State of the University Address (with critiques as written by Mark Psiaki between 11/3/2005 and 11/22/2005 and interspersed throughout the speech in parenthetical sections that start with MLP:)

(MLP Abstract: Intelligent design includes aspects that are proper science and aspects that are philosophy. Contrary to President Rawlings' assertions in this speech, the science aspects do not constitute junk science. Rather, they are valid and important elements of the study of origins in biology. They are needed as a counter-weight to Darwinism because much of Darwinism is driven by the world view known as philosophical materialism rather than by evidence and scientific method. Intelligent design poses challenging counter-examples to Darwinism. It runs counter to accepted practices in science to dismiss intelligent design because it does not offer a competing over-arching theory in the way that Darwinism does. It is a valid scientific pursuit to seek counter-examples to a theory, and those who propose the counter-examples do not need to offer a substitute theory. Darwinists who are committed to the scientific method should welcome the challenge posed by the scientific components of intelligent design as a means of testing the case for their theory. Scientists who are committed to the scientific method should demand that Darwinists accept the challenge. These issues and many additional issues related to the scientific debate on origins, to the scientific method, and to underlying world views are discussed in the responses to various parts of President Rawlings' speech. The organization of the comments is to respond to specific points in the speech just after the relevant paragraph and then to broaden the discussion to cover related topics. Additional related topics are discussed after the end of the text of President Rawlings' speech. A summary of arguments is included at the very end.)

By Hunter R. Rawlings III, Interim President, October 21, 2005

Thank you, Jay. Elizabeth and I are pleased to be back in our previous roles while Cornell searches for its next president. I share Pete Meinig's enthusiasm for Cornell's

priorities, and I can attest to the momentum with which the university is moving forward to realize them. I am grateful for the role that the Cornell University Council has played under the leadership of Ginger So for the past two years and now plays under your guiding hand. I have every confidence that the search committee will identify a first-rate person to lead Cornell as our next president, and I look forward to rejoining the faculty full time, once he or she has assumed the office.

This morning, though, I want to address a matter of great significance to Cornell and to the country as a whole, a matter with fundamental educational, intellectual, and political implications. This matter has become so urgent that I feel it imperative to make it the central subject of my State of the University Address on Trustee-Council Weekend.

The issue in question is the challenge to science posed by religiously-based opposition to evolution, described, in its current form, as "intelligent design." This controversy raises profound questions about the nature of public discourse and what we teach in universities, and it has a profound effect on public policy.

(MLP: Although intelligent design (ID) scientists may have religious motivations for pursuing their line of research, this fact in itself does not make all ID religiously-based. Would it be valid to reject the work of atheist Darwinists if one could show that their atheism is what motivated them to study evolution? Our evaluation of a piece of research should not consider the motives of the researcher. Rather, it should consider the actual methods used to do the work.)

Right now, this issue is playing out in school districts, cities, counties and states across the country. In August, the Association of Christian Schools International and the Calvary Chapel Christian Schools in Murrieta, California, brought suit against the University of California system for rejecting three of the Calvary Chapel Schools' courses, including a creationist-oriented biology course, as inadequate preparation for college. The plaintiffs charge that by rejecting the courses, the University of California infringes on their rights "to freedom of speech, freedom from viewpoint discrimination, freedom of religion and association, freedom from arbitrary discretion, equal protection of the laws, and freedom from hostility toward religion." [1]

Kansas, which was at the heart of the anti-evolution movement a few years ago, is *again* considering new science standards that would urge public school teachers to present alternatives to evolution. Here in New York State, a member of the State Assembly introduced a bill last May that would require that "all pupils in grades kindergarten through twelve in all public schools in the state…receive instruction in both theories of intelligent design and evolution." [2] The bill was referred to the Committee on Education.

As we meet today, a federal court in Pennsylvania is hearing the case of Kitzmiller v. Dover, in which a group of parents is challenging the October 2004 decision of their local school board to teach "intelligent design" along with evolution in biology classes. The parents contend that "intelligent design" is essentially a religious concept and as such violates the separation of church and state.

(MLP: According to my understanding of the Dover case, this statement is factually incorrect. The Dover case is not about teaching ID. It is about making a short statement that points out the serious flaws in the support for evolution. There is no mandate to teach any alternative theory; there is only a mandate to briefly inform the students about Darwinism's known weaknesses. The Dover goal is to counter the tendency of naive biology

teachers to present macro-evolution [a] as something other than it is, to present it as an established fact when, in reality, it is a theory that is open to serious question.)

Disputes involving evolution are brewing in at least 20 states and numerous school districts. And in August, President Bush weighed in by suggesting that schools should teach intelligent design along with evolution.

"I think that part of education is to expose people to different schools of thought," the president told reporters. "You're asking me whether or not people ought to be exposed to different ideas. The answer is yes." [3]

Most of us have some familiarity with "creationism," which asserts that life as we know it was created more or less in its present form about 10,000 years ago. Intelligent design is a more subtle construct. While not necessarily denying that some forms of life have evolved over time, it contends that some features of the

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[a] It is important to distinguish two types of evolution. Micro-evolution is the observed change over time of the distribution of traits within a given species in response to environmental factors that cause differential survival rates for the possessors of differing traits. In micro-evolution, no significant new genetic information arises nor do any significant changes occur in a bio-chemical process or a biological mechanism. Macro-evolution is the claim that the actions of gradual micro-evolutionary-type processes have compounded over long periods of time to cause life to progress from the first cell and produce all of the different species that exist today. Some Darwinists refuse to acknowledge the distinction between these two types of evolution. The distinction is fair because micro-evolution has been observed, but no macro-evolutionary change has ever been observed that produces a significant new piece of genetic information which gives rise to a significant modification of a bio-chemical process or a biological mechanism. Their refusal to acknowledge this distinction is part of a debating strategy that purposefully exploits confusion of terms.

natural world (the flagella of bacteria is one often cited example) are so "irreducibly complex" that they require an intelligent designer.

The Seattle-based Discovery Institute, which has been leading the intelligent design movement, defines it this way: "The scientific theory of intelligent design holds that certain features of the universe and of living things are best explained by an intelligent cause, not an undirected process such as natural selection. Note: Intelligent design theory does NOT claim that science can determine the identity of the intelligent cause. Nor does it claim that the intelligent cause must be a 'divine being' or a 'higher power' or an 'all-powerful force.' All it proposes is that science can identify whether certain features of the natural world are the products of intelligence." [4]

Evolutionary theory states that genetic mutations and natural selection, over millions of years, gave rise to human beings and all other forms of life. Evolutionary theory says nothing about the existence or the non-existence of 'god'. As our own President Emeritus Frank Rhodes, a distinguished scholar of Charles Darwin and the history of evolutionary theory, has written, "…[T]he truth is that evolution is neither anti-theistic nor theistic. So far as religion is concerned, evolution is neutral. It does suggest that species arise by natural selection which proceeds by natural laws, but, like all scientific theories, it provides no ultimate interpretation of the origin of the natural laws themselves; for it no more proves them to be the result of random chance, than it proves them to be the servant and expression of purpose." [5]

(MLP: This paragraph makes it seem that the main complaint of the ID folks is that evolutionary theory is bad for religion. In fact, the main complaint is that macro-evolution is bad for science. In all other areas of science, one is trained to be skeptical of theoretical assertions until they are proven convincingly. In macro-evolution, on the other hand, one must throw skepticism to the wind and accept the theory despite a lack of convincing proof. One can't really do experiments that prove macro-evolution. One can look for evidence in the fossil record, but one doesn't find it. One must just accept it.

This departure from the scientific method, this lack of the discipline of the lab, causes errors to persist in Darwinism much longer than they would persist in any other branch of science. The Piltdown Man fraud lasted for more than 40 years, and it was only uncovered because of a voluntary confession. The false hypothesis that embryology recapitulates evolution lasted even longer and probably retarded progress in embryology. It is important to the future of biology that we break the shackles which unnaturally bind it to Darwinism.)

