



Dr. Hwang Scandal from the Viewpoint of Politics of Science: Characteristics of Dr. Hwang's Politics of Science*

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In order to clarify the role of individual activities and social setting in Dr. Hwang scandal, this paper examines the characteristics of Hwang's comprehensive politics of science: academic politics, resource politics and other social politics, on the basis of P. Bourdieu's politics of science in science field. He started his academic career as non-mainstream scientists and extended his specialty of animal cloning to stem cell research. His idea to SCNT ES cell research had been implemented in collaboration with other medical scientists but was revolutionary in changing dominant paradigm and main actors in stem cell research. To develop SCNT ES cell research as national agenda, he promoted his resource power and academic positions by private networks, and legitimated his way to SCNT ES cell research by active communication with journalism and the public, frequently by using exaggerated words and profession and nationalistic words. To stabilize his position as leading scientist and politician of science, he developed a 2004 Science paper in scientific and ethical controversies into a faked paper showing industrial value of SCNT ES cells. Hwang's comprehensive politics of science demonstrated the scandal as an intermingle phenomenon between social setting of the scandal and his individual activities misusing it.

Keywords: *scientific misconduct, politics of science, bio-medical field, cloning, SCNT ES cell research*

INTRODUCTION

Memories of Dr. Woo-Suk Hwang scandal are gradually fading amongst people in Korean society, being outplayed by other important issues such as problems of North Korean nuclear power, soaring housing prices, and new government's antidemocratic policies.¹ The decline in

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the public's interest in the scandal sharply show contrast with the situation 2-3 years ago, in which it continued to be one of the main topics in newspaper headlines from September 2005 to March 2006. This change cannot be attributed to the specificity of Korean dynamic society that is bombarded with too much global news, but should be rather explained from an internal perspective, that related controversies came to be scientifically and legally arranged and stabilized. Here we focus on the inner stabilization mechanism² behind the decline in the public's interest.

The scandal, after its debunking, was on a troublesome thorny path to define the core issues and to differentiate the main actors from other related actors in scientific communities and in court, so that it was stabilized as one of many academic misconducts³ such as so-called plagiarism, falsification and fabrication, regardless of complex social context. The stabilization mechanism led people to easily blame Hwang's individual activities and mainly focus on an establishment of research ethics infrastructure. Internationally the situation was not similar in the definition of Hwang scandal as one, but serious case of scientific misconduct from a failure of scientific and social policies including ethical policies (Gottweis and Triendl 2006; Bogner and Menz 2006). Hence, the simple stabilization of the scandal as a case of scientific misconduct allows us to ignore its relevance within a broader context. A critical analysis (for 'interpretative flexibility') of the scandal on basis of politics of science will contribute to a reflection of related social and structural settings which remain yet unchanged in Korea, and therefore to allow us to consider the scandal in a more balanced way while considering both Hwang's individual responsibility and structural constraints. For this goal this paper deals at first with a critical review of Hwang scandal studies and an introduction of Pierre Bourdieu's politics of science and further with Hwang's politics of science in 3 specified aspects.

DR. HWANG'S SCANDAL IN CRITICAL REVIEW AND POLITICS OF SCIENCE

After debunking the scandal, most journalistic and academic papers in Korea ascribed the scandal to Hwang's individual activities and personal character: He was a swindler in nature and immoral,⁴ and exceptional.⁵ Indeed, Hwang's personal character and mind does partly

¹ By December 2006 Hwang scandal was already out of memory, and surprisingly it was included not in top 10 top news in opinion survey of male office workers that was conducted in December 2006. Additionally, it ranked only third as a news story of interest based on a survey of professors' opinion (December 2006) and even in a survey of scientists and technologists which was conducted by KOFST. The scandal was considered as the most popular news story only in a survey of online users conducted by empas.com, one of popular portal sites in Korea.

² The concept of stabilization or closure mechanism is coined by H. Collins to show lurked broad social forces among related actors (Collins 1982).

³ Various academic misconducts such as data fabrication by a prominent scientist of KAIST and a senior scientist of Yonsei University, top-tier universities in Korea, and plagiarism by BJ Kim, former Minister of Education and Human Resources, followed the scandal.

⁴ He was divorced. Divorce itself was considered as exceptional among senior groups.

compose the scandal. However, such narrow approach results in an exclusion of social-structural factors that contributed to the generation of the scandal.

