received: 20 December 2001 / Accepted: 26 May 2002 / Published online: 17 July 2002

Abstract
A specimen of the horned dinosaur *Psittacosaurus* from the early Cretaceous of China is described in which the integument is extraordinarily well-preserved. Most unusual is the presence of long bristle-like structures on the proximal part of tail. We interpret these structures as cylindrical and possibly tubular epidermal structures that were anchored deeply in the skin. They might have been used in display behavior and especially if one assumes that they were colored, they may have had a signal function. At present, there is no convincing evidence which shows these structures to be homologous to the structurally different integumentary filaments of theropod dinosaurs. Independent of their homology, however, the discovery of bristle-like structures in *Psittacosaurus* is of great evolutionary significance since it shows that the integumentary covering of at least some dinosaurs was much more complex than has ever been previously imagined.

Document B

PROCEEDINGS OF THE ROYAL SOCIETY B

Proc. R. Soc. B (2006) **273**, 1545–1550
doi:10.1098/rspb.2006.3479
Published online 21 March 2006

An invasive species induces rapid adaptive change in a native predator: cane toads and black snakes in Australia

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Rapid environmental change due to human activities has increased rates of extinction, but some species may be able to adapt rapidly enough to deal with such changes. Our studies of feeding behaviour and physiological resistance to toxins reveal surprisingly rapid adaptive responses in Australian black snakes (*Pseudechis porphyriacus*) following the invasion of a lethally toxic prey item, the cane toad (*Bufo marinus*). Snakes from toad-exposed localities showed increased resistance to toad toxin and a decreased preference for toads as prey. Separate laboratory experiments suggest that these changes are not attributable to learning (we were unable to teach naive snakes to avoid toxic prey) or to acquired resistance (repeated sub-lethal doses did not enhance resistance). These results strongly suggest that black snake behaviour and physiology have evolved in response to the presence of toads, and have done so rapidly. Toads were brought to Australia in 1935, so these evolved responses have occurred in fewer than 23 snake generations.

Document C

Science 313:831-833 (2006)

Divergent Induced Responses to an Invasive Predator in Marine Mussel Populations

Aaren S. Freeman* and James E. Byers

Invasive species may precipitate evolutionary change in invaded communities. In southern New England (USA) the invasive Asian shore crab, *Hemigrapsus sanguineus*, preys on mussels (*Mytlius edulis*), but the crab has not yet invaded northern New England. We show that southern New England mussels express inducible shell thickening when exposed to waterborne cues from *Hemigrapsus*, whereas naïve northern mussel populations do not respond. Yet, both populations thicken their shells in response to a long-established crab, *Carcinus maenas*. Our findings are consistent with the rapid evolution of an inducible morphological response to *Hemigrapsus* within 15 years of its introduction.

Document D

Microbial Ecology 20:75-84 (1990)

Changes of Traits in a Bacterial Population Associated with Protozoal Predation

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Received: February 14, 1990; Revised: May 18, 1990

Abstract. In an attempt to understand the significance of predation in the evolution of prey species, the ecological and morphological characteristics of bacterial species under predation by a ciliated protozoa, *Cyclidium* sp., were investigated. Serial transfer at 7 day intervals was applied to the bacterial populations in the presence or absence of *Cyclidium*. Although cells of the parental bacterial strain are typically short rods up to 1.5 μm long, cells of much greater length, up to 20 μm long (type L) were found in populations exposed to predation from *Cyclidium*. However, the wild-type, shorter length bacteria persisted even after the appearance of type L. Type L was not observed in the single bacterial culture throughout the serial transfers. Type L appeared to improve the ability to escape predation by elongating cell size, but growth rate and saturation density were decreased.

Document E

Proc. Natl. Acad. Sci. USA
Vol. 95, pp. 7933–7938, July 1998
Biochemistry

The stability of the RNA bases: Implications for the origin of life

MATTHEW LEVY AND STANLEY L. MILLER*

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Contributed by Stanley L. Miller, May 8, 1998

ABSTRACT High-temperature origin-of-life theories require that the components of the first genetic material are stable. We therefore have measured the half-lives for the decomposition of the nucleobases. They have been found to be short on the geologic time scale. At 100°C, the growth temperatures of the hyperthermophiles, the half-lives are too short to allow for the adequate accumulation of these compounds (t1/2forAand G ' 1yr;U 5 12 yr; C 5 19 days). Therefore, unless the origin of life took place extremely rapidly (<100 yr), we conclude that a high-temperature origin of life may be possible, but it cannot involve adenine, uracil, guanine, or cytosine. The rates of hydrolysis at 100°C also suggest that an ocean-boiling asteroid impact would reset the prebiotic clock, requiring prebiotic synthetic processes to begin again. At 0°C, A, U, G, and T appear to be sufficiently stable (t1/2 > 106 yr) to be involved in a low-temperature origin of life. However, the lack of stability of cytosine at 0°C (t1/2 5 17,000 yr) raises the possibility that the GC base pair may not have been used in the first genetic material unless life arose quickly (<106 yr) after a sterilization event. A two-letter code or an alternative base pair may have been used instead.

Document F

Science 144:548-550 (1964)

House Sparrows: Rapid Evolution of Races in North America

Abstract. *Conspicuous adaptive differentiation in color and size has occurred in the house sparrow* (Passer domesticus) *in North America and the Hawaiian Islands since its introduction in the middle of the 19th century. Patterns of geographic variation in North America parallel those shown by native polytypic species, in conformity with Gloger's and Bergmann's ecogeographic rules. Racial differentiation of house sparrow populations may require no more than 50 years.*

Document G

Journal of Paleontology (1972) 46:39-42
Erik K. Kjellesvig-Waering

BRONTOSCORPIO ANGLICUS: A GIGANTIC LOWER PALEOZOIC SCORPION FROM CENTRAL ENGLAND

ABSTRACT.—*Brontoscoprio anglicus*, the largest scorpion ever recorded, is described from a free finger collected in the Silurian-Devonian, Downtonian beds of Trimpley, Worcestershire, England. The part preserved indicates a scorpion more than nine-tenths of a meter in length from anterior of the carapace to the end of the telson. This is nearly twice as long as the largest fossil scorpion previously known, and about five times longer than the largest living scorpion.