

**Reply of the Authors to The Response of a Majority of the
Kansas Science Writing Committee to
Changes made by the Kansas State Board to Draft 2 of
Kansas Science Education Standards
August 8, 2005**

On August 2, 2005, a Majority of the Science Writing Committee adopted a Response to Changes made by the Board as of July 12, 2005, to Draft 2 of the 2005 Kansas Science Education Standards (the “Response”). The Response reflects a dissent to the Changes (the “Changes”). The Changes derive primarily from proposals made by eight members of the Science Writing Committee, known as the Minority Report. Those proposals, and therefore the Changes themselves were the subject of extensive public hearings conducted by the Science Committee of the Board during May, 2005, where 23 expert witnesses testified as to the scientific validity and educational propriety of the Changes.

Prior to the vote on August 2, 2005, the Authors of the Minority Report (the “Authors”) distributed to all members of the Committee two documents explaining why the Committee should vote against the Response. One consisted of a preliminary reply of the Authors, dated August 2, 2005, that pointed out numerous errors and omissions in the Response. The other document consisted of a seventeen page commentary by Dr. Jonathan Wells, a cell and molecular biologist who testified at the hearings with respect to the scientific validity of certain of the Changes (the “Wells Reply”). The Wells Reply also explained why four key criticisms contained in the Response are “false” or evasive. Both the preliminary reply and the Wells Reply were prepared on short notice and therefore could not have been made available to the Committee as a whole the day before the August 2, 2005 meeting. However, they were passed out to the Committee prior to the discussion and vote, with notice that the replies detailed numerous errors in the Response. Unfortunately that notice was ignored and the vote was taken without consideration of any of the points contained in the preliminary reply and the Wells Reply.

The Authors have posted on their web site at www.KansasScience2005.com the Response, the preliminary reply and the Wells Reply. This document is also being posted on that web site and is being distributed to the Board and the members of the Writing Committee. This Reply is intended to be a summary of the various replies and materials that address the principle criticisms contained in the Response. It also details the principle reasons why the Response does not otherwise provide any good or valid basis for any substantive revision to the Changes.¹

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This document does not address any grammatical improvements that might be made to any of the Changes. Clearly any errors in grammar, spelling, etc. should be corrected. However, most of the errors in grammar identified by the Majority do not appear to be errors at all, given the context of the statements. Also, all so-called errors of grammar identified by the Response may be found throughout the response itself. See the preliminary reply of the Authors in documenting these instances.

General comments.

- ? **The Response itself, which wholly misses the mark, is perhaps the best evidence of why the changes made by the Board (“Changes”) are both scientifically valid and educationally appropriate.** This is because the Response purports to be the definitive written criticism of the Changes. However, its criticisms completely miss the mark. This failure of the Response to controvert the changes, essentially validates them. If the Majority had good reasons to rescind the changes, one would expect to find them in this document. Their absence implies that there are none. The Response also ignores and therefore fails to controvert the unrebutted testimony adduced during the hearings that showed the scientific validity and educational propriety of the Changes. This omission also implicitly validates those changes. Accordingly, given the lack of substance of any of the criticisms contained in the Response, there appears no reason for revising any of the changes.
- ? **A key reason the Response is inadequate is that it completely ignores the scientific reasons for the Changes and the evidence that supports them. To be adequate it should explain why the stated reasons for the change are inappropriate and why the evidence of its scientific validity that was introduced during the hearings is lacking. The Response does neither.** Reasons were given and evidence was documented in the Minority Reports dated December 10, 2004 and March 29, 2005; the oral and written testimony of 23 expert witnesses adduced during the hearings; the Suggested Findings of Fact and Conclusions of Law, dated May 26, 2005 (the “Findings”), and the preliminary replies of the Authors dated August 2, 2005 and of Dr. Jonathan Wells, dated August 1, 2005, which were handed to the Committee prior to their vote. A Response that ignores the reasons for a Change is simply unresponsive. Instead of showing why the stated reasons are inadequate it raises issues that often are not issues at all. A response that ignores a stated reason for a change implies that it has no cogent argument against it. That leaves the stated reason and the change itself essentially uncontroverted. This describes a primary reason why the Response deserves no favorable consideration.
- ? **A second problem that plagues the response is the claim that the Changes are false or erroneous without describing in particularity the words that make the statement false and without providing any evidence that supports the claim of error.** Thus, the claim of the Response that it is incorrect to say that there is no known cause for the Cambrian Explosion is not supported by reference to a known cause for the event. A known cause would falsify the Change. Instead the claim of error is accompanied only by a statement that science has much information about the products of the event. A claim that we have much information about a dead body does not explain the cause of its death.

As explained by Dr. Wells, citation to a letter signed by 20 Kansas University Professors does not supply the evidence necessary to show the scientific invalidity of the Changes. What is needed is citations to published scientific literature and arguments responsive to the stated reasons for the Changes.

All of these complaints are covered in particular detail with respect to the claims made against each Change.