The ‘exceptionalism’ of Dr. Hwang has been challenged by social scientists’ new frame to explain the scandal from socio-structural perspective. These challenges included as follows: first, it came from a small-persons-dependent and non-transparent decision-making system of scientific and technological policies (Lee 2006); second, from too much developmental orientation of scientific and technological policies as a legacy of the old scientific regime of the late president JH Park (1961-1979) (Hong 2006; Kim 2006b); third, from the general governmental policy of economic growth (Kim 2006a); fourth, from new-liberalism focusing in industry-friendly and competitive scientific and technological policies without public monitoring of it (Han 2006). And it is additionally from the role of media (Chen 2006; Lee 2007; Chekar and Kitzinger 2007) and from the specificity of national scientific culture in modern Korea (Kim 2007; Kim 2008; Kitzinger 2008). These factors contributed clearly to open our eye into the social setting of the scandal, but conversely to ascribing the scandal mainly to the social setting or structure and to ignoring Hwang’s individual activities of misusing it and, thus, his responsibility. They raised no question of why he led the scandal, including data falsification and fabrication (Kim et al. 2006). Hence more knowledge of its social setting cannot contribute to more accurate understanding of the scandal, if not considering its relevance.

In this sense, it is necessary to simultaneously take into consideration both individual activities and social structural setting, and explain the scandal in a balanced way. This perspective helps to underline the studies using the concept of ‘power alliance’ (Kang et al. 2006; Han 2006). These books explain the role of individuals and social structure in the scandal through a conspiracy or a co-operation between various power groups such as scientist groups, journalist groups and politicians in the middle-range level.

Although they have an advantage for revealing empirically the relatedness of main power groups (and so of the social setting) in the scandal, many problems remain unsolved. First, they have offered no adequate explanation of its dynamics in process, especially its collapsing process. They continued to stress the interest-agreement and consensus between related power groups, so failed to present the existence of tension and conflict. As such, their assumption that its strong alliance was dominant⁶ led them to hold on mainly to the question of why Hwang’s studies could remain unquestionable and even supported among power groups for almost as long as two years (2004-2006). This resulted in exaggerating the role of ‘PD Suchöpp,’ an

⁵ *Jungang Ilbo* reported on November 1, 2006, “There is a hope in stem cell research except Hwang.”

⁶ They developed the concept of power alliance in the scientific and technological field in terms of the analogy of power alliance in general and emphasized the similarity between a power alliance in Dr. Hwang’s scandal and a political or economic power alliance (Yang-Koo Kang et al. 2006: 8). Internal characteristics of the power alliance in Hwang scandal was never specified in particular in comparison with other scientific or technological power alliances such as an alliance for developing CDMA.

exploratory report program broadcast on MBC TV,⁷ which had ignited to debunk closely the scandal. But its role is really impossible without dissent scientists' allegations and their help prior to it. Second, these books gave no answer to the 'why' question of the scandal. But the scandal's essential crux, even at the time of the stable alliance, lies in answering the question of why Hwang began Somatic Cell Nuclear Transfer (SCNT) embryo stem (ES) cell research and eventually committed data falsification and fabrication.

Within this context, it is critical for understanding the scandal to clarify the relation between Hwang's individual activities and broad social settings in more specified way and to answer the 'why' question. This critical mind leads us to pay attention to P. Bourdieu's theory of 'politics of science' in science field.⁸ The politics of science is traditionally understood as a decision-making process of scientific policies. But in contemporary society it includes not only decision-making but also various politics inside of science and even outside of science, for example to the public through journalism and civil associations etc(Dickson 1984; Greenberg 2001; Gough 2003). Bourdieu's theory of the politics of science helps us to understand a more comprehensive boundary of politics of science and additionally its more special inner dynamics.

Politics of Science

Science field is a small world with autonomous rule of game between scientists with differently recognized capitals. Politics of science is, however, defined not only by internal logic of science but also by external power such as economic resources and political power etc. The rule of game itself in a field of science can be even distorted under the direct dominance of outside power. Although Bourdieu claims that promoting the autonomy of the science field by making the entry barrier high is pivotal for scientific development (Bourdieu 1997: 53), the science field is not considered to be completely separated from other social fields.⁹ All scientists relate to the various politics of science for example academic politics, resource politics and discourse politics etc., when developing their career, whether they are field scientists, research organizer, or directors of institutes etc. The majority of their work for field

⁷ "The allegation of Hwang's SCNT stem cell research being fabricated and a collection of related data by PD Suchöb produced a break inside the core groups of the alliance of science and technology, and it led to conflict between Hwang and Roh, between Hwang and Gerald Schatten etc. Finally the alliance was collapsed" (Kang et al. 2006: 10).

