

Third Submission from the Concern Group of Science Education of Hong Kong regarding the new Biology Curriculum - On the crucial concept of "testable predictions (testable)" and "falsification of hypothesis (falsifiable)" in science

24 June 2009

The Honorable Cyd Sau-lan Ho
Chairman, Education Panel
Legislative Council

Copy: Education Bureau

Dear LegCo Panel of Education and Education Bureau,

We would like to alert the LegCo Panel on Education (the Panel) and the Education Bureau (the Bureau) about several serious flaws in a recent letter (LC Paper No. CB(2)1565/08-09(01), Letter dated 30 April 2009 from Dr Pauline CHIU concerning the Biology curriculum guidelines, hereafter referred to as the Letter) dated 30 April 2009 which was sent to the Panel and the Bureau from an Associate Professor in HKU called Dr. Pauline Chiu regarding the Biology curriculum.

The Letter by Dr. Pauline Chiu omitted the key concepts of **"testable predictions (testable)" and "falsification of hypothesis (falsifiable)" (related to "testable")**, and will mislead the reader to believe Intelligent Design is an "emerging theory" (less developed "theory", yet somehow implying it is a developing "scientific theory") when in fact it is NO way an "emerging theory".

We did a critical analysis of the Letter and wanted to draw bring this to the attention of the Panel and Bureau's (page 2 of this paper) some tactics by Intelligent Design/Creationism to undermine science education and teaching of evolution [1] which will mislead the public, the Panel and the Bureau.

Our Group oppose any form of dogmatic approach in teaching, and that included teaching of science, which is inline with the spirit of the education reform in Hong Kong. We do not advocate that evolution (some miscalled it as "Darwinian" evolution) as the only "allowable" explanation of the origin of life; however it is a fact that the Theory of Evolution is the only "well supported and tested" explanation; it is by far the most robust scientific explanation of biodiversity, well supported with overwhelming evidences; with no other available theory or explanation that can match its comprehensiveness, robustness and its ability to provide a framework where all areas of biology fits so well, this it is the "only" scientific explanation available and thus being taught in a science class.

Dr. Pauline Chiu's comments about "those scientists who believe that Darwinian evolution is the only allowable explanation of the origin of life" demonstrated a lack of understanding about evolution or the term "theory"[2].

As such, we oppose any attempts of diluting / undermining science to allow supernatural ideas to be mistaken as "science", such as those by the "group of scientists, educators and professionals" and Dr. Pauline CHIU who submitted their papers to the Panel and the Bureau.

We will also like to emphasize to the Panel and the Bureau the concepts of **"testable predictions (testable)" and "falsification of hypothesis (falsifiable)"**, they forms the very crucial part of scientific methods that qualify what is science, and are repeatedly emphasized throughout this paper; it is crucial for the Panel and the Bureau to have them in mind when evaluating any opinions about the Biology curriculum:

- "Testable predictions" (testable) - to show that a theory works and how it works, otherwise it could be fatal if we cannot prove to ourselves that it worked as expected
- "Falsification of hypothesis" (falsifiable) - an extension to the above, which is to prove a hypothesis may be wrong, to find out its flaws; if a testable prediction turns out to be wrong the theory will be proven to be mistaken - this is crucial because if we don't know if there is any flaw in an idea, we cannot put it to practical use - the application of it maybe equally fatal as in the case of not testing it

The following is a critical analysis of the Letter (by Dr. Pauline CHIU) for the Panel and Bureau's information.

The Letter watered down and diluted science to open the door for supernatural ideas

The letter watered down and diluted the meaning of science by avoid mentioning of "**testable predictions and falsification of hypothesis**" - they are the very criteria that separates science from supernatural.

This is always the first step the Creationists/Intelligent Design proponents took, because those criteria will automatically reject Intelligent Design and other supernatural ideas.

Scientists made logical inferences from observable natural phenomena, and put forward hypothesis to explain those natural phenomena. A hypothesis becomes a theory if it is supported by evidence, that is a test or falsification (to look for evidence in support or contradicts the hypothesis). Intelligent design as so far not gone through testing or falsification, and neither has it offer any testable predictions, in particular, about the "intelligent agent".

By avoiding the mentioning of science' rejection of supernatural it opens the door for the Letter to talk about Intelligent Design as though it is a "less developed (scientific) theory" (by confusing the meaning of "theory" [1] yet again).

The Letter watered down Evolution's status and omitted Intelligent Design's inherent "unresolvable" weakness (its supernatural cause) to elevate Intelligent Design[3]

The letter watered down Evolution (and place Intelligent Design on equal grounds with it) by:

- Exaggerating that Evolution's current incompleteness that still await explanation and has "unresolvable" weaknesses (without even stating what they are)
- Omitting the fact that Evolution is supported and confirmed by overwhelming and non-refutable evidences - no evidences that ever come forward has contradicted the general outlines of evolution

In fact Intelligent Design is not a theory at all (not even a "less developed theory"):

- Intelligent Design is unsupported by evidence and not actively researched in the scientific community
- It is NOT under development
- Its very own "unresolvable" weakness - the supernatural "Intelligent agent" which is not testable - and that disqualifies Intelligent Design as a "science" and any hope of it becoming a "scientific theory"

The Letter compromised "analytical and critical discussion" so that Intelligent Design will not be rejected as "ideas of poor scientific quality"

By omission of the crucial criteria of science, i.e. "testable and falsifiable", it makes any "analytical and critical" discussion INCAPABLE of rejecting Intelligent Design or any other ideas of "poor scientific quality" (because now you do not have to test it or falsify it).