1. **The Response makes one accurate point: “*The Board and the Commissioner have outlined a process for the development of curriculum standards in science and other subject areas. This process is not being followed.*”** (General Responses, First Bullet)

It is true that the process has not been followed. Problems with the process have been the following:

- ? **Leadership of the Committee conducted extra-curricular media events to disparage the views and reputations of particular members of the committee in September, thereby polarizing the committee and discouraging honest and productive debate.** The event that was held on the KU campus in September was organized and conducted by the Chairman of the critical High School Life Sciences Committee and was attended and applauded by the Chair and Co-Chair of the Committee. This event resulted in numerous calls for the resignation of the Chair of the Life Sciences Committee. This kind of extra-curricular political activity by leaders of the Committee helped polarize the committee and was detrimental to the conduct of its business.
- ? **Refusal of the leadership to permit a vote in October on the proposals made by the Authors of the Minority further polarized the committee and delayed its work and the work of the Board.** This move by the leadership studiously avoided inquiry as to the consensus on substantive points raised by the Authors. This forced the Authors to submit their suggestions directly to the board in December. This required a delay in the public meetings on the standards and thereby delayed the entire process by at least a month. Subsequent votes on those proposals indicated significant support for some of those proposals and a clear division within the committee on the proposals as a whole.
- ? **Participation of the leadership in the boycott contrary to the wishes of the Board further polarized the committee and had the effect of coercing silence and fact finding about the proposals.**
- ? **Counsel for the Majority committed a serious violation of Rules Established by the Science Committee for the Conduct of the hearings by not allowing his case to be cross examined as required by the Rules.** Counsel for the Majority presented that case without explaining to the Science Committee that he intended to not allow his case to be cross examined in violation of an express rule to the contrary. (The Transcript of the Testimony shows very clearly these events, except for the press conference conducted immediately before the start of the hearing out of the hearing of the Science Committee and Counsel for the Minority wherein Counsel for the Majority disclosed his intention to not comply with the rule.)
- ? **The work of the Committee would have been much more productive if its leadership had accepted an offer from the Minority for more in-depth and pointed dialogue between the leaders of the Majority and Minority on the issues that divided them.** The eight Minority Authors represent not only a significant segment of the committee, but their members include three holding doctoral degrees in Life sciences, credentials not held by the Majority. Furthermore, based on polls recently conducted in Kansas and polls introduced during the hearings, the Minority

viewpoint is one that appears to reflect the wishes of a majority of the patrons of public education. Given, these factors and the substantive nature of the points they raised, the Leadership should have made an effort to resolve outside the public arena the issues that divided its members.

2. **General Criticism of the Changes:** *“Committee recommendations for standards do not include scientific theories on the origin of life. While the subject of life's origins is within the province of biology, the scientific community does not consider the subject as part of evolutionary theory, which assumes the existence of life and is directed to an explanation of how life evolved after it originated. The committee feels that the introduction of life’s origins and the scientific explanations for the origin of life are not a fundamental part of K-12 student’s education and should not be included in the K-12 Content Standards.”*

This objection is inadequate as not responsive to any of the reasons shown during the hearings for including an origin of life indicator in the Standards:

- ? **The subject is admittedly a part of biology and is covered by all biology textbooks as a part of the discussion about evolution. Whether it is an explicit component of the theory is not relevant.**
 - ? **Testimony and evidence introduced during the hearings show that textbook discussions of chemical evolution are inadequate, thereby showing a need for standardizing the discussion.** This shows a legitimate need for setting a standard for teaching about this aspect of science that is very relevant to explanations about the history of life.
 - ? **Chemical evolution is a key assumption of biological evolution that students need to understand to be adequately informed about that theory.** The fact that chemical evolution is a key assumption is conceded by the Response. Given the need for students to understand the evidentiary bases for this key assumption, it is important to an understanding of biological evolution that students understand both the theories of chemical evolution and the many scientific criticisms of those theories that were adduced at the hearings and that have not been controverted by any expert testimony.
 - ? **The Response is inadequate because it does not respond to any of the reasons asserted by Minority for this indicator. (See pages 25 and 26 of their suggested Findings of Fact and Conclusions of Law)** All of those points, that were supported by significant expert testimony, remain unrebutted, while the Response is not supported by any cogent evidence.
3. *“The minority report comes directly from the language of the Intelligent Design Network and Discovery Institute. Critical analysis of evolutionary theory is a repeated theme of both organizations’ web sites and literature. This critical analysis has no basis in science or science education.”*
- ? **It is expected that proposed science standards will in some cases parallel positions taken by its members in other arenas and affiliations.** In this case many

members of the Writing Committee, including members of its leadership, are members of or have affiliations or relationships with organizations that have declared public interests in teaching about origins and evolution. Accordingly, it should be expected that the views of those organizations may show up in proposals for standards. For example, during the hearings, Draft 2 was introduced with comments embedded by Eugenie Scott, the president of the National Center for Science Education, an organization whose activities appear to resist any teaching that would “weaken” evolutionary theory.² Although we believe the motives of these organizations are relevant to an understanding of proposals made by their supporters and affiliates, we believe the focus should be on the scientific validity and educational propriety of the proposals themselves.

