

Second Submission from the Concern Group of Science Education of Hong Kong regarding the new Biology Curriculum

Dear LegCo Panel of Education and Education Bureau,

Due to the complicated nature of this topic, we would like to highlight a few crucial points in this letter and follow-up with a paper of additional information for better understanding.

1 Education Bureau must respond with open statement regarding damaging statements on science education made by educators

There are a number of educators in Hong Kong, including several high profile leading educators, have made public remarks that damaged science education in Hong Kong.

They displayed poor understanding of science by endorsing factually wrong information, misrepresenting science, advocating teaching of pseudoscience as science, falsely claiming that there is controversy in evolution, and misrepresenting science and evolution. Those statements are also harmful to their reputation as educators.

We deeply regretted that they made such statements. We hope those statements are just result in a lapse of judgment, ill-formed process or insufficient due diligent, and hope they will retract their statements as they realized their mistakes and the damages done.

The Education Bureau must respond to those statements with a message to the public to clear up the confusion.

The following are just some of the cases, which reflect the sad situation of science teaching in Hong Kong. [**Appendix**]

- a) A group of 62 people, among them Prof. Stephen K.W. TSUI, Professor, Department of Biochemistry (Medicine), CUHK, Open University's dean of science and technology Ho Kin-chung and St Paul's Co-educational College principal Anissa Chan Wong Lai-kuen: makes wrong claims/misrepresented science's definition and the status of the theory of evolution (Darwinian Theory), and provided factually wrong/disputable information to LegCo and Education Bureau [1],[4],[6],[7]
- b) The same group in (a) mislead the public and misrepresented fact by using a bogus list which they claimed including over 750 "highly qualified scientists" to claim that there is a real debate about Dawinian theory of evolution, and as in (a), misrepresented science's definition
- c) Chan Yau-chi, principal of United Christian College in Shek Kip Mei: advocates teaching non-scientific ideas as "counterbalancing theory" (i.e. as science) in science classes [2]
- d) Wong Shiu-hung, principal of Kwai Chung Methodist College: advocate modes of teaching that may allow personal conviction/belief to interfere with teaching science [2]
- e) Siu Sze-chuen, headmaster of Newman Catholic School: again advocates teaching non-scientific ideas as "counterbalancing theory" (i.e. as science) in science classes [3]
- f) Wong Tang-Tat, principal of CCC Fong Yun Wah Secondary School: accuse scientists as being narrow-minded [3]

2 Education Bureau should clarify criteria as to what is science and what those terms such as "alternative explanation" means and what are included/not included

The Education Bureau issue messages to the public to clarify that the intention of the entire science curriculum, which is to learn about science, i.e. finding natural explanations to natural phenomena based on evidences, testable predications and falsification, and exclude those non-falsifiable ideas based on supernatural/non-natural cause or belief. Therefore terms like

"alternative explanations" imply "alternative scientific explanations", and exclude all those "alternatives" which purported non-natural/supernatural/belief-based ideas as explanations. The Education Bureau should consult scientists closely related to field of research in biodiversity, evolution etc. on their expert advice because they are ones who have the knowledge within this field, and make reference to publicly proclaimed statements such as the IAP Statement, which represent the scientific community's overwhelming consensus.

3 Education Bureau should clarify that Intelligent Design is not science because of (2), and be consistent with Education Bureau's earlier statement about Creationism in RTHH Program "The Pulse"

Education Bureau's earlier on clarified Creationism in the RTHK program "The Pulse", which is a very positive move. Likewise, Intelligent Design which also proposes non-testable, non-falsifiable explanation from forces of deity or intelligent agent, or subjective judgment of "design", hence it is not an "alternative (scientific) explanation" apart from Darwin's theory. Therefore for Education Bureau to be consistent with their position, they should treat Intelligent Design equally with Creationism, and exclude it as the "alternative scientific explanation" apart from Darwin's theory.

4 Education Bureau should emphasize that evolution is currently the only robust and well established explanation to biodiversity and speciation, there is not yet any other competing theories in science

According to the book "Science, evolution and Creationism", the theory of evolution is supported by so many observations and confirming experiments that scientists are confident that the basic components of the theory will not be overturned by new evidence, it is also the central organizing principle of modern biology [8],[9].

A similar view is expressed by IAP Statement on evolution. [7].