Many Americans, including some supporters of evolution, believe that intelligent design should be taught along with evolution. "Teach the controversy" has become the rallying cry of the Discovery Institute and others in the "I.D." camp, and it is the view apparently endorsed by President Bush. In fact, according to a recent report by the Pew Research Center in Washington, D.C., which analyzed 20 years of trend data on public attitudes toward evolution, a *large minority* of Americans -- around 40 percent -- says that creationism should be taught *instead* of evolution in public schools. [6]

Even here at Cornell, there are sharp divisions on the issue. Each year in his large course on evolution for non-majors, Will Provine, the C. A. Alexander Professor of Biological Sciences in the Department of Ecology and Evolutionary Biology, asks his students a set of questions about evolution. The exact percentages vary a bit from year to year, but typically about half the students come out in favor of some sort of "purpose" informing the process through which life develops and half come out on the side of mechanistic evolution.

(MLP: This example paints the division at Cornell as existing between an informed faculty who accept evolution and a naive student body, half of whom accept some form of special creation. In fact, there are Cornell faculty who work in the technical fields and who do not accept Darwinism. I am one of them, and I know of others, at least one of whom works in biology.)

Of course, this is not the first time the country has experienced serious disagreement about evolution. In 1860, a year after Darwin published *On the Origin of Species by Means of Natural Selection*, many Americans eagerly followed accounts of the

Wilberforce-Huxley debate before the British Association for the Advancement of Science.

The controversy came up again 80 years ago in Tennessee, pitting William Jennings Bryan against Clarence Darrow to decide the fate of John Scopes, a high school biology teacher accused of violating the state's law against teaching evolution. In his opening statement, Bryan claimed that "if evolution wins, Christianity goes," while Darrow argued, "Scopes isn't on trial; civilization is on trial." Although the decision in the case achieved less than Darrow had hoped, it provided a significant deterrent to anti-evolution legislation that in 1925 was pending in 15 other states. [7]

It arose a third time in 1987 when the Supreme Court ruled, in *Edwards v. Aguillard*, that Louisiana's "Creationism Act" was invalid. That act forbade the teaching of evolution in public elementary and secondary schools unless accompanied by instruction in "creation science," and the Supreme Court found that the Louisiana act "lacks a clear secular purpose." [8]

(MLP: I distinctly recall reading the majority decision and at least one dissenting opinion in this case. One of the significant points of the majority was that the Louisiana law was invalid because it could be shown that religion played a role in motivating the legislators. Thus, the question was not one of establishing religion, but of doing anything in the public arena based on religious motivation. By this same reasoning, if the Supreme Court could show that legislatures' primary motivation for outlawing murder was their belief in the religious commandment "Thou shalt not murder", then the Court should strike down all laws against murder. Similarly, if religious motivation could be shown for laws that grant government help to the poor, than all such laws would be declared null and void based on this same principle.)

Now, with the well-organized, resolute intelligent design movement, the issue is back again. What adds urgency to this iteration of the dispute is the fact that this country is so polarized, both culturally and politically. When we divide ourselves into "Red States" and "Blue States"; into the people who watch Fox News and those who watch PBS; into "people of faith" and "secular humanists," when ciphers substitute for nuanced ideas, is it any wonder that this debate now concerns matters as

fundamental as what we teach in our primary and secondary schools, what academic standards universities require, and what rhetoric candidates adopt in political races? When ideological division replaces informed exchange, dogma is the result and education suffers.

(MLP: I agree 100%. Unfortunately, a significant portion of this speech serves to promote an ideology rather than exchange information.)

And if we are honest, we have to admit that many of us in universities have contributed to the polarization that afflicts the country as a whole. President Emeritus Frank Rhodes, writing in 1982 at the height of the "creationism" debates, noted that "both fundamentalist advocates and some popular scientists claim an extension of their area of authority which is logically illegitimate. The fundamentalists offer an old doctrine of scriptural infallibility, improperly disguised as science; the scientists offer an old doctrine of materialism, equally improperly disguised as science…. Each, in its increasingly intemperate pronouncements, is guilty of intellectual imperialism." [9]

(MLP: Unfortunately, much of this speech is based on the assumptions and biases of the old doctrine of materialism. As such, it represents one more instance of intellectual imperialism.)

Today, as Glenn Altschuler, Cornell's Litwin Professor of American Studies, has noted, we continue to have scientific imperialists who believe that only science can be looked to for answers to all answerable questions and that those areas where science cannot provide answers are unimportant. And we have religious imperialists who assert that all questions are appropriately directed to faith-based sources for answers.

(MLP: Yes, this is bad, but ID isn't about religious imperialism. It is about bringing science to its senses in an area where it has lost them. There are reasonable ID folks who are researching ID because it will improve science, not because it will promote their religion.)

I want to suggest that universities like Cornell can make a valuable contribution to the nation's cultural and intellectual discourse. With a breadth of expertise that

embraces the humanities and the social sciences as well as science and technology, we need to be engaging issues like evolution and intelligent design both *internally*, in the classroom, in the residential houses, and in campus-wide debates, and also *externally* by making our voices heard in the spheres of public policy and politics.

At the time of its founding in 1865 – six years after Darwin published *On the Origin of Species* – Cornell responded to the first assault on science and reason in a direct and forceful way. In creating what has been called the first *American* university, Ezra Cornell and Andrew Dickson White insisted that it break new intellectual ground. Looking back some years later, White wrote, "We had especially determined that the institution should be under the control of no political party and of no single religious sect, and with Mr. Cornell's approval, I embodied stringent provisions to this effect in the charter." [10]

White made the defense of science, including evolution, the center of his scholarly attention during and after his presidency. It figured prominently in the history courses he managed to teach at Cornell while president. It figured in the lectures he was invited to give, as a leading college president, around the country. And it formed the basis of his magnum opus, a two-volume work entitled *A History of the Warfare of Science with Theology in Christendom.*

As Glenn Altschuler wrote in his biography of A. D. White, in *The Warfare of Science*, White sought to provide his readers with a clear distinction between theology and science. The essential difference was methodological.

As a rule, White wrote, the conclusions of a great theologian ripen into dogma. "His disciples labor not to test it, but to establish it; and while, in the Catholic Church, it becomes a dogma to be believed or disbelieved under the penalty of damnation, it becomes in the Protestant Church the basis for one more sect."

In contrast, as Professor Altschuler noted, "White championed unlimited free inquiry; it was as crucial to the ultimate survival of religion as it was to progress in science." [11] Religion did more damage to itself than to science, White observed, when it insisted on adherence to discredited ideas. What we now call "creationism,"

in his view, was no more essential to faith than a belief that the earth was at the center of the universe.

(MLP: I am not an expert about this subject, but I have heard from more than one source that White's work was problematic, that he distorted history in order to support his particular view that religion has had a negative impact on science. This reference back to White implies that he was a luminary on the subject. Cornell needs to get past White's fallacies. It shouldn't linger on them as some sort of bequeathed wisdom.)

Ezra Cornell also found the issue of religion central to his concern for his new university. A few years ago, when we were rebuilding Sage Hall, I had the privilege of reading a letter that he had placed in the building's original cornerstone on May 15, 1873.

In it, Cornell warned "that the principal danger, and I say almost the only danger I see in the future to be encountered by the friends of education, and by all lovers of true liberty is that which may arise from sectarian strife. From these halls, sectarianism must be forever excluded, all students must be left free to worship God, as their conscience shall dictate, and all persons of any creed or all creeds must find free and easy access, and a hearty and equal welcome, to the educational facilities possessed by the Cornell University…."