- ? **The argument that proposals of an individual should be denied because an organization with which she is affiliated seeks critical analysis of evolution seems absurd, since critical analysis is the gold standard of science. A more problematic affiliation would be with an organization that seeks to limit that analysis.** Critical analysis is the very essence of science. Although it is true that no particular scientific theory should be singled out for critical analysis simply because of its implications, the evidence during the hearings demonstrated a significant need for critical analysis of evolutionary theory. The Response does not respond to any of that evidence and does not otherwise provide any evidentiary support for this seemingly incoherent complaint.
- ? **The evidence adduced during the hearings did not show that organizations with which the Authors had affiliations had improper motives.** During the hearings, Dr. William S. Harris, the leader of the Minority and a managing director of Intelligent Design network, inc. testified in detail as to the objectives of that organization. He demonstrated convincingly that since inception its core mission has been institutional objectivity in origins science. Dr. Harris sincerely believes that this objective will produce not only the best science, but also constitutional neutrality. We find no fault with both of those objectives and are not aware of any activity by Dr. Harris or other members of IDnet that show that objective to be a sham or facade parading for some other hidden agenda. Dr. Wells also testified as to the present goals of the Discovery Institute, which also seem proper.
- ? **During the hearings a memo of the Public Relations and Media officer of Kansas Citizens for Science was introduced suggesting that organization was implementing an improper strategy. The chair of the High School Life Sciences committee that has vehemently opposed the Changes and that has worked to polarize the Committee is a key officer of that organization.** The memo states that

² Ms. Scott is a signatory to the Humanist Manifesto III, introduced during the hearings, which holds as a key tenet of that Religion that life results from “unguided evolutionary change.” Any, weakening of that tenet, would obviously weaken the strength of that Religion.

the strategy of the Public and Media Relations Officer of KCFS has been, since 1999, to

“...notify the national and local media about what's going on and portray *them* in the harshest light possible, as political opportunists, evangelical activists, ignoramuses, breakers of rules, unprincipled bullies, etc.

“There may be no way to head off another science standards debacle, but we can sure make them look like asses as they do what they do.

“Our target is the moderates who are not that well educated about the issues, most of whom probably are theistic evolutionists. There is no way to *convert* the creationists.” (emphasis added)

Although officers of that organization have publicly “disavowed” this outrageous strategy, in our opinion the conduct of that organization shows no change in the implementation of its strategy.

4. ***“Page iii – The committee requests that the dedication of the writing committee and the listing of the names of the writing committee be deleted from the July 12, 2005 KSES revision document.”***

Given the outstanding work of the committee as a whole with respect to 95% of the Standards and the many days and hours they have devoted to this task, their involvement should be recognized. On the other hand, we believe it appropriate that members be entitled to show that they do not agree with everything written in the final standards. This is true not only for Changes made by the Board, but also with respect to changes which reflect a “consensus,” but less than a unanimous vote. For these reasons we believe the following should be substituted for the dedication:

"The Kansas State Board of Education wishes to express its deepest thanks to the scientists and educators listed below for their dedication and commitment to the preparation of the 2005 Kansas Standards. We fully recognize that some aspects of these Standards are controversial and that many members of the Committee may not agree with our final decision. That decision, however, is our responsibility alone and not the Committee's. We therefore acknowledge that the views expressed in the 2005 Kansas State Science Standards are not necessarily those of all of the members of the Science Writing Committee."

5. ***“Adding the word informed does not improve the language of the mission statement. The addition adds vagueness to the credibility of information: Informed about what? The Standards are the information (an outline to content) with which students should be informed. The minority report states that student should be informed that supernatural explanations should be included in science. This position is far outside the mainstream of science.”***

? **Any critical analysis of this claim reflects its utter absurdity. To inform is “outside the mainstream of science”? If that is the case, then we need to abandon “mainstream science,” and return to its traditional calling.**

- ? **Adding the word “informed” is not intended to improve the language, rather it is intended to add additional meaning, an additional and fundamental goal of Kansas public education.** The very definition of the term “educate” is “to inform.” To argue that informing students is not the goal of public education is utterly and obviously senseless. The word should be included in the mission statement, because the standards are designed to identify the content of material that students are to be informed about. It should be made clear that the standards should identify the material information relevant to a topic so that students will be equipped to make not just a reasoned decision, but a reasoned decision that is based on reasonably complete information.
- ? **The suggestion that the Change seeks to inform students about the “supernatural” is clearly unwarranted and does not identify any Change that seeks to inform students about the supernatural.** In fact the definition of science added by the Board and related provisions contained in the current standards make it clear that scientific explanations are limited to those that can be derived through rigorous testing. The statement that “the minority report states that students should be informed that supernatural explanations should be included in science,” is false. The Minority report’s position is very clearly stated both in that report and in the Suggested Findings of Fact. – science institutions should not suppress data and legitimate inferences from that data simply because of their theistic or non-theistic implications.
- ? **Objections to this clearly reasonable addition suggest an intent to oppose any change regardless of its actual merit. This casts doubt on the fundamental veracity of the Response itself.**

6. *“Draft two of the Committee Standards is consistent with the definition of science as recognized by AAAS, NSTA, NABT, and the National Academies of Science.”*

This objection is evasive and not responsive to evidence and testimony adduced at the hearings relative to the definition of science.