In other words, it is important in the learning process that student be able to realize the current status of evolution theory in science, that its, it is the most robust available explanation to biodiversity supported by evidence and many disciplines, it is also what makes biology makes sense, and that it is inappropriate to cast doubts to evolution theory without justification and substantial evidential support, and compromise the students' right to learn the current, updated knowledge in **science**.

5 Critical thinking in 3-3-4 Education Reform - Education Bureau should also emphasize what is science and enable students to grasp proper concept critical thinking (evidence based, logical, scientific) and skepticism, not criticize for criticism's sake

We fully support that education should foster stimulating, balanced, non-biased approach in learning which is consistent with the 3-3-4 reform in stimulating students to exercise more critical thinking. However, any critique, must be within the framework of critical thinking, which embodies logic, evidences and reasoning. It is certainly not the intention of our education to encourage criticism for criticisms' sake. Critical thinking does not mean "any criticism goes", nor does open-minded means "everything goes".

Critique towards evolution or any theories, the proposition must be evidence based, logical and one that is currently a topic under serious research, otherwise such critique will not be consistent with the critical thinking process emphasized by our current education reform.

Education Bureau should emphasize one of its main objective is to enable student to clearly distinguish which are scientific explanations, and which are religious ideas; our curriculum in science which foster critical thinking, skepticism, and open-mindedness and scientific methods, should emphasize that science is about finding natural explanations to natural phenomena based on evidences, testable predications and falsification, and that it can enable student to be aware of their own process of making up their minds -- to tell the differences between making a decision

based on scientific methods/principles/evidences which is independent of personal belief and those one that is out of personal belief.

Follow-up

Our group will submit another paper as those erroneous claims needed elaboration in order to show the severity of those errors, and to provide the public, LegCo Panel on Education and Education Bureau useful information.

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Speaker and Convener of Concern Group of Science Education of Hong Kong

Appendix

(a) A group of 62 people, among them Prof. Stephen K.W. TSUI, Professor, Department of Biochemistry (Medicine), CUHK, Open University's dean of science and technology Ho Kin-chung and St Paul's Co-educational College principal Anissa Chan Wong Lai-kuen: makes wrong claims/misrepresented science's definition and the status of the theory of evolution (Darwinian Theory), and provided factually wrong/disputable information to LegCo and Education Bureau [1],[4],[6],[7]

Error: There is clear consensus in scientific community (e.g. IAP Statement [7]) over Darwinian theory, and scientists works with consistent understanding of what science is, the scientific methods and scientific theories. In addition the group misquoted the book “Science, Evolution and Creationism” (National Academy of Science 2008) [8] and left out sections that is crucial of scientific methods. [9], which emphasis testable predictions and falsifiable hypothesis, and the rejection of supernatural causes. The letter is also wrong about the status of evolution theory, which in fact is the central organizing principle of modern biology.

The same letter claimed that the US National Academy of Sciences revise its definition of science between 1999 and 2008 to be more friendly to the supernatural, which is a claim borrowed from Creationist.

The 2008 NAS report, “Science, Evolution and Creationism,” reiterates “the basic requirements of science that hypotheses must be restricted to testable natural explanations.” (See page 43.) Their paper appears to argue that testable explanations need not be natural, but this is simply not true; one cannot test for the presence or involvement of a being which can violate the laws of nature at will. Scientists have no way of setting up an experiment and commanding "God" to keep out!

(b) Prof. Stephen K.W. TSUI, Professor, Department of Biochemistry (Medicine), CUHK, alongside with 60 other “educators, professionals and scientists” including Open University's dean of science and technology Ho Kin-chung and St Paul's Co-educational College principal Anissa Chan Wong Lai-kuen: They mislead the public and misrepresented fact by using a bogus list which they claimed including over 750 “highly qualified scientists” to claim that there is a real debate about Dawinian theory of evolution, and as in (a), misrepresented science's definition.

They mislead the public and misrepresented fact by using a bogus list which they claimed including over 750 “highly qualified scientists” to claim that there is a real debate about Dawinian theory of evolution. [1]

Error: This so called “Dissent from Darwinism” quoted in their letter is a list created by a group who promoted Intelligent Design back in 2001. It only managed to get a little over 750 people in 8 years. Of the total of 752 (as at today) it was found that many of them have positions unrelated to science, or their area of knowledge has little to do with natural science related to biology or evolution, many are not involve in scientific research. There are even individual on the list later found themselves to be

tricked to sign it and requested their names to be removed [6]. Anyone who claimed the list contains over 750 “highly qualified scientists” borderlines on the verge of lying in public. And as in (a), they left out the part of “definition of science” from the book “Science, Evolution and Creationism” (National Academy of Science 2008) [8] which requires scientific explanation to be testable and falsifiable, and rejects supernatural causes.