(MLP: Amen. But Cornell is allowing the secularist sectarians, the philosophical materialists [b], to take over biology by trumpeting macro-evolution as infallible while ignoring its many weaknesses.)

In keeping with the convictions of A. D. White and Ezra Cornell, Cornell has remained a non-sectarian university that actively supports students in the practice of their religious faiths. Cornell United Religious Work (CURW), established in 1929, was

[b] Philosophical materialism is the assumption that the physical world and its natural laws are all that exist, or all that have any impact that will ever matter.

created in order to give Cornell students an array of religious options. CURW now hosts 26 affiliate groups, including Jews, Roman Catholics, Unitarians, Christian Scientists, the Society of Friends, the Church of Jesus Christ of Latter-Day Saints, the Muslim Educational and Cultural Association, a number of Christian evangelical organizations, an African-American worship service, Muslim, Hindu, Zen and Tibetan Buddhist, Hasidic Orthodox Jewish and Pagan groups. Anabel Taylor Hall provides a physical home to a wide range of student organizations and programs that are religiously-based. Even our dining options have been designed to encourage religious observance.

Religion has also figured prominently in Cornell's academic program. As early as 1896, Henry W. Sage agreed to fund a chair of Semitic Languages and Literature, and its first holder, Nathaniel Schmidt, taught courses in Hebrew, Aramaic, and Arabic languages, in the Old Testament Literature, and in oriental history. Today the study of world religions is alive and well at Cornell. There is a Religious Studies Program with an undergraduate major. Its faculty is drawn from several departments including Near Eastern Studies, Asian Studies, History, English, Anthropology, Philosophy, Classics and others. I believe that this is a very good thing.

So if religious beliefs of all sorts are welcomed, encouraged and supported at Cornell and if religious studies has a secure place within the curriculum, should creationism or intelligent design be taught in science courses? A substantial fraction of the American people and of our own students accept creationism or intelligent design, so what is the harm?

The answer is that intelligent design is not valid *as science*, that is, it has no ability to develop new knowledge through hypothesis testing, modification of the original theory based on experimental results, and renewed testing through more refined experiments that yield still more refinements and insights.

(MLP: This paragraph distorts the nature of science. The observed fact that the elements are fixed, chemically-immutable entities is open to the same criticism of being unmodifiable. The elements either are or are not fixed quantities in chemical reactions. Does President Rawlings propose that we not teach this observed fact of chemistry? The ID assertion that certain bio-

chemical processes and biological mechanisms (BioP&M) are irreducibly complex is closely analogous to the observed fact of the chemical immutability of the elements.

Another reasonable analogy presents itself for the Darwinist attempt to explain how these BioP&M came into being by purely natural, gradual processes of mutation and selection. Unfortunately for the Darwinists, the appropriate analogy is with alchemy. Just as at proved impossible to turn lead into gold by chemical reactions, so it may well prove impossible to explain by naturalistic causes how these BioP&M came into being. Remember that even Isaac Newton believed in and worked on alchemy. Many smart people believe that all BioP&M have been created by purely naturalistic causes that work gradually through mutation and natural selection, and they work to prove that this belief is true. Unfortunately, the fact that they believe and the fact that they are smart do not combine to guarantee that their beliefs are true, just as Newton's reputation does not combine with his pursuit of alchemy to confer legitimacy on alchemy. Rather, it is a shame that such an intelligent man wasted so much time on a vain pursuit.

It is entirely within the realm of science for the ID community to assert that certain BioP&M are irreducibly complex and to test this assertion. Prof. Michael Behe of Lehigh has asserted that certain specific mechanisms and processes are irreducibly complex, one of which is the blood clotting mechanism in mice. Researchers who oppose him have sought to disprove this assertion by reference to laboratory work in which genes have been knocked out of mice in order to reduce the complexity of their blood clotting mechanism. In his lecture here last spring, Prof. Behe talked about an article by a leading researcher in the area of blood. The article was written to refute Behe's claim of the irreducible complexity of this biochemical process and referred to the mouse gene experiments. The article claimed that the blood clotting function remained sufficiently intact to yield viable mice even after two pieces of the original blood clotting mechanism had been removed by knocking out genes. Unfortunately for the ID opponent, his paper was based on a mis-reading of one of the main works that his article cited. It seems

possible that he failed to read much of the cited article at all. The mice with reduced blood clotting mechanisms all died prematurely. The mode of death changed depending on whether one or two genes were removed, and the ID opponent misinterpreted this change in the mode of death as a change from non-viability to viability.

This episode shows that ID is falsifiable in its assertions about the irreducible complexity of specific mechanisms. Unfortunately for the Darwinists, the attempt to falsify ID failed because the laboratory evidence supported the assertion that the mouse blood clotting mechanism is irreducibly complex.

This paragraph of President Rawlings' speech overlooks an important aspect of science, which is the search for counter-examples. As in math, just one counter-example to a theorem is enough to prove it wrong. If the ID folks do nothing more than pose challenging possible counter-examples to evolution, then they are serving an important scientific function.

Even Darwin endorsed the importance of possible counter-examples when he wrote in The Origin of Species: "If it could be demonstrated that any complex organ existed which could not possibly have been formed by numerous, successive, slight modifications, my theory would absolutely break down. But I can find out no such case." One of the main points of ID is that we have achieved enough understanding at the micro scale to enable us to find the cases that Darwin couldn't find.

When I was an assistant professor, I had a friend in OR&IE who worked in computational geometry. He told me about a certain researcher who worked at Bell labs. His one job was to review theory papers and to look for counter examples to the proposed theorems. My friend told me that no one wanted to have this particular person picked to review his or her paper. I was shocked that my friend could say such I thing. In effect, my friend was saying that no one wants the flaws in their theorems to be found out. Such people value career advancement over the pursuit of knowledge. They don't mind if their career advancement comes at the expense of knowledge.

An honest researcher would definitely want the Bell labs person to review his or her work. An honest researcher only wants to publish work that can stand the test of severe critics. If there is a problem with a given work by an honest researcher, then that researcher wants to be the first to know about it.

The Darwinists should welcome the challenge from ID researchers. The resulting duel, conducted in the laboratory rather than through spin in the speeches of university presidents, should serve to strengthen support for macro-evolution if macro-evolution is true. Those who wish to avoid the duel are like my friend, and as a fellow researcher, I am shocked at their attitude. Do they have so little confidence in their theory? Why should they be afraid to have their theory tested in response to the challenges of critics?

President Rawlings' speech fails to recognize the important contributions in science, engineering, and mathematics of negative assertions. Proofs of "it can't be done" are important technical contributions. For many years mathematicians tried to develop an analytic solution to a general 5th order polynomial. There exist general solutions for linear, quadratic, cubic, and quartic polynomials. Finally, after years of fruitless research, some clever mathematician proved that there cannot be an analytic solution for a general polynomial of degree 5 or higher. This was a purely negative result, but it was nonetheless important because it warned other mathematicians away from wasting time on pointless efforts to develop formulas which cannot exist

I know of 2 other examples of this type of negative result in my own area of expertise, system dynamics and control. Earnshaw, who also served as an assistant minister of a parish in the UK, proved that a static arrangement of magnets and electric charges could never produce a stable levitating device. This result kept engineers from wasting their time seeking to develop such a device. Bode developed a relationship between the gain and phase of feedback circuits that proved the impossibility of making the "perfect" stabilizing feedback mechanism that had high gain at low frequency, low gain at high frequency, and a very fast gain transition between the two frequency regions without an accompanying large destabilizing lag in the phase of the

response. Again, Bode's result kept engineers from wasting their time in the search for something that does not exist. Engineers, scientists, and mathematicians have a nasty habit of dreaming up new "philosopher's stones", and it is an important function of research to expose their non-existence.