- ? **The response does not respond to the testimony during the hearings that showed both scientific and legal needs for having an objective rather than a naturalistic definition of science.** See in particular pages 8-12 of the Findings of Fact and pages 54-58 with regard to legal concerns for importing Naturalism into the standards, either explicitly or implicitly.
- ? **The stated claim is disingenuous because evidence introduced during the hearings show that the National Science Education Standards do not contain a naturalistic definition of science.**
- ? **The claim ignores the evidence introduced during the hearings that no other state uses the naturalistic definition of science proposed by the Majority.**

7. ***“The following statements from the Standards are incorrect: Although science proposes theories to explain changes, the actual causes of many changes are currently unknown (e.g. the origin of the universe, the origin of fundamental laws, the origin of life and the genetic code, and the origin of major body plans during the Cambrian explosion).”***

This assertion no merit because:

- ? **The accuracy, scientific validity and educational propriety of the statement was certified by the testimony of a number of PhD,'s during the hearings.** The response does not address either that testimony or the reasons for adding this Change. The Change was added because the context of the paragraph incorrectly implies that all phenomena are in fact due only to a series of naturally “Accumulated changes through time.” See page 14 and 15 of the Findings. The change properly seeks to temper the implications of the paragraph by explaining that the causes of many changes are unknown.
- ? **The Response fails to list any known cause for any of the events parenthetically listed, thereby acknowledging the truth of the statement that causes for these events are not known.** Instead of showing known causes, the Response states that “The science community has a good deal of information about the listed items.” However, the Change does not state or in any way imply that science does not have information about “the listed items.” Accordingly, the Response shows no basis for the assertion that the Change is “incorrect.”
- ? **The Response’s only stated example of a cause for which science has a “good deal of information” is refuted by a recent scientific publication and the Wells Reply.** The Change lists the Cambrian explosion as one of the many unanswered questions of evolutionary biology.³ The Editors of a 2003 compilation of articles about 26 unanswered questions in evolutionary biology agree. They list one of the unanswered questions as: “**Why**, for instance, did the basic body plans of nearly all metazoans arise within a relatively short time span, soon after the origin of multicellularity?” Ignoring these points made during the hearings and in the Minority Report, the Response makes the false argument that the conclusions are “incorrect” because “*The origin/change of major body plans during the Cambrian explosion has been clearly linked to small changes in HOX genes.*” But, the claim of error is not established simply by identifying a possible link that does not provide an explanation of the cause of the explosion. Even if it were, the Wells Reply explains why this slight-of-hand is itself “False:”

³ “**Why**, for instance, did the basic body plans of nearly all metazoans arise within a relatively short time span, soon after the origin of multicellularity? *Assuming that evolution is driven by incremental genetic change*, should it not be moving at a *slow, steady, and gradual pace*? *And why* do similar morphological *design solutions* arise repeatedly in phylogenetically independent lineages that do not share the same molecular mechanisms and developmental systems? *And why* do building elements fixate into body plans that remain largely unchanged within a given phylogenetic lineage? *And why and how* are new elements occasionally introduced into an existing body plan?” [*The Origination of Organismal Form*, edited by Gerd B. Muller and Stuart A. Newman (MIT Press 2003,). See also Note 6 and the accompanying text of the March 29, 2005 Minority Report.

“My reply: THIS IS FALSE. The most striking thing about HOX genes is that they are remarkably similar in animals with radically different body plans. For example, a HOX gene from a human, when inserted into a fruit fly, behaves just like the fruit fly's gene. [1] This means that whatever is causing the differences between a fly and a mouse, it is not the HOX genes.

“Furthermore, HOX genes are turned on in an animal embryo only after the body plan has already become established. [2] Thus HOX genes could not possibly be responsible for differences in body plans.

- ? **Dr. Wells Reply cites a fundamental problem with the Response - it's lack of reference to published scientific literature to support its claims.**

“The Majority's Response contains numerous factual claims that are demonstrably false. The sole authority given for those claims appears to be a letter signed by twenty Kansas State University Biology Faculty members. Scientific facts are not established by faculty committees, however; they are established by evidence reported in the scientific literature. In my comments below I reference that literature.”

8. *“The following statements from the Standards are incorrect: ... Grades 5-7 S3B3 Teacher notes, page46 The theory of biological evolution is an explanation of explains how gradual changes of characteristics of organisms over many generations may have resulted in variations among populations and species.”*

This criticism is based on the ludicrous claim that “Evolutionary theory does not specify a rate (*gradual*).” The claim is ludicrous because:

- ? **If the statement regarding “gradual changes” is “incorrect,” then it is an error of the Majority, not of the Board, since the claimed error does not inhere in the underlined changes made by the Board. This is because the statement is one authored and approved by the Majority.** The only words inserted by the Board are two descriptive qualifiers that do seek to temper its assertion: “*is an explanation of*” and “*may*.” The claim that evolution explains how *gradual* changes resulted in variations among populations and species, is the claim of the Majority, not of the Minority. This is a important, because much of the criticism in the Response contradicts its very own proposition by arguing that evolution does not postulate a gradual process.
- ? **It is also claimed that the statement is “an example of a poorly written statement that is scientifically inaccurate and confusing.” If so, then it is a criticism that applies to the Majority, and not to the Minority.**

? **The argument of the Response that the word “may” is an “incorrect qualifier that attempts to cast doubt on scientific explanations,” is absurd because it was inserted for the very reason suggested by the Response.** The postulate of many highly regarded evolutionary biologists is that evolution does proceed gradually, however the data does not fit this description.⁴ Due to this inconsistency between the data and the prediction, the Board has properly inserted the word “may” in a statement that otherwise states as a fact how variations in populations and species “have resulted” from “gradual changes.” See also page 15 of the Findings.