(c) Chan Yau-chi, principal of United Christian College in Shek Kip Mei, advocates teaching non-scientific ideas as "counterbalancing theory" (i.e. as science) in science classes

In an interview by SCMP in Feb-2009, said, "When we teach about Darwin we treat it as one part of the subject. We teach students creationism as a counterbalancing theory." [2]

Error: Theories in science has to be supported by substantial evidence, falsifiable and verifiable. Creationism contradicts all of those and cannot be a counterbalancing theory in science. Education Bureau also ruled it out as an alternative.

(d) Wong Shiu-hung, principal of Kwai Chung Methodist College, advocate modes of teaching that allow personal conviction/belief to compromise science

In an interview by SCMP in Feb-2009 said: "Our religious belief does not approve of evolution. We organise schools upholding Christian faith. If teachers have such a religious background, we encourage them to integrate their faith into lessons." [2]

Error: Science is evidence based, with testable predications, has to be falsifiable. Religion is about personal conviction that is not compatible with science.

(e) Siu Sze-chuen, headmaster of Newman Catholic School, again advocates teaching non-scientific ideas as "counterbalancing theory" (i.e. as science) in science classes

In an interview by SCMP in Feb-2009 said: There was no space for creationism because examiners did not accept it. If exam pressure was reduced, "it surely would be a good thing" to introduce creationism as an *alternative*. [2]

Error: Theories in science has to be supported by substantial evidence, falsifiable and verifiable. Creationism contradicts all of those and cannot be a counterbalancing theory in science. Education Bureau also ruled it out as an alternative in an reply to RTHK in the programme the Pulse [3]. Moreover, the Catholic Church already accepted Evolution, and rejected Intelligent Design. [5]

(f) Wong Tang-Tat, principal of CCC Fong Yun Wah Secondary School, accuse scientists as being narrow-minded

In an interview with RTHK in April 2009, said: "When teaching about evolution theories, we also introduce intelligent design to our students. Sometime I think scientists are a bit extreme, where the matter of religion is concerned, I think they are too narrow-minded... That's why we introduce science education to them, to offer them a different perspective to look at things...and to tell the differences between different perspectives. [3]

Error: Open-minded do not mean open to any ideas, but requires skepticism. Science is about seeking natural explanations to natural phenomena. The explanations have to be evidence based, capable of giving testable predictions and falsifiable. Religion purports supernatural/non-natural forces not consistent with science, and naturally science will reject them because they contradicts science. This is far from being narrow-minded, but rather adhering to what science embodies.

(g) Prof. Stephen K.W. TSUI, Professor, Department of Biochemistry (Medicine), CUHK, give out factually wrong scientific claims which misrepresent evolution

He cited the complexity of living organisms today and gaps in the fossil record as examples of evidence not compatible with the Darwinian theory of evolution. "It is well known that in the Cambrian explosion many species appeared at the same time," he said. "It is not compatible with the dogma of random mutation in natural selection." [4]

Error: Theory of evolution predicts the complexity of living organisms, and is confirmed by genetics and fossil records. Gaps in fossil records are always expected, fossils are rare and hard to find, but evolution does not rely only on fossil records, but also studies from genetics, geology etc. and they supported evolution with much details. Cambrian period spans 50 - 70 million years. In geological times it is relative short and rate is relative faster in terms of emerging of new species -- but a far cry from "many species appeared at the same time". Several evolutionary explanations for this event have been proposed; perhaps the most widely-accepted is that, at the end of the pre-Cambrian, animals evolved the ability to form hard, mineralized parts (such as bones, shells, and teeth). This new ability stimulated an adaptive radiation, as different animal lineages exploited it to suit different niches. At the same time, animals with such hard parts were much more likely to fossilize than their soft-bodied ancestors had been, so that many more creatures made it into the fossil record at this time. Thus, evolutionary theory has no difficulty accounting for the Cambrian Explosion.

Notes:

[1] LC Paper No. CB(2)1499/08-09(01) - Letter dated 5 May 2009 from a group of educators, scientists and professionals concerning the Biology curriculum guidelines for secondary schools. Public information obtainable from LegCo Secretariat.