The net result is Intelligent Design will be swept in as "scientific".

This Letter's claim that it CAN reject other ideas of "poor scientific quality" is misleading the Panel and the Bureau.

The Letter accused the scientists who opposes Intelligent Design as being dogmatic

This letter accused scientific community and those opposing the discussion of "alternative theory" as being dogmatic etc. (i.e. saying they believe Darwinian evolution is the only "allowable" explanation). On the contrary, scientists (and the overwhelming majority) do not use the term Darwinian evolution, but rather Evolution (or Theory of Evolution). Moreover as stated above, there is no "alternative theory" to be discussed at all.

Scientists do not oppose the introduction or discussion of ideas or critique of evolution as long as the process is consistent with scientific methods. The scientific community only opposes those explanations that purported supernatural agents/causes, i.e. those that cannot be tested or falsified (by scientific methods), for they are not part of science. They also opposed attempts of teaching supernatural ideas like Intelligent Design as science or any attempts to water down science or evolution. This is not being dogmatic, but is upholding science and maintaining the professional critical thinking and skepticism of ideas, until the ideas are tested.

In short, the Letter is not advocating science education, but instead will mislead the reader by diluting science, and hiding the facts about Intelligent Design [4].

Finally we will like to emphasize that:

- The pursuit of science is about finding testable and falsifiable natural explanations to natural phenomena, and thus rejects any explanations which embraces supernatural causations, such as Intelligent Design/Creationism, as supernatural causations are not testable by scientific methods
- Science education is about teaching what is science, not supernatural ideas
- Intelligent Design is not science because it embraces supernatural causes, it has no scientific validity, it is not being actively researched, NO peer-reviewed papers about Intelligent Design has been published in renowned scientific journals
- Evolution is supported by overwhelming evidence via established scientific methods as we did to find cure for HIV, for General Relativity, for atomic physics (and its application on nuclear energy)
- The controversy surrounding Intelligent Design/Creationism Vs Evolution is NOT an academic debate nor about science, but merely "marketing" attempts by Intelligent Design/Creationism proponents to bypass strict academic scrutiny (by scientific methods) to package their ideas as science to the unsuspecting public

The Bureau's message should issue message to reject Intelligent Design/Creationism as science publicly to demonstrate the Bureau's commitment on science education, which is consistent with all scientific community (e.g. Interacademy Panel, Chinese Academy of Science)[5], such that the public will NOT get a false impression about science and evolution, and that schools principals, parents, and teachers get the clear message.

Science progressed for the last 200 years because great minds like Sir Isaac Newton, Galileo, Charles Darwin and Albert Einstein etc. questioned and critique those prevailing "theories" for improvement and refinement, and did away with many of immature ideas by scientific methods, especially those supernatural ideas. The Enlightenment is hard won and we do not want to see a return to those Dark Ages.

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Reference

[1] Our website has a longer article that discusses the common tactics of Intelligent Design/Creationism proponents : <http://sites.google.com/site/hkscienceeducation/tactics-by-creationists-id>

[2] "Science, Evolution and Creationism" (National Academy Press 2008) page 10, clearly stated that science must be "based on naturally occurring phenomena", and "if explanations are based on purported forces that are outside of nature, scientists have no way of either confirming or disproving those explanations. Any scientific explanation has to be testable..."

[3] Frequently Asked Questions (FAQ) about Evolution:
<http://sites.google.com/site/hkscienceeducation/faq>

[4] In the Kitzmiller Vs Dover Area School District trial in late 2005, the plaintiff had the burden of proof to show that Intelligent Design is not science; after six weeks of trial, the overwhelming evidence provided by expert witnesses (biologists, paleontologists etc. like Kenneth Miller, Kevin Padian), and cross examination of the defendant's witnesses (Intelligent Design proponents) had shown that Intelligent Design is not science and the whole line of evidence against Intelligent Design are documented in the case (Intelligent Design below was being referred to as ID).

In the 139 page decision by Judge John E. Jones III, it stated that:

- The overwhelming evidence at trial established that ID is a religious view, a mere re-labeling of creationism, and not a scientific theory (Page 43)
- After a searching review of the record and applicable caselaw, we find that while ID arguments may be true, a proposition on which the Court takes no position, ID is not science. We find that ID fails on three different levels, any one of which is sufficient to preclude a determination that ID is science. They are: (1) ID violates the centuries-old ground rules of science by invoking and permitting supernatural causation; (2) the argument of irreducible complexity, central to ID, employs the same flawed and illogical contrived dualism that doomed creation science in the 1980's; and (3) ID's negative attacks on evolution have been refuted by the scientific community. (page 64)
- ID's backers have sought to avoid the scientific scrutiny which we have now determined that it cannot withstand by advocating that the controversy, but not ID itself, should be taught in science class. This tactic is at best disingenuous, and at worst a canard. The goal of the IDM is not to encourage critical thought, but to foment a revolution which would supplant evolutionary theory with ID. (page 89)

(http://en.wikipedia.org/wiki/Kitzmiller_v._Dover_Area_School_District#Decision)

[5] International Statements on Teaching of Evolution
<http://sites.google.com/site/hkscienceeducation/articles/international-statement>