I want to thank professor Anne Fagot-Largeault and professor Hank Greely for inviting me to this meeting to talk about « How french scientific journalists deal with stem cells and genetically modified organisms ».

I have to insist first on the fact that I will talk about how Pour la Science deals with this topic because I think there is almost as many ways of dealing with that topic that there are magazines. Our magazine chooses the scientific point of view rather than a controversial approach.

I would like to be a bit more specific and describe first what is Pour la Science, what is for Pour la Science the meaning of the scientific journalism, then I will talk about the stem cells, a topic that deals with science but also that has ethical, philosophical and political issues. Then I will say a few words on GM plants, which is more difficult to deal with because as we will see the science behind is quite easy to explain and when you explained the method for one modified plant you explained it for almost all the varieties. This topic is much more a question of beliefs and opinions than a question of science.

What is « Pour la Science » ? The french edition of Scientific American, born in 1977. Scientific American is a world well known scientific magazine. From the end of the 70s, the late editor Gerard Piel, accepted to create european editions : german, italian, french and spanish and, later, polish, russian, greek, corean... Progressively, this foreign editions became more and more numerous all over the world. The majority of them are a translation of the US edition. Some, especially the french and german editions are more a mix of american articles and original ones. So we choose in the american magazine what we find interesting on an international scientific basis (astronomy, molecular biology for example) and we add some articles written by european wellknown specialists.

We deal with all the scientific domains : astrophysics, physics, chemistry, mathematics, molecular and cellular biology, medicine, archeology, psychology, neurosciences, environnement, geophysics and so on. Every topic as soon as there is a new fundamental result is of interest.

What is the position of our articles ? We stay between the first publications in international magazines with referees, and very popularised science magazines. We publish articles that help teachers in university or high school to prepare their lessons and that help students to
find articles with up to date research results. And of course we speak to people interested in sciences. Those articles make some kind of the « state of art » in the field we deal with.

It is not that easy, because the articles are written for people who already know the domain and want to get the most recent results, and for the naive people who discover the domain. So the readers who already know the field do not want to be bored with unuseful details. In contrary, these boring apparently useless details are absolutely necessary for people who do not know what it is about.

Long years ago, Scientific American had the very innovative idea to ask people who « find » to write about their discoveries. We do not publish articles written by journalists, but articles written by scientists, by people who do know what they are talking about. So we deal with science not with opinions and we will see how it is important with the topics we are interested in today.

Then, because we, the scientific journalists, are just poor ignorants, we easily identify the difficulties. When we edit the articles, that is when we prepare them for publication, we are the naive readers and point out easily the absconce sentences and the difficult concepts. So our goal is to put the topic in some kind of an historical perspective and to explain all that is making new difficult when you are not a specialist of the field. Our articles of astrophysics should be readeable by a biologist and an article of biology should be readeable by a mathematician. Sometimes the most important difficulty is the one of the terminology especially in biology where the vocabulary is hudge and have to be defined each time.

This may the specialists feel uncomfortable but is useful for the non biologist readers. The difficulty in biology is mostly terminology as the concepts are less abstract and less formalised than in other fields.

May be biology is still under construction, the pieces of the puzzle are put together but the « big » theory of biology is still to be done. May be biology has today the same status than physics at the end of the nineteenth century when the real important theories of physics was going to become a reality with Einstein in 1905.

Beside these “technical” difficulties, beside the difficulty to be understandable by everyone, the biggest one is to discover new topics, topics wich will have scientific and social impact. This seems to be the best way to stimulate the curiosity of our readers for science. We try
to make them interested in science and to increase their scientific knowledge. This is one way to let knowledge take place of opinions.

Our readers like astrophysics and cosmology, paleontology, anthropology and medicine. What are the common points of the top five topics? They are probably two: they are related to man or to the universe and by the same way to the origin of man. The second one, is the philosophical aspect of these topics: they make people think. In that sense stem cells is one of these topics that people like. In contrary, technologies and chemistry are less appreciated topics: they are down to earth.

When Professor Anne Fagot-Largeault asked me to talk about the way we deal with stem cells I did not remembered exactly how the story began, so I listed the articles about this topic. And I found interesting that we can see a kind of tendency in our articles that seems to me like a mirror of the evolution of this scientific field.

I found back to October 1988 a small paper that mentioned that the first stem cells from bone marrow in mouses had been isolated, here in Stanford. Everybody was talking of these cells since a long time, at that point that we could think that they already have been isolated but in fact it happened « only » in 1988. This small timid article gave a kind of feeling that something important was emerging. Then, in 1992, we published an article about the stem cells, by David Golde, from the Sloan Kettering Cancer Center, in New York. This article explained « all » about the blood stem cells.

Then in June 1999, we had an article by Roger Pedersen from the University of California in San Francisco about embryonic stem cells. They had been just isolated and seemed to be promising for producing all the human types of cells.

Then the cloning story appeared: we published one article by Ian Wilmut on Dolly, beginning of 1999. In January 2001, things accelerated because we had two articles on the topic, we made the cover with it and published the first French article by Jean-Paul Renard and Xavier Vignon (Cloning: the state of the art). It was published together with an article by Robert Lanza and colleagues named The cloning of the Noah’s ark explaining how cloning could avoid endangered species like pandas or cheetah to disappear.

One year later, in January 2002, we published an article on human cloning by Axel Kahn head of the Cochin Institute. A private American company had announced it obtained the first human clone. For Axel Kahn, this announcement was just a question of marketing for the company. The official purpose of this research was the engineering of replacement
tissues. Axel Kahn said that the regenerative medicine was a huge hope, but that the technical and ethical difficulties to come were at least as enormous.