Further information about the errors in the document can be found at this document at our site:

"Mistakes found in the LC Paper No. CB(2)1499/08-09(01) - Letter dated 5 May 2009 from a group of educators, scientists and professionals concerning the Biology curriculum guidelines for secondary schools": http://sites.google.com/site/hkscienceeducation/file-archive/Additional_Information_Revised.doc?attredirects=0

Our group's home page <http://sites.google.com/site/hkscienceeducation>

[2] SCMP Report, Feb 07 2009 "Scientists urge excluding God from biology"

[3] RTHK "The Pulse" on Apr 24, 2009

[4] SCMP Report, May 15 2009 "Creationism row hot up as objectors fight back"

[5] In a New York Times report, the Catholic Church agreed with the ruling of the Dover Pennsylvania trial regarding Intelligent Design, acknowledging that Intelligent Design is not science and not to be taught in science classes.

<http://www.nytimes.com/2006/01/19/science/sciencespecial2/19evolution.html>

As of now, the Catholic Church accepted Evolution, and urged creationists to acknowledge the evidence that supported evolution.

<http://www.livescience.com/blogs/2008/09/16/vatican-evolution-is-fine/>

<http://www.telegraph.co.uk/news/newstoppers/religion/4588289/The-Vatican-claims-Darwins-theory-of-evolution-is-compatible-with-Christianity.html>

[6] The list is the work of an organization, Discovery Institute, one that promotes the pseudoscience of Intelligent Design. Since 2001 when it was created, it could only gather a little over 750 signatures in 8 years. National Center for Science Education of USA did an analysis of this list and strongly skeptical of the qualifications of the individuals in the list:

"Doubting Darwinism through Creative License, by the National Center for Science Education:

<http://ncseweb.org/creationism/general/doubting-darwinism-creative-license> ° Several years ago,

somebody examined the list, and found that some of them worked at Law Schools or as park rangers,

that is their work have nothing to do with the field of science. Vast majority are computer scientists, hardly qualify them to comment on evolution.

<http://www.youtube.com/watch?v=Ty1Bo6GmPqM>

He found only five organismal biologists who might possibly study evolutionary biology:

http://scienceblogs.com/strangerfruit/2008/01/dissenting_from_darwinism.php

The anti-creationist British Centre for Science Education raised doubts about the claimed affiliations and relevant expertise of 34 British, or British-trained signatories of the Dissent list after analysing them. The analysis reviewed a number of them are not working in the academia nor practicing scientists (<http://bcseweb.org.uk/index.php/Main/IntelligentDesignAdvocates>).

The creator of this list, stretched the meaning of scientists, to include as many people into the list, even those that are not scientists that worked to discover new theories or advance current knowledge. This list is an attempt to create the impression that there are a lot of scientists coming out to dispute evolution. Yet in fact they do not represent the views of the scientific community and neither did anyone really provide evidences to support their dissent.

Another analysis discovered that some are tricked into signing it, they requested their names be removed but the Discovery Institute ignored them:

<http://www.youtube.com/watch?v=YsiWf-ctieA>

<http://www.youtube.com/watch?v=Ty1Bo6GmPqM>

As a result, we can see that the claim that there are “over 750 highly qualified scientists” is not true.

[7] Various groups of scientists and scientific academies, made public statements in response to propaganda similar to “Dissent From Darwinism”:

InterAcademy Panel (Among the 68 is the Chinese Academy of Science)

<http://www.interacademies.net/Object.File/Master/6/150/Evolution%20statement.pdf>

Nobel Laureates Initiative : http://media.ljworld.com/pdf/2005/09/15/nobel_letter.pdf

[8] “Science, Evolution and Creationism”, National Academy Press, 2008

<http://www.nap.edu/catalog/11876.html>, page 11, and its FAQ Section

[9] *ibid* [8], page 10 quoted as below. The 62 persons in the letter of [1] misrepresented the definition of science by misquoting [8], and left out crucial parts in scientific methods that rejects supernatural causes which are not testable or falsifiable:

In science, explanations must be based on naturally occurring phenomena. Natural causes are, in principle, reproducible and therefore can be checked independently by others. 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 — there must be possible observational consequences that could support the idea but also ones that could refute it. Unless a proposed explanation is framed in a way that some observational evidence could potentially count against

[10] *ibid*, page 2