The duel between Darwinists and ID proponents over irreducible complexity must be conducted carefully in order for it to produce a sensible conclusion. The ID proponents must not be allowed to endlessly propose new BioP&Ms as being irreducibly complex if the Darwinists are successful in proving that a representative set of reasonable contenders can be reduced in complexity. At some point, if the ID proponents are proved wrong about the irreducibility of a number of significant BioP&Ms, then the debate should conclude in favor of the Darwinists. Similarly, the Darwinists must not be allowed to endlessly explain away failures to demonstrate the reducibility of a particular BioP&M as being the fault of limited time or resources. If they fail time and again to prove the possibility of reducing complexity while retaining sufficient function to maintain viability, then they must eventually admit the truth that some BioP&M are irreducibly complex. In this duel, it will be important that the contestants choose their battles wisely. The ID proponents must be careful to choose good examples of possible irreducible complexity for the Darwinists to try to contradict. The examples will have to be amenable to experimentation, as was done with the mouse blood clotting, and they will have to be highly likely not to be reducible in the event that the ID claims are correct.)

H. Allen Orr, writing in *The New Yorker* last spring, noted: "Though people often picture science as a collection of clever theories, scientists are generally staunch pragmatists: to scientists, a good theory is one that inspires new experiments and provides unexpected insights into familiar phenomena. By this standard, Darwinism is one of the best theories in the history of science. It has produced countless important experiments … and sudden insight into once puzzling patterns…."

(MP: The statement "Darwinism is one of the best theories in the history of science," is pure rubbish. It has made no significant predictions that have

been fulfilled. It makes almost no predictions that are testable. One has to wait too long for a new species to arise that has any significant new structures or genetic information [c], and the long wait precludes the experimental testing of macro-evolution in the laboratory.

Many dyed-in-the-wool Darwinists will protest that evolution has predicted the mutations of microbes which allow diseases to become resistant to antibiotics. This, however, is a prediction of micro-evolution, not of macro-evolution. It is unreasonable to accept the observed occurrence of micro-evolution as a fulfilled prediction of macro-evolution that proves the latter's validity. To do so would be the equivalent of saying that the main proof of Newton's laws of motion and gravitation is their ability to predict that apples fall from trees. Wow!

The power of the macro-evolution theory, if it has any power at all, is that it reasons from the obvious truth of micro-evolution to the non-obvious proposition of macro-evolution. This is similar to Newton's reasoning from the fall of the apple (though it is probably a legend that the fall of a particular apple inspired Newton) to the explanation of the orbits of the planets around the Sun. The problem with this clear analogy is that Newton then went on to conduct experiments, develop calculus, solve a very difficult nonlinear differential equation, and show that the solution matched Kepler's laws, which were based on Brahe's observations of the planets. Even then, Newton was not fully believed until Halley used Newton's laws in order to successfully predict the time of the return of the comet that bears his name.

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[c] Note, speciation can be said to have been observed if one includes reshufflings or multiplications of genetic information that cause the organism to be reproductively isolated from its parent stock. These changes, however, involve the introduction of no significant new biological information and may, in fact, involve information loss.

Darwinists have done none of this. The state of Darwinism, as best I understand, would be equivalent to Newton if Newton had stopped at the assertion that the apple falling and the planets orbiting were caused by one and the same thing, but had never successfully proved the connection by his great labors. It is as though we hailed Newton as a great physicist, and as proof of his greatness, said "Look, don't you see that apples fall from trees, just as he predicted? You have to trust him that this also explains the orbiting of the planets around the Sun. It is unreasonable to demand more proof than the falling of the apples."

Stated another way, the main complaint against macro-evolution is that it is a huge extrapolation from micro-evolution. Other scientific theories make huge extrapolations, Newton being a prime example, but they go on to prove that the extrapolations are true by making successful predictions. One cannot merely make an extrapolation and assume its truth. We know that extrapolation does not work in going from micro-economics to macro-economics or in going from quantum physics to cosmology. Why should we assume that it works in the field of biology? It is bad science to accept huge extrapolations without the requirement that they offer convincing proof, but this is what has happened to Darwinism's claim of macro-evolution.

Darwin deserves recognition as the proposer of micro-evolution, which is an important biological theory. As far as I know, he was the first to propose it. Note, however, that once he proposed this idea, it must have seemed self-evident to those who read his works. In fact, it must have been the self-evident nature of micro-evolution that gave credence to the rest of the theory, to macro-evolution. Similarly, the obvious phenomenon of apples falling gave enough credence to Newton's theory to motivate him to put in the hard years of work needed in order to fully develop and finally prove the theory. Unfortunately, the subsequent developments in the theory of macro-evolution have not taken a similar positive course.

As a comparison of the two theories' power, consider the following quote from the book Hillyer, V.M., A Child's Geography of the World, Appleton-Century-Crofts, (New York, 1951), p. 14:

> "There is only one thing that men can send up high enough to travel above the ocean of air. That is a rocket, which doesn't depend on air for its motor or to hold it up. Someday rocket ships will probably carry men on trips to the Moon or even to the planet Mars. How would you like to go exploring in a rocket ship beyond the World's atmosphere out through empty, airless space? How would you like to be the first Man in the Moon? You wouldn't find any living thing on the Moon, for the Moon is a dead, lifeless ball without any air on it at all. But if your rocket got to Mars you would almost certainly find some living plants -- and perhaps, who knows? -- even some living animals."

This 1951 publication wisely predicted that a man would someday travel to the Moon using a rocket. On the other hand, it foolishly predicted the existence of obvious plant life on Mars. The reasons for the success of the one prediction and the failure of the other lie in the two scientific theories on which they are based. The successful prediction of travel to the Moon is based on Newton's theories. The unsuccessful prediction of obvious plant life on Mars is based on Darwin's theories. Thus, Newton provides valuable, practical predictive power. Darwin does not. In fact, the only significant prediction that macro-evolution makes is that there may be extra-terrestrial life on other planets. All other supposed predictions do not actually depend on the acceptance of macro-evolution.

Consider an additional contrast between the two theories. Suppose that tomorrow, or 10 years from now, the scientific community decided that ID was true and that macro-evolution was not able to explain how life came to be. Suppose that it could be proved or demonstrated in a lab that there could be no purely naturalistic explanation of how the different species came to be. If this happened, then this seemingly radical change in science would have very little impact on the actual practice of most scientists. It would not affect

any of the work that I do with spacecraft or the GPS system. It would not affect physicists or chemists. The surprising thing, though, is that it would not even affect many biologists. They could go about the experiments and studies and analyses that they are doing with little or no change of course. The only significant change would be that biologists would no longer have to dream up explanations for why a particular experiment or set of evidence was consistent with macro-evolution when, "on the surface", it "seemed" to contradict the theory. [d]

Suppose, on the other hand, that Newton's mechanics were proved false. I don't mean false in the limit of high speeds or large masses. We all know that one needs to use the theory of general relativity in order to work in this regime, but relativity approaches Newtonian mechanics in the low-speed/low-mass limit, and much of modern science and engineering is based on using Newton's laws in this regime. Suppose that we woke up tomorrow and found out that Newton was all wrong even in this regime. Suppose that we discovered that all of our engineering achievements had been merely the result of clever tinkering and that Newton's laws and their application really

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[d] The following is an example of the type of explaining that currently needs to be done by biologists. Consider so-called "convergent evolution." A better term would be "non-evolution" evolution. One of the basic tenants of macro-evolution is that commonality of appearance/form/function arises from commonality of ancestry. Unfortunately, there are cases where this is obviously not true. There exist pairs of species that have commonalities that are not shared by other species that Darwinists consider to be more closely related to one or the other of the pair. The evolutionists "explain" away this phenomenon as being a process where evolution took two separate paths to arrive at the conclusion that the same "design" for a particular organ/mechanism/process was the best one. The problem with this "explanation" is that we are left with the tautology: commonality of appearance/form/function arises from commonality of ancestry except when it arises for some other reason.

had nothing to do with any of our many successes in aeronautics, space flight, etc. If that happened, then there would be a huge revolution in industry, academia, and government. A lot of people would be immediately out of work, myself included. My point is this: We are dependent on Newton in a way that we are not dependent on Darwin because Newton's work is far superior to that of Darwin.)

