

Another manic Monday^{*}

(Speech to be delivered by rector magnificus Frans Zwarts on the occasion of the opening of the academic year 2008-2009 at the University of Groningen on Monday, September 1, 2008 at 4 P.M.)

Ladies and gentlemen:

Now that the number of international students at the University of Groningen approaches ten percent of the student population, it is appropriate to deliver the opening address in English. This is even more fitting since our guests of honor today include the director of international relations of the Universidade Federal de São Paulo, a delegation of Chinese scientists headed by the president of Tianjin Medical University, and last, but not least professor Fujiwara from Osaka University. I also don't need to remind you of Hendrik Casimir's famous phrase 'The language of science is broken English'.

You are in the auditorium of the only university in the Netherlands that possesses a tower. And as you no doubt know, a carillon was put in that tower in 1996, thanks to the efforts of the late Hendrik de Waard, one of our most renowned physicists. Ever since we in Groningen think that a university is only a real university if it possesses a carillon. According to this definition there are four real universities in the Netherlands: the Erasmus University Rotterdam, the Free University Amsterdam, the University of Twente, and the University of Groningen. Only one of these four institutions deserves to be called a top university. Yes, you understand me right, that is the University of Groningen, because it is the only one that has located its carillon in an academic tower.

A carillon, ladies and gentlemen, is an instrument that brings harmony to the hearts of the listeners. For a moment we feel that we go back in time when we hear the sound of bells high above our heads. A carillon is in my opinion a time machine. These sounds were part of the lives of our ancestors in a period that didn't know cars, cell phones, and ghetto blasters. It is a time that we have forgotten, or maybe I should say: a way of living that we have lost. Does it help us to experience for a few minutes those forgotten days, this lost way of living? Yes, it does. Without such experiences we would become one-dimensional beings, as the American sociologist Herbert Marcuse once called it. The carillon puts our world in parentheses and creates distance. For a moment we realize that the world was different in the past and will be different in the future.

I am not saying that a carillon evokes nostalgic feelings about yesterday's world. On the contrary, what I am trying to say is that a carillon makes us see the present world for what it is. As history that we are part of, as something that could have been very different, as something that maybe should have been very different. Now you understand why I am happy that there are still bells being cast in our present world and that there are still people who know how to make a melodious carillon with these bells. And now you also understand why I am happy that our carillonneur Auke de Boer each year plays the instrument before the opening ceremony. His

music makes us realize that there is much more between heaven and earth than what television and computer screens can bring us.

Yet, reality is harsh. The pointers of the clock in our tower have been removed for their periodic cleaning-up. Today we also witness the change of guards. Our old president, Simon Kuipers, has left and our new president, Sibrand Poppema, has arrived. I thank the old president for his efforts and I wish the new president all the best. Meanwhile, the students outside are anxiously waiting for the party to begin. Yes, this is another manic Monday, as the Bangles sang years ago.

Ladies and gentlemen, the first years after the Second World War were not the most pleasant ones for the Jewish physician Leo Meyler. He was a dynamic person, who studied medicine at Leiden University, moved to the University Hospital Groningen to be trained as an internist, and completed his doctoral thesis in 1932. Unfortunately, he was forced to go into hiding during the war. When peace came, it turned out that the hardships of the war years had worsened the lung tuberculosis he was suffering from. Much to his annoyance he was advised to rest. His stay in a sanatorium in Appelscha would have been a disaster, had his physician not been a wise man. For someone like Leo Meyler nothing was as strenuous as rest without preceding strain. Meyler's physician knew that he was interested in a phenomenon that had hardly been investigated until then – the side effects of drugs. Accordingly he allowed him to study the literature on this topic. Not only did Leo Meyler's health improve significantly, he also created a system in which adverse drug reactions could be described. Now, more than fifty years later, forty years after he became the first professor of clinical pharmacology at the University of Groningen, and more than thirty years after his death, *Meyler's Side Effects of Drugs* is the world's most important compendium in this field. It is so important that the title is completely irrelevant. Pharmacologists simply call it *Meyler's*.

At Elsevier's web site, there is a picture of the current editors with a glass of wine in front of them, both smiling happily. Guess why. Not only has the original edition of 1952 been expanded from just under 200 pages into 6 substantial volumes, but the price of a copy has reached the astronomical height of 935 US dollar. At present, there are hundreds of experts all over the world that keep *Meyler's* up to date. That fact alone is absolutely astonishing. How is it possible that, under miserable circumstances, a researcher designs a system that defies the ravages of time and breaks through all cultural barriers?

Ladies and gentlemen, we all know it: there are ideas and there are ideas. Most of them don't even reach the stage of articulation. We may have a vague impression, a visual image perhaps, or a muscle cramp, but before we can transform it into language everything is gone. Yes, some of our ideas are turned into experiments or even theories. We then have considerably more certainty, but most of these efforts die a slow death in the basements of our libraries. Occasionally, however, there are ideas that leave the nest and conquer the world. The system that Leo Meyler created in the solitude of his sanatorium room was such an idea. I consider it appropriate for the rector of a university to think about this remarkable phenomenon every now and then. A university, after all, is nothing but a breeding ground for new creatures in the universe of science.