9. “The following statements from the Standards are incorrect: Multiple references to ‘historical hypothesis’.. There is a false distinction of ‘historical’ sciences from the nature of all science.”

This criticism has no merit because:

? **The Changes do not explicitly or implicitly seek to draw a *false* distinction between “historical sciences” and “the nature of all science.”** Only two Changes raise the issue of historical hypotheses. The primary change is the added indicator in Standard 1, Benchmark 1. It is very explicitly narrow in its application and focus. It deals only with the testing of hypotheses about the cause of remote historical events that cannot be confirmed by experiment or direct observation. It does not claim that historical sciences are not science and does not make a “false” distinction between “historical sciences from the nature of all science.” The other Change relating to this issue is in the section that the Majority has described as one involving a discussion of “the *history of the diversification of organisms from common ancestors.*” (See Indicator 1, S3B3, 8-12) Given the fact that the Majority has described this as a history lesson, it is not inappropriate to point out in the Change relating to the extrapolation from microevolution to macroevolution that many of the explanations that support the extrapolation are “historical narratives,” rather than hard facts.

? **The indicator is tailored to a very narrow area of science where testing by observation and experiment is exceedingly hampered, a fact that does distinguish those kinds of hypotheses from other kinds.**

? **The criticism fails to address any of testimony adduced at the hearings that it is very necessary to distinguish between the kinds of historical claims covered by the indicator and other kinds of scientific claims that can be tested by direct observation and experiment.** The un rebutted reasons for the change are outlined on page 16 and 17 of the Findings.

? **The criticism appears to be leveled, not because the indicator is invalid, but because it will have the effect of “weakening evolutionary theory,” which has been equated by its advocates in strength to that of the theory of gravity and relativity.** If this information improperly weakens evolutionary theory, then that blame must be placed at the feet of one of the most eminent evolutionary biologists of all time, Dr. Ernst Mayr. Dr. Mayr is cited as a reference in the current science

⁴ See the references in the second bullet under paragraph 13 below.

standards. He makes clear that the distinction is real, not false, and is necessary to an understanding of evolutionary biology. “Darwin introduced historicity into science. Evolutionary biology, in contrast with physics and chemistry, is a historical science where laws and experiments are inappropriate techniques for the explication of such events and processes. Instead **one constructs a historical narrative**, consisting of a tentative reconstruction of the particular scenario that led to the events one is trying to explain.” (Page 17 of the Findings.)

? **The Change does not, as the Response implies, argue that geology and other sciences that deal with the cause of past events are not science.** To the contrary, the Change explicitly acknowledges that fact. The Change merely correctly explains to students that due to inherent constraints, not all claims of science are tested in the same way.

10. *“The following statements from the Standards are incorrect Grades 8-12 S3B2In. 1 Page 76 Additional specificity c. The order of the nucleotide sequences within the gene is not dictated by any known chemical or physical law.”*

This assertion has no merit because:

? **The assertion cites no physical or chemical law to account for the sequences.** Rather than cite a physical or chemical law that orders the sequences, the Response ignores that challenge by making an argument that is completely irrelevant to the issue: “Scientists have documented many evolutionary adaptations and the nucleotide sequences (the organization of the DNA that directs heredity) responsible for them.” Although this slight of hand might resonate with “moderates who are not that well educated about the issues,” it should be clear to any scientist knowledgeable about the subject that the criticism does not assert that the sequences are due to adaptation, rather that the sequences themselves produced functional systems that have adapted to the environment. This completely begs the question of the cause of the sequence in the first instance. Indeed the Majority should know that the current claim for the cause of the sequences is chance - random mutation, not any chemical or physical law.⁵

? **The truth of the Change was validated by numerous experts during the hearings, by literature cited in the Minority Report and by the Peer Review collected by the leadership of the Committee and posted on the DOE web site, including the statement of Dr. Kenneth Miller that “no scientist has ever suggested otherwise.”** The comment of Dr. Kenneth Miller about this issue is particularly emphatic:

“Watson’s observation that the order of nucleotide sequences is variable is a direct and necessary consequence of the fact that DNA carries information. That fact, of course, is stated in many places in the guidelines. Adding that these sequences are not dictated by any physical law is misleading and unnecessary, since

⁵ Because there is no known physical or chemical law that orders the sequence, Jacques Monod claims that it “necessarily follows that chance *alone* is at the source of every innovation, of all *creation* in the biosphere.” See pages 19 and 34-35 of the Findings.

no textbook, no curriculum, and no scientist has *ever suggested otherwise* since the discovery of the double helical structure of DNA in 1953.” (Kenneth R. Miller, undated “Peer Review” of the Minority report.)

- ? **Dr. Miller’s statement that no “scientist has ever suggested otherwise,” casts doubt on the credibility of the 20 K-State experts who allowed their name to be used in connection with the claim that the Change is false.**
- ? The Majority’s claim of error is evasive because it completely ignores and does not respond to the rationale for the Change and its scientific validity as expressed in the Minority Report and as expressed by those testifying during the hearings.