Orr notes that in the 10 years since one of the "I.D." movement's chief theorists, biochemist Michael Behe (*pronounced Bee-Hee*), offered arguments about the irreducible complexity of cells as evidence for "intelligent design," "I.D. has inspired no nontrivial experiments and has provided no surprising insights into biology." And he adds, "As the years pass, intelligent design looks less and less like the science it claimed to be and more and more like an extended exercise in polemics….Biologists aren't alarmed by intelligent design's arrival in Dover [PA] and elsewhere because they have all sworn allegiance to atheistic materialism; they're alarmed because intelligent design is junk science." [12]

(MP: First, this statement is spin. It would be more relevant to note that Darwinists have been unable to disprove the irreducible complexity of even one BioP&M example that Prof. Behe proposed 10 years ago, even though they have tried. At the same time, Prof. Behe continues to publish non-trivial research findings that support ID -- e.g., see Behe M.J. and Snoke D.W. "Simulating evolution by gene duplication of protein features that require multiple amino acid residues," *Protein Science*, 13(10), Oct. 2004, pp. 2651-2664.

Second, Einstein's theory of special relativity, which was published in 1905, inspired no experiments for more than 10 years. It was the theory of general relativity, published in 1915, that inspired an experiment, and it took until 1919 for that experiment to be performed. Thus, there were 14 years from the first relativity publication to the first confirming experiment.

For ID, the problem is further compounded by the great prejudice against ID in the science community. Near the end of this document, I describe the nasty reaction of some Darwinists to Prof. Behe's lecture here during the

spring semester. This type of reaction shows that any researcher who proposed to do experiments to test ID would immediately find himself or herself in the middle of a firestorm of criticism from Darwinists. Funding would be nearly impossible to obtain. Publication of results in refereed journals would be difficult to achieve. Tenure would never be granted, no matter how well the work was done. This very speech by Cornell's president will serve to further dissuade any biologist from doing any such experiments. Certainly no biologist who wanted to work at Cornell would touch ID with a 10 ft. pole. Speeches like this serve the purpose of closing out debate on ID without giving it a fair hearing.

Then again, what non-trivial experiments have ever been done to confirm the Darwinist theory of macro-evolution? Darwin has had almost a century and a half, and yet no experiment has positively confirmed his theory in the way that the above quote demands of ID.)

We should not suspend, or rather annul, the rules of science in order to allow any idea into American education. I.D. is a *subjective* concept. It is, at its core, a religious belief.

What about including "I.D." in public policy discourse? After all, it is an important view of the world shared by many Americans. Many religiously-based views enter the public arena and inform our policy debates, and they should. Religiously-derived arguments, in my view, must bear two burdens: they must be clearly identified as such, that is, as propositions of faith; and, in acknowledging that others do not share these propositions of faith, they must be supported by other arguments.

When religion moves beyond the private realm and into the public square, it must do so with great care; otherwise, it creates serious potential dangers to the civic polity and to religion itself. That is why James Madison, the author of the First Amendment, was at such pains throughout his long public life to separate church and state. In 1785, when his fellow Virginian Patrick Henry proposed that a small tax be imposed to support the churches of the Commonwealth for the avowed secular purpose of improving the general morals of society, Madison responded with his "Memorial and

Remonstrance Against Religious Assessments," the single most influential document in American history on the subject of the separation of church and state.

Madison maintained (in article #1) that "we hold it for a fundamental and undeniable truth, that religion or the duty which we owe to our Creator and the manner of discharging it, can be directed only by reason and conviction, not by force or violence." He allowed (in article #8) that "Rulers who wished to subvert the public liberty, may have found an established Clergy convenient auxiliaries." But he stressed, "A just Government instituted to secure & perpetuate it…will be best supported by protecting every Citizen in the enjoyment of his Religion with the same equal hand which protects his person and his property; by neither invading the equal rights of any Sect, nor suffering any Sect to invade those of another." And he declared that (in article #5) "… the Bill implies either that the Civil Magistrate is a competent Judge of Religious Truth; or that he may employ Religion as an engine of Civil policy. The first is an arrogant pretension falsified by the contradictory opinions of Rulers in all ages, and throughout the world; the second an unhallowed perversion of the means of salvation."

In essence, Madison argued that government must be extremely cautious in employing religion as an instrument of civil policy. "I.D." is a religious belief masquerading as a secular idea. It is neither clearly identified as a proposition of faith nor supported by other rationally-based arguments. As we have seen all too often in human history, and as we see in many countries today, religion can be a source of persecution and repression. As Pascal, the great French philosopher, said, "Men never do evil so completely and cheerfully as when they do it from religious conviction." [13]

(MLP: One of the major complaints of ID folks is similar, that Darwinism is a religious belief of philosophical materialism masquerading as science and thereby being given preference in public education and other endeavors. The philosophical materialist's creation story, i.e. macro-evolution, is given preference in the public schools even though it is fraught with scientific weakness. The philosophical materialist demands this public establishment of his religion because it would be a very weak religion without it.

It is wonderful that our founding fathers decided to exclude all religious beliefs from direct influence on the government based on religious authority. It would be wonderful if philosophical materialism were treated the same way. Philosophical materialists don't see it this way. They claim the right to special treatment under the banner of science because they present their philosophy as being a pre-requisite for doing science. Their assertion is false. In fact, their philosophy can lead to absurd conclusions, as will be discussed below in the case of free will.

The Darwinists have no evidence that life started from non-life by purely naturalistic processes or that all life descended from a single original cell. All they have is their assumption that for everything in the material world, including the arising of life on what we know was once a lifeless planet, there must exist a purely naturalistic explanation. Thus, it is a matter of faith with them that there exists a valid naturalistic explanation of how life came into existence. They have no proof that this explanation exists, only their faith. Other religious views admit that there may not exist such an explanation, just as there exists no chemical recipe for turning lead into gold.

Philosophical materialism has infected science to the detriment of the latter. The reason to fight against this infection is to improve science, not to improve religion. Science used to be more humble. It was happy that it could successfully explain some of what was observed in the material world based on rational, mechanistic laws. The original scientists, Newton etc., made no claims about being able to explain everything. As science progressed, the philosophical materialists became arrogant and claimed everything for science. They claimed that everything that affects the material world can be fully explained in terms of purely mechanistic principles. This change seems to have occurred during the last half of the 19th century. This is an assumption, a matter of religion. It is not something that has been proven using the scientific method.

The past 150 years of science have seen great advances, but they have also seen limits. We don't know the limits of science, but one instinctively knows

that they exist. Freud tried to analyze the mind based on the scientific method and the implied assumption that the human mind and soul are merely a machine, yet today we seem to have more people who suffer from incurable mental illnesses than ever. Why have other areas of medicine made much greater progress? The reason is that mental illness involves a person's spirit, which is not some machine, some purely physical device, that can be completely analyzed using the scientific method.

The philosophical materialist's view of science has led people such as Prof. Will Provine to deny the existence of free will, yet in the midst of his own denial he reaffirms his belief in its existence: He calls society to account for its acts of calling criminals to account for their acts. If criminals do not have free will, if they are just pre-programmed machines who should not be held accountable for their actions, then society, which is just made up of a group of "pre-programmed biological machines" in Prof. Provine's view, also has no free will. It is just a collection of machines that punish other machines. Why should Prof. Provine be angry at society? He is angry because he actually believes that society has the free will to change its ways. The idea that society has free will is nonsense, however, if his worldview of philosophical materialism is correct. He has no basis for being angry with society or with anyone, for that matter. The problem is not Prof. Provine or society or criminals. The problem is with the over-reach of science that has been inspired by philosophical materialism. Human behavior cannot be reduced to a complex set of mechanistic laws, and Prof. Provine instinctively knows this fact even though he dare not acknowledge it intellectually [e].