When we think about the origin of species in the universe of science, one thing strikes us at once: coincidence plays a very important role. Many discoveries show a high degree of serendipity. As the Groningen researcher Pek van Andel once described it: a scientist is looking for a needle in a haystack, but comes home with the farmer's daughter. One of the reasons why Leo Meyler studied the side effects of drugs was that he himself suffered from adverse reactions to the drugs that were prescribed to him. Would he ever have created *Meyler's* if he hadn't been ill? Would he ever have created *Meyler's* if his physician had been strict and dogmatic? These questions are hard to answer, but it is certain that irrelevant factors can influence research immensely. We know that the Romans had the technology that eighteen centuries later produced the steam engine during the industrial revolution. What prevented them from discovering it was the fact that their society was based on cheap slave labor.

When we look at the uninterrupted flow of publications in the universe of science, it is difficult to avoid the impression that the evolution of science has much in common with the evolution of life. As you know, evolutionary theory rests to a large extent on the notion of coincidence. Let us adopt the view, put aptly by Richard Dawkins in his famous book *The Selfish Gene* (1976), that the evolution of life is a process that doesn't involve individuals, let alone species, but separate genes instead. If we reason by analogy, the place of these separate genes is taken by separate research results in the universe of science – *Meyler's*, for instance, or a molecular motor, or a theory about the Dead Sea Scrolls. Likewise, the mutations that affect genes as the result of cosmic radiation, viruses or similar external causes can be compared to the numerous external factors that influence research. And the chance that mutated genes will survive in a highly competitive, not to say hostile, world, I put on a par with the chance that research results will be successful in the universe of science. The question is whether this analogy is useful. Does it help us when we want to know what determines successful research?

Ladies and gentlemen, the comparison between the evolution of life and the evolution of science is irresistible. Richard Dawkins couldn't stay away from it either. What he suggests is that human culture be regarded as a pool in which not genes, but 'memes' fight their struggle for life. As examples of memes he mentions ideas, melodies, slogans, cloths, fashions, artistic methods, and construction modes. His thesis is the following. In the same way that genes reproduce by jumping from survival machine to survival machine through sexual intercourse, memes reproduce by jumping from brain to brain. When scientists hear a good idea or read about it, they pass it on to their colleagues and students. They refer to it in papers and lectures. And when the idea catches on, we can say that it keeps itself alive. Memes, so Dawkins concludes, must therefore be regarded as living structures, not only metaphorically, but also technically. When you plant a fertile meme in my mind, you literally put a parasite in my brain and change it into a vehicle for the reproduction of that meme.

Meme theorists contend that memes move through the cultural universe in a manner similar to the contagious behavior of viruses. Some will propagate less successfully and become extinct, while others will survive, replicate or even mutate. A clear example is the existence of media hypes, contagious information patterns that spread through imitation. Now you understand why our board is absolutely fascinated by the efforts of Marc Chavannes, professor of journalism at

our institution, to set up a center for journalism studies. And as all of you know, when the university board gets fascinated, substantial financial support is within reach.

Not surprisingly, Dawkins' proposals have remained highly controversial. In his book *The Institutional Imperative* (2000), the Dutch philosopher Anton Zijderveld tries to explain why. When we want to account for the dissemination of cultural elements, it is not the human brain that matters, but collectivities: groups, tribes, generations, societies, or even states. Ideas do not land in brains, objects of flesh and blood, but in institutions, social structures that not only shape behavioral patterns, but ways of thinking as well. 'Mind in the human brain', as he puts it, 'is not the cause and origin of culture but should instead be seen as an emergent property, arising from man's ongoing actions and interactions'.

This seems to me a fruitful way of looking at the universe of science. Not as a collection of brains that have been influenced by a meme, but as an institution that gives birth to memes. Like genes they will be put to the test, they will be passionately disputed and just as passionately defended, and very often they will be weighed and found wanting. But sometimes, we never know exactly when, they will grow into a characteristic element of the universe of science, as a tried technique, as an indispensable instrument, as a maddening mystery, as a set of implicit assumptions, or as an influential theory.

The universe of science, ladies and gentlemen, should thus be regarded as a cultural survival machine in the jungle of our society. This is an analogy, of course, a perspective that has its limitations. And I must admit that it makes you feel uprooted. It is a view that I normally don't think about on manic Mondays or in the manic months that follow the opening of the academic year. But it does help us to elucidate the intricate relationship between coincidence and purposefulness.