Then, in June 2004, came a new article about stem cells again by Robert Lanza that was more optimistic explaining what we could expect from these cells but also how long the way would be. It was published together with an article by Anne Fagolt-Largeault who, as a philosopher, explained the philosophical issues of all this stem cells and the cloning question. To end up with this list, we published recently four articles together on human tissue replacement in last July. One by Lukas Sommer in Zurich, in Swiss, about the difficulties of making the stem cells differentiate the way we want; one by Corinne Ferraris at L'Oreal Laboratories about reconstructed skin; one by Smadar Cohen in Israel about heart reconstruction after a heart attack; one by Hervé Petite about the reconstruction of bones.

The list illustrates the evolution of facts and ideas. Looking at them one can separate three « periods »: first the blood stem cells period. Then came the cloning period. Today we assist to The regeneration medicine period and the adult stem cells period. The number of articles on this topic is growing as the number of french articles, reflecting the different ways the US and France deal today with these topics. When the stem cells issue became a more social issue we wanted to have the opinion of french specialists of what was going on in France on this topic. They were three key points: the question of the reproductive cloning, of the therapeutic cloning and of the embryonic stemcells. Then came the discovery of the adult stem cells in brain, in lipidic tissues, in muscles and so on. So our approach progressively changed and the topic is more and more visible today. What happens today in the stem cells field reminds me the « great gene discovery period », 10 or 15 years ago: every day we learned about the discovery of a new gene. The postgenomic era seems to be a little disappointing compared with the hope the human genome project had raised. Hopefully the future of stem cells and tissue replacement will be more fruitful.

We can make a first intermediate conclusion: stem cells and cloning can be dealt in a scientific way. We explain facts, methods, results. What about the social implication? At that point, the editorial board can make a stand: for example have the conviction that the research on stem cells must be developed and encouraged if we do not want France to stay on the side of the road while other nations are becoming more and more competitive in that field. So when we publish articles about the science behind the stem cells and the associated hopes we try to inform the people who make the decisions and, that way, to
influence the political decisions trying to encourage these researches of course in the appropriate ethical context.

What about the genetically modified organisms in plants? The trend of this field is surprisingly very different from the previous one. We published some articles about what is a genetically modified organism, how it could be obtained and what could be the interest of these organisms. The first article was published in 1983, the others between 1992 and 1998. So no particular trend appears in the way we deal with GMOs. I think it is difficult to have a scientific and objective point of view for numerous reasons. There is a tough competition between the academic teams and the industrial ones and the published results often seem to be kind of propaganda.

In France there is a popular man called José Bové (close to the green party) that is against the GMOs and is making regularly shows of destroying open fields with GMOs in front of the TV cameras. The more numerous these actions, the less trusted the scientific data. As the scientific data are ignored, there is free room for opinions.

The behavior of this people is against the law but it has some echoes in the public. Again we trust on rationality and present articles to defend the research: if we want to know what could be the status of GMOs we have to get scientific results. But I am afraid that scientists are not heard.

We had in 2001 a article by Daniel Nahon, the president of the International cooperation Center for the agronomic research for the development. He said that the genetic transformation of plants raises questions and worries from the public and from the researchers themselves. But confusion impairs a scientific attitude: the regulation of international trade, the politic of the private companies, the progress and its applications, the pressure of agronomic productivity, the use of pesticide, the international repartition of food supplies and the threats on environment, all is mixed up. Furthermore, the published results seem often contradictory, which is confusing for the public and also for the journalists. To get objective answers requires to have scientifically controlled cultures. This obstructive attitude is amazing when we know the development of the biotechnologies. In the public, I am afraid that opinions are becoming the prevalent way to deal with GMOs. One of the main goals of the public research is to anticipate, to explore the potential interest of new discoveries. To find out if the GMOs have a real interest or if they have to be restricted or even forbidden we have to study them.
I could insist again on the importance of scientific education, but I believe you are already convinced. So, I will conclude by applying a recent result in neurobiology to the GMOs case.

Opinions are generally so strong that they make the most well educated people lose their rationality. Everyone knows that if you do not want to lose your best friend or make your brother in law an ennemy you should avoid to talk politics during a dinner. An american neurobiologist recently demonstrated that to have opinions allowes the brain to save energy. How did it prove that ? He asked the subjects of a psychological experiment to classify images of things or animals in two categories : "living" or "non living". He discovered that the subjects learned to classify more and more rapidly the images in its category and at the same time, he noticed the activity of the brain decreased. Conclusion : as we, human being, become experts, the connexions between the images and the appropriate category are more rapid and efficient. At the beginning one such task activate lots of neural connexions, but as the subject becomes an expert this number decreases. If the activity of the brain decreases that means that the brain wastes less energy. That is why we, lazy humans, are so convinced that our opinions are the good ones : they allow us to rest (at least to our brain to rest) contrary to the thoughts that require efforts and energy. If an opinion has to be modified, the cerebral connexions have to be reconfigured. Opinions are automatic thoughts. If the opinions are energy saving (from the brain point of view) they impair the independance of mind, but the brain does not care. How could we apply this result to GMOs?

Associating GMOs with danger, with benefits for the big companies, with threats on health and environment allows the brain to make significant energy savings and that is probably why Jose Bové and his group adopt these non scientific attitude : for energy saving. One difference though, they usually defend energy savings to preserve environment not to allow their brain to rest.