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[e] Prof. Provine has a strange way of denying his own perceptions of his own free will. He discounts them as being illusions. The one area where he has the most and best data is in the area of his own thoughts, yet he is willing to write off those thoughts as illusions whenever they do not agree with his theories. If one is willing to reject disagreeable data as being illusory, then there is virtually no limit to the zany theories that one can develop and espouse about reality.

A related topic is the meaning of the words "scientific" and "unscientific." These terms get thrown around by philosophical materialists in a way that wins arguments through a subtle use of intentional confusion. In one sense of the word, "scientific" means something that can be explained mechanistically and tested in a laboratory or field experiment. This is what I would call science with a small "s". This is a good use of the term "scientific". In another sense, "scientific" is a synonym for "real", and "unscientific" is a synonym for "un-real" or for "it has no bearing on anything of importance in the physical world." This is what I would call Science with a large "S." "Science" becomes a religion in this use of the terms; it ceases to be the methodology that has given us computers, cell phones, airplanes, and space flight. The philosophical materialist will label an assertion that he doesn't like as "unscientific." That label will be true in the first sense of the word, in the sense that the assertion is not about a purely mechanistic phenomenon which can be tested in a laboratory. What the philosophical materialist wants, however, is for the hearer to interpret the meaning in the second sense, i.e., in the sense that the proposition has no significant bearing on reality. If one challenges the philosophical materialist about this implied second meaning, then he immediately retreats to the first definition of the term "unscientific" to prove the validity of his use of the label, but he always wants the hearer to persist in the confusion of the two definitions so that he can win acceptance of his unreasonable point.

The philosophical materialist will make the following protest: but science must be able to account for everything that impacts the material world; otherwise, science can explain nothing. This is a false dichotomy. It is only necessary that science be able to explain some of the important things that impact the material world in order for science to be a sensible pursuit. Science is not the all-or-nothing proposition that the philosophical materialist makes it out to be. It is possible that the electrons in the computer on which I type this paragraph respond according to definite physical laws while my mind and soul do not.

It is even possible that there exist both physical laws that can explain some of the material world and that there also exists a Deity who sometimes intervenes to perform miracles that run counter to those physical laws. The existence of understandable physical laws is a presumption of all religions that claim miraculous wonders as proof of the particular religion's correctness or that describe a Deity who makes pronouncements such as "Thou shalt ..." or "Thou shalt not ..." Miracles are impressive only if there exist a set of physical laws that the miracles obviously violate. Recipients of commandments can be held morally responsible only if they live in a world where they can make rational predictions about the effects of their actions based on understood physical principles. Otherwise, a religious person could point a gun at some enemy, pull the trigger, pray for the bullet to turn sideways after it leaves the barrel, and feel no sense of moral culpability when the Deity fails to answer the prayer and the bullet kills the enemy.

Another protest of the philosophical materialist is: If science cannot explain all that has a significant impact on the material world, then how can one know what is and what is not a reasonable field for scientific inquiry? This is a reasonable question. The answer is the following: one cannot know until one has tried and, through trying, has achieved success in showing that the phenomena are explainable in terms of mechanistic principles. This demonstration often must include the ability to predict new phenomena that have never been observed or even imagined.

This onus to prove its ability to tread on new ground will be good for science. It will restore to science the humility that it needs. It will make researchers cautious about working in areas that are likely to prove fruitless, which is always a good type of caution to have -- remember the alchemists, and it will force a researcher to make a very strong case for any new scientific theory that he or she proposes.

In case anyone is in doubt of the proposition that science cannot explain all of the material world, consider the big bang. The singularity that started the big bang is the single most important physical event that has impacted the form

of our universe. Yet, science cannot say anything about what led up to this event. In fact, science cannot even say anything sensible about what happened during the first few picoseconds or nanoseconds or so after the singularity. Therefore, science is known to have at least one limit. Given the nonsense that can result when other limits are not recognized -- e.g., Prof. Provine's condemnation of condemnation, which is discussed above -- it is self-evident that science has additional limits.

If we adopt this view, then macro-evolution is unsupportable based on current knowledge. The most significant support that macro-evolution has at the moment is the philosophical materialists' presumption. The Darwinists have no provable explanation for how the first cell began from non-life. They have no provable explanation for how all the species supposedly descended from a single cell. All they have is the knowledge that there once was no life and that there now is life. If we presume that science must explain everything, then there must exist some purely naturalistic explanation for the development of life and of the species, even if we don't know what it is. If we return to the classical assumption that science need not explain everything, then we have no reason to believe in the existence of a purely naturalistic explanation for life. It may or may not exist, but we are not forced to assume that it exists even when there is no proof.)

The United States, it is worth noting, where church and state are most rigorously separated, is also the country where churches, synagogues, mosques, and other houses of worship flourish, where a healthy pluralism predominates, and where everyone is free to worship as he or she chooses.

I am convinced that the political movement seeking to inject religion into state policy and our schools is serious enough to require our collective time and attention. Cornell's history, its intellectual scope, and its current commitments position us well to contribute to the national debate on religion and science.

(MLP: Cornell has been at the forefront of injecting the religious viewpoint known as philosophical materialism into state policy and our schools through the teaching of macro-evolution as an established fact when it is a shaky

theory. It seems plausible that this speech is motivated by a fear that this establishment of Cornell's preferred religion will end.)

As you know, Cornell is in the midst of a major investment in the new life sciences, the physical sciences, and computing and information sciences, and also in issues surrounding sustainability. These priorities have come out of a sustained academic planning process with strong involvement of the faculty and academic deans. Along with a focus on student aid and diversity, faculty recruitment and retention, they will figure prominently in the capital campaign, which in its quiet phase is already moving forward with great momentum. Yet I want to suggest that ultimately our efforts to position Cornell as the leading academic citizen of an interconnected world will fall short of their potential if we neglect the background conditions that have put rational thought under attack.

(MLP: An easy way to stop the attack on the rational thought of the ID folks is to stop making speeches like this one.)

We have at Cornell great intellectual resources to deal with the current attacks on science and reason. We also have a strong tradition of faculty members using their expertise to comment on public policy, as the late Hans Bethe did as an advocate for nuclear non-proliferation, and as Kurt Gottfried is still doing as the co-founder of the Union of Concerned Scientists.

I believe that now, as we proceed with our investments in scientific inquiry, we should also be addressing the cultural issues that the invasion of science by intelligent design embodies. This is an issue that should engage not simply our science faculty, like Will Provine, but, in particular, our social scientists and humanists.

(MLP: ID is not an invasion of science by religion. It is, in part, a call for science to retreat from its rigid assumption of philosophical materialism to a more rational view that recognizes the possibility that there are limits to what science can accomplish.)

This is above all a *cultural* issue, not a scientific one. The controversy is about the tensions between science and belief, reason and faith, public policy and private religiosity.

(MLP: Amen, but President Rawlings is not on the side that he thinks he is on.)

Modern research universities have become segmented. We have scientists over here, humanists and social scientists over there. Knowledge is divided into ever-smaller categories; our specialization becomes ever more narrow.

I believe it is time to put the disparate parts of the modern research university back together. We have at Cornell philosophers expert at making fine distinctions and careful definitions. We have scholars of literature who have made the close reading of texts their life's work. We have historians and scholars of American Studies who can identify and explicate the antecedents of the current controversy. We have economists, sociologists, political scientists and others adept at exploring linkages among science, religion and public policy and their relationship to broad societal themes like privilege, poverty, and inequality.