11. *“The following statements from the Standards are incorrect* a. *Biological evolution postulates an unguided natural process that has no discernable direction or goal.*

The claim has no merit because:

- ? **The Change does not state: “that science endorses a particular religious perspective; that there is no external guidance for nature.”** The sentence describes the process that biological evolution postulates. The process consists of random mutation in replicating populations sorted by random changing environmental circumstances. The conclusion that this process is unguided necessarily follows from the mechanism postulated for the process. That mechanism has been recognized as being unguided by numerous evolutionary biologists and even the NABT, whose supplementary materials describe evolution as an unpredictable and natural process that has no discernable direction or goal. It is true that the postulate impacts religion, as do all postulates about origins. That is precisely why it must be taught objectively. It is critical that the mechanisms postulated for any particular origins explanation be clearly identified and described.
- ? **Science institutions are, in fact, not neutral on whether the evolutionary process is guided or unguided.** This fact is reflected in the Majority’s own statement that its view of science is that “Science process clearly states that teleologic thinking cannot be a part of science.” Teleological thinking is thinking that the process is somehow guided. Thus, the Response actually validates the postulate contained in the indicator.
- ? **The testimony of the 23 experts adduced at the hearings uniformly agreed with the proposition that evolution postulates an unguided process due to the nature of its postulated mechanism.** The Response ignores this testimony.
- ? **The Response cites no authority for its position.**
- ? The Humanist Manifesto III cites science as its authority for its central tenet that life results from “an unguided evolutionary process.”
- ? **The American Association for the Advancement of Science urges all public schools to not permit teachers to show to students evidence that would suggest that evolution might be a guided process.**

- ? **The Response ignores the arguments and evidence adduced during the hearings as detailed in the Findings - see page 20-21.**
- ? **Complaints concerning issues of grammar contained in the Response are not particularly helpful in the quest to get to the bottom of substantive scientific matters at issue.** The claimed errors of grammar seem to arise where the Majority lacks any other valid basis for their claim of error. The same instances of the claimed errors of grammar also populate the Response, and within the context do not seem actually problematic.

12. *“The following statements from the Standards are incorrect: ... f. The view that living things in all the major kingdoms are modified descendants of a common ancestor (described in the pattern of a branching tree) has been challenged in recent years by: i. Discrepancies in the molecular evidence (e.g. differences in relatedness inferred from sequence studies of different proteins) previously thought to support that view.”*

The criticism has no merit because:

- ? **It stems from a obviously false dogma, repeated by the Response, that: “There are not issues in the science community that challenge evolutionary theory.”** The validity of this statement seems ludicrous given the enormous volume of literature to the contrary. The 2003 publication, *Origin of Organismal Form*, discussed in The Minority Report and the Findings, lists no less than 26 unanswered questions regarding evolutionary biology.
- ? **The more detailed basis for the claim offered by the Response has been convincingly refuted by the Reply of Dr. Wells.** That basis is: “First, molecular evidence has solidified, not contradicted, the view of life as arising from a common ancestor.” Dr. Well’s reply is:

“My reply: THIS IS FALSE. All evolutionary tress based on molecular evidence assume the truth of the common ancestry claim, so they cannot possibly contradict it. Yet the molecular evidence is beset by so many inconsistencies that it cannot possibly "solidify" that claim. In response to assertions made by the Majority's reviewers before the May 2005 hearings, I submitted a supplement that documented (with references) some of the problems with the molecular evidence. See Appendix A (below)”
- ? **The Response ignores and does not otherwise respond to the proof offered by Dr. Wells and which was introduced during the hearings, including Appendix A.** This reply and Appendix A were also handed to the Committee prior to the vote, but completely ignored. Thus, the vote was taken without any reasonable consideration of the data relevant to the issue or the authorities cited by Dr. Wells in support of his position.

? **The Response fails to cite any scientific literature in support of its position on this issue, while the Reply of Dr. Wells cites numerous publications.**

13. ***“The following statements from the Standards are incorrect: ... f. The view that living things in all the major kingdoms are modified descendants of a common ancestor (described in the pattern of a branching tree) has been challenged in recent years by: ii. A fossil record that shows sudden bursts of increased complexity (the Cambrian Explosion), long periods of stasis and the absence of transitional forms rather than steady gradual increases in complexity, and***

The basis for the claimed inaccuracy is that “Evolutionary theory does not specify a rate (sudden vs. gradual).” This has no merit because:

? **This claim is belied by provisions in the Standards authored by the Majority that specify the rate as “gradual.”** *“The theory of biological evolution explains how gradual changes of characteristics of organisms over many generations have resulted in variations among populations and species.”* (See the discussion under the Teacher’s notes to S3,B3, Grades 5-7 above.)

? **The discussion of this issue in *Origins of Organismal Form* cited by the Authors suggests that gradualism is essential to evolutionary theory due to the assumed incremental nature of genetic change.**

“Why, for instance, did the basic body plans of nearly all metazoans arise within a relatively short time span, soon after the origin of multicellularity? Assuming that evolution is driven by incremental genetic change, should it not be moving at a *slow, steady, and gradual pace?*”.....

