Concept Inventories/Conceptual Assessments in Biology (CABs): An annotated list (March 25, 2011)\(^1\)

Compiled by Kathleen M. Fisher and Kathy S. Williams for CAB III meeting participants
Point Loma Nazarene University, San Diego, CA
Kathleen M. Fisher\(^2\), Kathy S. Williams\(^3\), Dianne L. Anderson\(^3\), organizers.
(\(^2\)San Diego State University, \(^3\)Point Loma Nazarene University)

Assessments by topics and references. Legend: Topic of assessment – capitalized;
Assessment name italicized and underlined, followed in parentheses by assessment
abbreviation, number of items, item characteristics, and notation of whether items are presented
in references. Item characteristics: MC = multiple choice, TF = true/false, diagram = diagrams
used in items, scenario = scenarios used in items. All are one-tiered items unless noted.

1) NATURAL SELECTION

*Conceptual Inventory of Natural Selection (CINS) (20 MC items, scenarios)*

**ITEMS PROVIDED**
Anderson DL. 2003. Natural selection theory in non-majors' Biology: instruction,
assessment, and conceptual difficulty. Thesis (Ph.D.) University of California, San Diego
and San Diego State University, San Diego, CA.

2) MACROEVOLUTION

*Measure of Understanding of Macroevolution (MUM) (28 items: 27 MC items, plus one
open-ended item, diagrams)*

**ITEMS PROVIDED**
Nadelson LS, Southerland SA. 2010. Development and preliminary evaluation of the
Measure of Understanding of Macroevolution: Introducing the MUM. *The Journal of
Experimental Education* 78: 151–190.

3) EVOLUTIONARY RELATIONSHIPS

*Basic Tree Thinking Assessment (two tests, 10 MC items each, diagrams)*

**ITEMS PROVIDED**

4) GENETICS LITERACY

*Genetics Literacy Assessment Instrument (GLAI) (31 MC items)*

**ITEMS PROVIDED in Bowling et al. Genetics 2008; ALL in Moskalik 2007**
Bowling BV, Acra EE, Wang L, Myers MF, Dean GE, Markle GC, Moskalik CL, Huether CA.
2008. Development and evaluation of a genetics literacy assessment instrument for

\(^1\) Please cite as: Fisher, K.M. and K.S. Williams. 2011. Concept Inventories and Conceptual
Assessments in Biology (CABs): An annotated list.
http://www.sci.sdsu.edu/CRMSE/files/Concept_Inventories_in_Biology_20110325.pdf


[Note: Instrument appears in the document above. The instrument was called Genetics Literacy Concept Inventory (GLCI) in the thesis and is called Genetics Literacy Assessment Instrument (GLAI) in most places in the BioScience paper, and always GLAI in the Genetics paper. Items appearing in Bowling, Acra, et al. 2008, match those in Moskalik 2007.]

5) GENETICS

Genetics Concept Assessment (GCA) (25 MC items, diagrams)
ITEMS NOT PROVIDED


6) GENETICS

Genetics Literacy (13 two-tiered MC items, diagrams)
SOME ITEMS PROVIDED


7) INTRODUCTORY BIOLOGY

Biology Concept Inventory (BCI) (30 MC items)
ITEMS PROVIDED ON-LINE at http://bioliteracy.colorado.edu/


8) ANIMAL DEVELOPMENT

Developmental Biology Content Survey (15 MC items)
ITEMS PROVIDED

9) PLANT GROWTH AND DEVELOPMENT

*Flowering Plant Growth and Development (13 two-tiered MC items)*

**ITEMS PROVIDED**


10) TRANSPORT IN PLANTS AND CIRCULATION IN HUMANS

*Internal Transport in Plants and the Human Circulatory Systems (28 two-tiered MC items)*

**ITEMS NOT PROVIDED**


11) HOST-PATHOGEN INTERACTIONS

*Host-Pathogen Interactions (HPI) (17 [18 noted in 2009 paper] two-tiered MC items)*

**ITEMS NOT PROVIDED**


12) OSMOSIS AND DIFFUSION

*Diffusion and Osmosis Diagnostic Test (DODT) (12 two-tiered MC items, diagrams)*

**ITEMS PROVIDED**


13) INTRODUCTORY MOLECULAR AND CELL BIOLOGY

*Introductory Molecular and Cell Biology Assessment (IMCA) (24 MC items, diagrams)*

**ITEMS PROVIDED**


14) MOLECULAR LIFE SCIENCES

*Molecular Life Sciences (MLS) Concept Inventory (26 MC items in trial reported in Wright and Hamilton 2008; 96 MC items addressing 10 “big ideas” in 6 modules on-line at www.lifescinventory.edu.au, diagrams, scenarios)*

**ITEMS AVAILABLE WITH REGISTRATION ON-LINE at www.lifescinventory.edu.au**


15) BREATHING AND RESPIRATION

*Breathing and Respiration (12 two-tiered MC items)*

**ITEMS PROVIDED**


16) PHOTOSYNTHESIS AND RESPIRATION

*Photosynthesis and Respiration (13 two-tiered MC items, plus open ended)*

**ITEMS NOT PROVIDED**


**(Covalent Bonding and Photosynthesis test development)**

**ITEMS NOT PROVIDED**


17) ENERGY AND MATTER (total of 16 Diagnostic Question Clusters of 6-8 items each; some items appear in more than one DQC)

*Diagnostic Question Clusters on Energy and Matter (DQCs)*

(five groups of MC, TF, and open-ended items on different aspects of metabolism in photosynthesizing and respiring organisms; diagrams, scenarios)

**ITEMS PROVIDED**


*Thinking like a Biologist: Using diagnostic questions to help students to reason with biological principles (16 DQC sets of ~7 items each, MC, TF, open-ended)*

**ITEMS PROVIDED ON-LINE** at www.biodqc.org


[http://www.biodqc.org/ has Diagnostic Question Clusters (DQC’s) organized by three ecological topics (Carbon Cycling, Energy Flow in Ecosystems, Climate Change), and by three biological processes (Photosynthesis, Biosynthesis, Cellular Respiration) - with two DQCs each; plus one each DQC under topics Gasoline, Biofuels, Carbon in Nature, and Carbon Balance. Some items appear in more than one DQC.]