(MLP: Here I am, a rocket scientist, trying to comment on the problematic science and philosophy of the Darwinists' macro-evolutionary hypothesis. I can almost hear the cries against me that will say that I am not worthy of getting a hearing in this debate because I am outside of biology. I predict that Cornell will largely ignore the inconsistency between the foregoing paragraph and the University's likely dismissal of my arguments without even considering their merit.)

For almost 40 years, the Cornell Society for the Humanities has supported research and encouraged imaginative teaching in the humanities, in part, by focusing each year on a single theme. For the 2005-06 academic year, it is "Culture and Conflict," a theme that relates quite directly to the issues I have been talking about. And our new Institute for the Social Sciences, partly modeled on the Society for the Humanities and partly on the social science and humanities seminars that Provost Martin helped launch a few years ago, brings together each year about a dozen

faculty members from across the university to work collaboratively on a cutting-edge topic that will stimulate new courses and productive discussions on campus, and important scholarship.

Social scientists should be asking questions such as: "How, if at all, might 'I.D.' influence the public-policy debate in the United States, given our strict separation of church and state?" "What would constitute evidence of a conscious or intelligent designer of the universe?" Humanists should be asking questions such as: "Are reason and faith polar opposites?" "Are they inevitably antagonistic to one another? How have the aesthetic roots of religious belief and the exploration of the spiritual shaped literature, music, art, and culture?" "How might we frame conversations to talk about when human life begins amidst assertions that a definition of human life may be so inherently subjective as to preclude reaching a consensus?" These are large and important questions. They go to the heart of our American democracy and to the essence of the human experience.

(MLP: I agree with the spirit of parts of this paragraph. I would add two additional questions: 1. "How can we restrict Darwinist philosophical materialism to have a lesser influence in the public-policy debate in the United States, given its current gross violation of our strict separation of church and state?" The 1980's Louisiana legislation aimed to address just this question, but it was overturned by a poor Supreme Court decision. 2. "How have religious belief and the exploration of the spiritual shaped science?" I would also modify the approach to the question "What would constitute evidence of a conscious or intelligent designer of the universe?" I would pose it to researchers in the hard sciences and mathematics, not to those in the social sciences. This is consistent with how the SETI program is run (see the discussion of SETI that is presented after the end of President Rawlings' speech).

There is a hint of the biased assumptions of philosophical materialism in the phrase "the aesthetic roots of religious belief." This could be taken to mean that the initiation and development of religious belief must be analyzed from a purely materialist perspective. In this perspective, it is *verboten* to study

any religion from the perspective that there might actually be a Deity who might actually have played some significant role in the inception and development of a particular religion. It is only allowed to assume that all religions are man-made and arose purely through the actions of some mechanistic laws of psychology or sociology. Thus, practical atheism is an underlying assumption of this type of study of religion, which is ludicrous.)

I am pleased that under Provost Martin's leadership, Cornell's strong tradition of interdisciplinary collaboration continues to embrace not only the sciences and technological fields, but also the humanities and the social sciences. Humanists and social scientists, whose expertise lies in understanding cultures and ideas, can – and should -- move us beyond ridiculing or ignoring our opponents or claiming that, at some level, science is good and faith is bad. They can keep us from claiming too much in the sphere of religion or in the sphere of science and give us the language we need to learn from each other.

(MLP: Amen, except that scientists also need to police themselves against claiming too much in their sphere. This passage implies that these two spheres don't overlap. On the practical side, many freshmen have to exercise faith in the Cornell curriculum, which tells them that calculus will actually make a difference to their eventual practice of science or engineering. They need enough faith to labor through 2 semesters of difficult problem sets and exams without any proof that their faith will be rewarded. Proof comes only after calculus has been learned. It should come as no surprise to such freshmen that the spheres of faith and scientific reason have significant overlap.)

To that end, I ask our three task forces, on life in the age of the genome, wisdom in the age of digital information, and sustainability, to consider means of confronting the following questions: how to separate information from knowledge and knowledge from ideology; how to understand and address the ethical dilemmas and anxieties that scientific discovery has produced; and how to assess the influence of secular humanism on culture and society.

Consistent with Cornell's land grant mission, I ask as well that humanists, social scientists, and scientists venture outside the campus to help the American public sort through these complex issues. I ask them to help a wide audience understand what kinds of theories, arguments, and conclusions deserve a place in the academy – and why it isn't always a good idea to "teach the controversies." When professors tend only to their own disciplinary gardens, public discourse is undernourished.

Cornell is known the world over as one of the great global research universities. Twenty-eight years ago, with substantial Cornell involvement, the Voyager I spacecraft set out on a journey to Jupiter, Saturn and beyond. Over the years Voyager has confirmed some of our expectations about the solar system and provided data that contravened others. Voyager I is now the most distant human-made object in the universe. It is approaching the very edge of our solar system and is about to venture into the vast unknown of the interstellar medium.

Voyager and its sister craft, Voyager II, traveling along at some distance behind, seem poised to amaze and enlighten us with a new perspective on the universe of which we are a part. They are the results of scientific method and experimentation, but also of imagination and creativity. They inspire in us the emotions we associate with both religion and science: awe, wonder, curiosity, and an intense desire to know more.

The spirit of discovery and innovation, exemplified by the Voyager mission, helped earn Cornell a 12th place ranking in a recent survey of the best universities in the world. Cornell is the place where the science behind the Mars Rovers was, and still is, being done. It is the university that led in the rediscovery of the ivory-billed woodpecker, which had not been reliably reported in the United States for 60 years, and was thought to have become extinct. It is the place where music professors like Steve Stucky win Pulitzer Prizes, and computer scientists like Jon Kleinberg and poets like Alice Fulton win MacArthur Foundation awards.

It is also a place that has nurtured great intellectual leaders who have not only made landmark contributions to their disciplines, but who are willing to speak out, frequently and forcefully, about the obligation of the academy to pursue knowledge

and truth unfettered by political or religious dogma. Cornellians who do will be acting in the great tradition of Cornell's founders, Ezra Cornell and Andrew Dickson White.

(MLP: I have a few other general observations relevant to this discussion.

I. Consider the project SETI, The Search for Extra-Terrestrial Intelligence (http://history.nasa.gov/seti.html). This research program looks at received radio signals from the Cosmos and analyzes them mathematically in order to look for signatures of intelligent communications. The idea is that certain features of seemingly random signal patterns, when analyzed statistically, can be taken as evidence of intelligent design of the signals. Thus, this whole project presumes that one can detect intelligent design of signals through some sort of analysis. What are the differences between this and ID in biology? There are two main distinctions: A. the SETI findings of intelligence would be less threatening, not coming from a presumed creator. B. The SETI criteria of declaring something as being intelligently designed are more quantifiable but probably much more generous on the side of ascribing intelligence than are the ID criteria.

Some people think that SETI is silly, but not because of its methods. Even NASA funded this work at one time. No one questions the scientific validity of what is being done. Those who laugh question whether the effort is worthwhile given the perceived low probability of success.

Why doesn't President Rawlings speak against SETI as an attack on reason? There are many people who volunteer the unused cycles on their computers, accessed through the internet, to this project. If President Rawlings is correct about ID, then SETI is duping those people into participating in an attack on reason and on the scientific method.

II. President Rawlings is correct that not all of ID is science. Some of it is philosophy or metaphysics. The science component is the proposal that certain BioP&M are irreducibly complex in a way that would render impossible the proposition that they came into being through naturalistic processes as described by macro-evolution. The statement that these irreducibly complex

BioP&M are the result of intelligent design amounts to philosophy or metaphysics, not science. It is this latter part of the argument that is now not testable or falsifiable. The ID proposition of irreducible complexity is testable and falsifiable.