“The neo-Darwinian paradigm still represents the central explanatory framework of evolution, as exemplified by recent textbooks (e.g., Mayr, 1998; Futuyma, 1998; Stearns and Hoekstra, 2000). This refined and canonical theory concerns the variational dynamics and adaptation of existing forms. It is a gene-centered, *gradualistic*, and externalistic theory, according to which all evolutionary modification is a result of external selection acting on incremental genetic variation.” (p.4 and 7)

? **The Response is not adequate because it does not address the testimony of numerous experts during the hearings regarding this issue.**

14. ***“The following statements from the Standards are incorrect: ... f. The view that living things in all the major kingdoms are modified descendants of a common ancestor (described in the pattern of a branching tree) has been challenged in recent years by: iii Studies that show animals follow different rather than identical early stages of embryological development.”***

The claim of error is inadequate because:

- ? **It does not address the evidence and testimony introduced at the hearings or the rebuttal offered by Dr. Wells that supports the Change.**

“Majority's Response to proposed changes: "[D]evelopmental biology has made tremendous strides in describing embryonic development and has greatly enhanced our understanding of evolutionary relationships among species. For example, the 1995 Nobel Prize for Medicine was awarded for work on a common set of genes (including HOX genes) that influence development and body plans of creatures as diverse as sea anemones, fruit flies and humans. Small changes in these genes can result in vastly different body plans."

“My reply: THIS IS BOTH EVASIVE AND FALSE. It is evasive because it does not address the issue, namely that animal embryos are not most similar in their earliest stages, as Darwin thought and many modern textbooks falsely claim. In fact, well-documented radical differences in early animal embryos [3] contradict Darwin's belief that early embryonic similarities provided "by far the strongest" evidence for common ancestry. [4] Furthermore, although developmental biology has "made tremendous strides in describing embryonic development" (as the Majority states), it is false that small changes in developmental genes "can result in vastly different body plans." This is the case not only for HOX genes (see item I, above), but also genes in general, since it is becoming increasingly clear that much of the information needed to specify organs and body plans lies outside the DNA. [5]

15. “*The following statements from the Standards are incorrect: ... d. Whether microevolution (change within a species) can be extrapolated to explain macroevolutionary changes (such as new complex organs or body plans and new biochemical systems which appear irreducibly complex) is controversial. These kinds of macroevolutionary explanations generally are not based on direct observations and often reflect historical narratives based on inferences from indirect or circumstantial evidence.*

The claim of error is based on the assertion that the distinction between micro and macroevolution is no longer used. That assertion has no merit because:

- ? **Although the Response states that the terms are no longer in common usage, the Response contradicts itself by making arguments based on the distinction between micro and macroevolution, such as the following:**

“As the KSU professors point out, this statement is in direct conflict with the acceptance of *microevolution*, which is clearly stated on the same page of the Standards.” and

“Small changes in sequences governed by physical and chemical laws, under the influence of biological processes, are called *microevolution*.”

- ? **Although the Response claims the definitions to be incorrect, it does not specify the flaws in the definitions.**
- ? **The Response fails to address the Reply of Dr. Wells which convincingly shows that the claim of error tests the limits of credulity.**

“Majority's response to proposed changes: "The definitions of microevolution and macroevolution are incorrect. Also, while these terms have been used in the past (primarily in the 1940-1950s in reference to work by Fisher and Wright) they are no longer in common usage. The terms were used at a time when our understanding of genetics was somewhat limited and more based on the work of Mendel. With more current understandings of genetic interaction and complexity, the terms lost their usefulness."

“My reply: THIS IS FALSE. In fact, it is so blatantly and demonstrably false that it casts serious doubt on the competence or honesty of the author of the Majority's response.

“Before the May 2005 hearings in Topeka, reviewer Hurd made the wildly inaccurate claim that the distinction between microevolution and macroevolution was a creationist invention. Reviewer Miller, dismissed decades of peer-reviewed evolutionary biology articles by claiming that the distinction is "artificial," and reviewer Theobald falsely claimed that the controversy over whether microevolution can be extrapolated to explain macroevolution has been settled. At the time, I distributed to the Board and to counsel for the Majority a supplement that extensively documented the falsity of these claims. That supplement is attached below as Appendix B.

- ? Although the suggestion that certain biological systems are irreducible complex supports design theory, it is actually a challenge to the adequacy of natural selection to explain the development of systems that “appear irreducibly complex. Much scientific research is now being conducted to test the claim of irreducible complexity.” This was explained by biochemist Michael Behe during the hearings. The argument that it is a claim not found in any scientific literature is refuted by numerous scientific papers that have sought unsuccessfully to refute this hypothesis, many of which were mentioned by Dr. Behe during the hearings

16. “The following statements from the Standards are incorrect: Grades 8-12 Standard 3 Benchmark 7 (sic) – Page 80 explains proposed scientific explanations of the origin of life as well as scientific criticisms of those explanations.. a A lack of empirical evidence for a “primordial soup” or a chemically hospitable pre-biotic atmosphere; b. The lack of adequate natural explanations for the genetic code, the sequences of genetic information necessary to specify life, the biochemical machinery needed to translate genetic information into functional biosystems, and the formation of proto-cells; and c. The sudden rather than gradual emergence of organisms near the time that the Earth first became habitable.