To illustrate this, let me return to evolutionary theory, not to the memes, but to the genes. Darwin always insisted that the mutations which occur are the result of blind fate. The changes that they bring about frequently lead to evolutionary disadvantage. This means that they don't catch on and will disappear again. Occasionally, however, they lead to evolutionary advantage and spread. This notion of coincidence still gives rise to heated debates, as you know. The thought that we are the product of blind fate is unbearable to many of us.

However, it has always been clear to evolutionary biologists that coincidence cannot be the only driving force in evolution. As purposeless and unstructured as gene mutations are, as purposeful and structured the reactions of the organism are in which the mutation occurred. To stick to Dawkins' terminology, mutated genes will have to fight selfishly for a place in the genome because it won't accept everything. The genome is not a passive automaton whose behavior can be completely described in terms of environmental input. On the contrary, it is a self-regulating system that administers and corrects itself for generations. A mutated gene's struggle for survival begins right away, within the genome. Only changes that meet certain physical, chemical, and functional requirements will survive. It is not until a mutation has passed the test of internal selection that it will face the Darwinian test in the external world. And in this test the purposefulness which is intrinsic to the organism will show its power. Now you understand why

it is wrong, as generations of Dutch authors have done, to regard survival of the fittest as being equivalent to survival of the strongest. It is not strength that counts, but the extent to which a mutated gene fits into the genome.

I have always been very much impressed by the fruit fly in this respect. Fruit flies have a recessive gene that makes them eyeless. They can therefore be manipulated in such a way that an eyeless variety comes into being. But after a few generations fruit flies with eyes will appear again. Yes, perfectly normal fruit fly eyes. Those eyes have been produced by a different combination of genes than the original eyes. What this means is that the genome has stabilizing mechanisms that span several generations. A mutation which is not considered 'cool' by the genome has no chance of surviving. That is what I regard as the genome's great strength. In evolutionary theory it is not coincidence that rules, but a design which keeps creating itself, at the crossing of blind fate and the struggle for life.

Ladies and gentlemen, you no doubt understand that I didn't put forward these thoughts on the evolution of science to portray myself as an evolutionary biologist. I did so to show you that research results only count when they are considered 'cool' according to the criteria that hold in the universe of science. If you don't believe me, I will let George Whitesides speak to you, professor of chemistry at Harvard University. This is what he says about Ben Feringa, one of our most distinguished scientists: 'Feringa is genuinely creative: he is interested in making 'cool' systems, not useful ones'. Although coincidence plays a very important role, it is not blind fate that determines which scientific results are cool, but a series of experiments, judgments, and decisions. Universities can only survive if they know how to identify and support cool research. Forget the meetings and stay in touch with the evolution of science. And don't forget that the university belongs to the scientists and their students.

To give you an illustration, when Leo Meyler and his physician decided that it would be beneficial to the patient to study the side effects of drugs, they ran into a problem. Meyler was in Appelscha, but the literature was in the university library in Groningen. To solve this problem, one of the members of the library staff once a week collected Meyler's literature and took it to Appelscha. In my opinion that was cool too, even though it wasn't science. Suppose that the librarian had said that this activity didn't fit into his budget or that the staff member in question had pointed out that his job description didn't allow such work. That would have been disastrous. No *Meyler's* would have existed. Fortunately, they didn't do any of these things.

Recognizing cool science when it manifests itself and promoting it as much as possible are parts of what I call quality awareness. Yes, we are fortunate that our student population has grown with 8,000 students during the last decade. And we are happy that the city of Groningen portrays itself as a city of talent, even though the problem of providing adequate student housing has not been solved yet. But ultimately it is only quality awareness and pursuit of excellence that are essential to the university's survival. That is why we have made 10 million euro available to establish an international center for synthetic biology. That is why we will make 7.6 million euro available to intensify teaching in the first year of our bachelor programs. And that is why we will set up a university-wide honors college for talented and motivated bachelor students. For the foundations of quality awareness and excellence are laid in the bachelor programs. Now you

understand why I am happy that the gifted young geneticists Cisca Wijmenga and Marten Hofker decided to move to the University Medical Center Groningen. And why I am happy that Roberta Croce gave up her position in Milan to accept a professorship in photosynthesis at our institution. I still remember her answer when the Italian ambassador asked her what she thought of the University of Groningen: 'Paradiso'. Finally, now you also understand why I am happy that Ben Feringa was one of the few European scientists who received an advanced grant from the European Research Council.

Ladies and gentlemen, Leo Meyler had the courage to put a topic on the agenda that had hardly been investigated until then. He did so because he himself suffered from the side effects of drugs. But *Meyler's* became *Meyler's* because adverse reactions to drugs are immensely important to the survival of the human species. I am convinced that there are many other problems that are crucial to our survival, but have not been transformed into scientific language yet. This is what I consider the ultimate definition of cool science. You should always remember, though, that 'cool' doesn't mean 'fashionable'. With these words I declare the academic year 2008-2009 open.

I wish you all the best in the manic months ahead of us and thank you for your attention.

* This text is the result of joint work by Hans Kuné and Frans Zwarts.