ID proponents are not alone among scientists in being inspired to think about philosophy based on the science that they have done. This is exactly what Prof. Provine is doing when he leaps from science to the philosophical conclusion that human beings lack free will. No one rebukes him for doing junk science when he makes this leap. Instead, Cornell organizes a special symposium on free will and praises the effort, even though it results in the nonsense that has already been discussed above. Physicists also wax philosophical about the anthropic principle, which notes that the laws of physics seem fine-tuned to enable the existence of life. No one accuses them of doing junk science for having allowed their science to drive some philosophizing.

Therefore, it is unfair to write off the valid science part of ID work because ID proponents also do philosophy/metaphysics that is inspired by their findings. The science part of ID begs one to think about the philosophical/metaphysical questions. Of course, the federal government should not fund the philosophical/metaphysical part of their work, but neither should it cut off funding for the scientific side of their work because it has metaphysical ramifications.

III. At some future point, however, it may well be possible to bring the assertion of intelligent design into the fold of scientific analysis and to determine whether or not the proposed irreducibly complex BioP&M are indeed the result of intelligent design. Of course, if several significant proposed examples of irreducibly complex BioP&M are refuted by Darwinists in the lab, then there will be no reason for doing such research.

What is needed is a set of theoretical developments and experiments that attempt to develop methods for determining whether intelligent design is evident in an artifact. The theoretical analyses would revolve around

questions of whether certain signatures of geometry, chemical/material properties, electromagnetic properties, complexity-based function, etc. were strongly indicative of intelligent design. The work would concentrate on artifacts that may or may not have been produced with the aid of human intelligence. Researchers could evaluate proposed methods for distinguishing intelligently designed artifacts by testing them in blind experiments that involved some systems whose characteristics were determined in some part by human intelligence through a design process and other systems that were completely natural. The goal would be to find methods that reliably distinguish between the two. Such a method would be able to operate on raw data and automatically distinguish Mt. Rushmore as being intelligently designed and the Adirondacks as being the result of random natural processes.

If such research were successful, then its methods might be applicable to BioP&M that had been proposed by ID proponents as being irreducibly complex and that had withstood the challenges of Darwinists. In this case, the claim of intelligent design, or its refutation, would become a matter of science rather than philosophy.

IV. I propose the hypothesis that there exists an affliction that I will call "science insecurity." Science insecurity is the irrational fear, felt most often by non-scientists, of challenging macro-evolution and the whole world view of philosophical materialism. The fear of the afflicted person is that he will be branded a Neanderthal if he should express some unorthodox view. If such a person is a public person, then he has the fear of being depicted in editorial cartoons as a Puritan, perhaps in the very act of burning a witch. The person with science insecurity melts with fear at the thought of others looking down on him.

The typical person afflicted with science insecurity does not have a good understanding of the details of science. He looks at science as some sort of impenetrable magic that works for unknown reasons. He deals with science

as a matter of faith in scientists and does not rise to the challenge of trying to understand the details himself.

The scientifically insecure person is easily buffaloed into accepting Darwinism and rejecting ID. Because of this, we have the counter-intuitive phenomenon that support for macro-evolution probably runs stronger among classicists than among biologists.

Actual scientists and engineers are less likely to suffer from science insecurity. They know from their own proven successes in the lab, at the computer, or at the blackboard that they understand what true science is and what it can and cannot do. They have the freedom to see and note the merits in ID and the flaws in Darwinism without fear of being personally belittled for taking an unorthodox view.

V. Prof. Michael Behe, one of the leading ID proponents and researchers, visited Cornell in the spring of this year and gave a lecture, as has been previously stated. His talk was attended by a number of Darwinists. I was also in attendance. President Rawlings was not there; otherwise, he might not have delivered this speech. Some of the Darwinists verbally attacked Prof. Behe during the question-and-answer session that followed the talk. Their voices cracking with rage, these people upbraided Prof. Behe as having taught them nothing, as being a disgrace to science. These antagonists offered no counter-arguments to the technical points of the lecture.

I am a researcher and an associate editor of a scholarly journal, and I regularly attend professional meetings. I have never seen such behavior on the part of researchers. Prof. Behe gave a largely technical talk that was very reasonable, though it also contained some philosophy. I learned a lot about mouse blood clotting and about the technical interchange on this subject that had followed the publication of Behe's book, Darwin's Black Box. Therefore, I was shocked that anyone could assert that Prof. Behe had taught them nothing.

Several reasonable technical questions were posed by Darwinists during the question-and-answer period. One involved the possibility that the elements of an irreducibly complex BioP&M might have been assembled over time through macro-evolution because they might also have been elements of other systems that were not irreducibly complex. Another question concerned whether other species have less complex blood clotting systems that might give clues about how to counter the claim that the mouse blood clotting mechanism is irreducibly complex. These were the high points of the question-and-answer session.

Unfortunately, there were too many low points, too much unprofessional behavior on the part of Darwinists. An objective observer would have concluded that this type of behavior poses the real threat to rational discourse in the university.

Prof. Will Provine was in attendance, and he provided comic relief. His main complaint against ID at the meeting was that it is boring. He claimed that once a researcher concludes that a particular BioP&M is irreducibly complex and therefore must have been intelligently designed, there is nothing more to do, which is boring. I saw in an article from a recent speech by Prof. Provine that he is very proud that he made his charge of "boring" stick because Prof. Behe did not deny it. In Prof. Provine's mind, the charge of being boring constitutes a damning indictment of ID.

The humor here is that Prof. Provine is again doing poor philosophy. The observed fact of the chemical immutability of the elements is at least as boring as the proposition that a particular BioP&M is irreducibly complex. It is much more exciting to try to turn lead into gold than to admit that it can't be done via chemical reactions and to give up. Wisdom, however, takes the boring latter course because the excitement of alchemy is a fool's excitement. The excitement of the macro-evolutionist may be similarly foolish. Besides, what Cornell freshman, having labored through an introductory Chemistry or Physics course, would believe Prof. Provine's implied assertion that good science is never boring?

Summary: President Rawlings' speech attacking intelligent design is based on a distorted view of science. It presumes that intelligent design cannot be scientific unless it offers an over-arching theory that explains many things and that makes positive predictions. This premise ignores the recognized scientific role of the spoiler, of the researcher who proves theories wrong by developing counter-examples. The speech also ignores the role of observed facts or laws that are not full-blown theories, such as the observed fact of the chemical immutability of the elements. The theory of intelligent design may not be a full theory on the order of macro-evolution or Newton's laws of mechanics, but if true, it is comparable to the observed immutability of the elements, and it is valuable as a means of posing counter-examples to Darwinism.

The principle scientific proposition of intelligent design is that there exist irreducibly complex biological processes and mechanisms that cannot have been assembled in small increments through the process known as natural selection. The intelligent design proposition asserts that none of the partial forms of the mechanism would offer any natural advantage to the host organism. Intelligent design not only proposes this idea, but it also proposes specific processes and mechanisms as being irreducibly complex. Darwinists have the opportunity to prove intelligent design false by showing that each proposed process or mechanism can offer an advantage to the host organism in a reduced state of complexity. To date, all such attempts have failed.

Intelligent design also encompasses philosophy. Its philosophizing lies in the small leap from the existence of irreducibly complex biological processes and mechanisms to the proposition that they must have been designed by an intelligent being.

President Rawlings has attacked intelligent design as being junk science. Perhaps his attack stems from the fact that intelligent design includes philosophical aspects. It is unreasonable to single out intelligent design for such an attack because other scientists have been known to tackle philosophical questions that arise naturally from the results of their scientific

research. Intelligent design has been singled out for attack not because of weakness in its science nor because it gives rise to philosophical questions. Rather, it comes under fire because it poses a challenge to the academy's reigning religion of philosophical materialism.

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