The criticism is based on the assertions that (1) “While the subject of life's origins is within the province of biology, the scientific community does not consider the subject of origins as part of evolutionary theory;” (2) “evidence on formation of organic compounds... is accumulating..”; (3) “explanations are available for the genetic code, the sequences of information (see discussion above) and the biochemical machinery needed to translate genetic information;” and, (4) a “rate, sudden vs. gradual, is not supportable by current understandings ...that life *probably* developed multiple times, not just once, in this early environment.” The criticisms lack merit because:

- ? **Item (1) ignores and does not address the many reasonable reasons for including a chemical evolution indicator, as explained above and by the Minority Report, the Findings and the testimony and evidence adduced during the hearings.** The reasons include the fact that it is a subject addressed by all biology textbooks in connection with the discussion of biological evolution and because its truth is assumed as a key tenet of evolutionary biology. The evidentiary basis for that assumption is therefore necessary for an adequate understanding of evolutionary biology. Further reasons that address this indicator are discussed under Section 2 above.
- ? **Item (2) is not helpful, because the indicator does not assert that there is no evidence about the natural formation of organic compounds.** Rather, the indicator asserts there is scientific criticism regarding the existence of a primordial soup or other environment that would be hospitable to the formation of life. The two PhD origin of life experts that testified during the hearings detailed enormous problems with even conceptualizing an environment hospitable to a chemical origin of life.
- ? **Item (3) is not helpful because it does not reference any adequate natural explanation for the origin of the genetic code, the initial gene sequences necessary for life or the biochemical machinery necessary to translate those sequences into functioning biochemical machinery necessary for life.** Simply saying that explanations are available is not helpful and is not consistent with origin of life expert Andrew Knoll’s statement that we are in substantial ignorance about the chemical origin of life. If explanations deemed adequate exist, then we would expect references to literature that provide those explanations.
- ? **Item (4) actually suggests the need for the indicator given the remarkable statement that life “probably” “developed multiple times.”** If true, then life has no common ancestor. But more importantly, the implication of the Response that science “probably” has the answer to this controversial issue is the very reason this

indicator is needed. The testimony introduced during the hearings and literature indicate that the word “probably” is a gross exaggeration. The testimony adduced during the hearings is that textbooks provide a misleading view of the state of scientific knowledge on this subject. An example of this is the Response itself. Rather than acknowledge our basic ignorance about this issue, the Response would have us continue to mislead children into believing that life “probably” arose via chemical evolution, that we have many explanations for it and it is really a scientific slam dunk that no one need be concerned about. The response is also filled with vague assertions that “Scientific (testable) explanations are available for the genetic code, the sequences of information (see discussion above) and the biochemical machinery needed to translate genetic information.” However, the fact that we know something about the genetic code does not in any way address the question posed by the indicator - what is the chemical origin of that code as well as the origin of other complex systems necessary for life? It is this kind of slight of hand that may be effective to convince the uninformed “moderates,” but an informed person should clearly recognize that the response studiously avoids any serious discussion of the real issues.

? **The Response ignores the discussion in the Minority Report which shows that our current assessment of the state of knowledge about this issue is that of “basic ignorance:”** “[W]e don't really know how life originated on this planet. There have been a variety of experiments that tell us some *possible* roads, but we remain in substantial ignorance.”⁶ See page 19 of the Minority Report. Note the use of the word “possible,” rather than “*probable*.”

17. **The Response criticizes the following standard for the reasons stated below:** *“Modern science has been a successful enterprise that contributes to dramatic improvements in the human condition. Science has led to significant improvements in physical health and economic growth; however, modern science can sometimes be abused by scientists and policymakers, leading to significant negative consequences for society and violations of human dignity (e.g., the eugenics movement in America and Germany; the Tuskegee syphilis experiments; and scientific justifications of eugenics and racism).”* (S7,BM3, G8-12)

The criticism states: “This statement is a very odd statement to include in science standards. It seems the message to students is that “Science is great, but do not trust it.” Science abuse by policy makers [*sic, is?*] generally different than abuse of science by scientists. This is a complex area of the social sciences that is important but does not help students understand the Standard - *The student will develop understanding of science as a human endeavor, the nature of scientific knowledge, and historical perspectives.* Providing examples of abuse from the 1940s is misleading and will not help student[s ?] develop understanding. These abuses *have* [*sic?*] were fringe, horrific events that have informed the science community, who has reacted appropriately to prevent this kind of abuse from

⁶ Joe McMaster, *How Did Life Begin: An Interview with Andy Knoll* (Interview conducted on May 3, 2004, by Joe McMaster, producer of "Origins: How Life Began," and edited by Peter Tyson, editor in chief of NOVA online).


happening again. The science community has no control over policy makers and how society might use or abuse scientific understandings.”

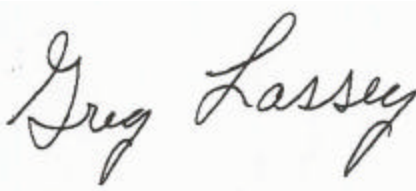
We believe the criticism has no merit because:

- ? **The Response itself demonstrates the need for this indicator and does not show any part of the standard to be incorrect or misleading.** We disagree that the standard states that one should not trust science. It merely informs students about an undeniable fact that science has been abused by scientists and policy makers. Informing students about this historical perspective will hopefully provide them with a bit of healthy skepticism that is actually the hall mark of science itself. One truly interested in science should encourage teaching of this kind because it should strengthen, not weaken, the scientific enterprise. The Response argues that the examples given are misleading on the one hand, but then contradicts itself by saying that the very same examples have “informed the science community” to take positive action. Further, the Response itself is disingenuous in stating that science “has *no* control over policy makers.” Use of a boycott to defeat this teaching policy is a good example of science seeking to control it.

Respectfully submitted, August 8, 2005.

For the Authors of the Minority Report

By 
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By 
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