⁸ In the sociology of science P. Bourdieu's theory of politics of science is characterized to emphasize interest conflict and struggle against the institutional sociology of science. Furthermore, it emphasizes the structural frame of interest conflict and struggle against the constitutionalistic sociology of science which seems to focus on conflict among individual actors in knowledge production. He criticized Bruno Latour by stating that P. Pasteur was considered not as a real actor of mobilizing resources but rather as a textual signifier in his book of the Pasteurization of France (Latour 1988). He acclaimed that its essential point should lie in the question of how Pasteur organized his alliance and changed his strategy for promoting his research program (Bourdieu 2004: 28-9).

⁹ He made clear that the concept of science field is intended to criticize the fact that science is developed without intervention of social reality (Bourdieu 1997: 22).

scientists is oriented to research work in the laboratory and academic politics, while for research organizers or directors of institutes it extends to works outside the scientific field including resources, social network and legitimation discourses. The politics of science is exclusively extended from academic politics into works outside the science field according to their status.

Inner Dynamics of Science Politics

Scientists in a field of science have a special ‘position’ for structurally constraining their activities according to their own ‘capital.’ Basic capital of scientists comes from academic education and achievements. Besides, there is institutional capital from a power in distribution of resources or in appointment of professors, comparable to academic capital from peers’ recognition of academic ability. The latter is measured from noting one’s citation index or acknowledging one’s status as a Nobel laureate etc. Their capital constrains their possible politics (Bourdieu 1997). It is emphasized that politics of science includes not only politics according to capital-based rule of game but also politics for the rule of game itself, as is shown by paradigm shift. Dominant actors try to maintain their power on the existing rule of game, while the weak try to get more power and even change the rule of the game for their interest.

Biomedical Science Field in Korea

The autonomy of science field and influence of external resources on it are dependent on the size of the scientific community and scientific resources. The greater the size of community and resources is, the greater its autonomy can be and the less the influence of external resources upon it. In Korea the science field is likely to have less autonomy and is more greatly influenced by external resources because of its middle size and of a long history of the dominance of governmental finances. In addition, the autonomy of the science field is different depending on each subfield. In emerging subfield of science such as bio-medical science¹⁰ its boundary is yet fluid, so both its main actors and its dominant scientific paradigm are unclear and unstable. There various conflicts are dominant not only for scientific paradigm but also for resources. Hereby academic achievements itself and community in emerging subfield can be easily controlled by external resources.

Hwang’s politics of science as a case of the biomedical politics of science in Korea being democratized within bureaucratic dominance, will be explained in 3 points: academic politics, resource politics and other social politics.

¹⁰ Donald Kennedy, the editor of *Science*, said, “There are no subfields of science like bio-medical science, which is rapidly developing and producing great *success*” (Scott 2005).

CHARACTERISTICS OF DR. HWANG'S POLITICS OF SCIENCE (1): ACADEMIC POLITICS

First point of Hwang's academic politics is his academic training and career, which was considered as a non-mainstream academic in science field. He entered the department of veterinary medicine in the agricultural college at Seoul National University (SNU), which was less popular during the period, and majored in the science of veterinary production, which was dominated by an output-oriented engineering mind. Here he received his Ph.D. in 1982 after conducting a study on the breeding of cows on the basis of *in vitro* fertilization (IVF). His career was never outstanding on considering that scientific animal experimentation through bio-chemical or molecular biological method was emerging in developed countries at that time. It was a dominant academic trend in Korea that advanced scientific knowledge should have been adopted from developed countries. Thus, aside from some majors of field experience-orientation, obtaining a foreign Ph.D. especially from USA and Europe was counted as a source of prestige in most scientific areas. It was in 1999 that at SNU the rate of professors with foreign Ph.D. amounted to more than 90% in the college of natural sciences and more than 80% in the college of agricultural life sciences. Even in the college of veterinary medicine the proportion of professors with foreign doctorate degree was more than 60%.

Hwang's doctorate paper was not published in a major journal,¹¹ so it was uncertain whether he could succeed in acquiring a position as a professor, whereas receiving post doctoral training overseas was strongly required. His postdoctoral, further training was done at Hokkaido University, a university with a long history of veterinary research in Japan. This is where he first came to be exposed to the animal cloning technique. He has stated, "My experience at Hokkaido had changed my future, although it was only one year long" (Hwang et al. 2004: 62). There, he continued to expand his repertoire of knowledge, learning especially the technique of separation of a fertilized egg blastomere. He opened his eyes to animal cloning, considering it as critical for developing superior Korean cow with more milk or producing a higher quality of beef.

Second point of his academic politics is an academic recognition of him as a leading expert of animal cloning. During his appointment of an assistant professor in 1986, he had made a significant contribution of developing superior cows by using the technique of cloning through fertilized egg. In 1993, Hwang first produced a cloned cow through IVF domestically. In trials of numerous techniques of IVF animal cloning he was deemed excellent in dealing with eggs in fertilization and was regarded as an expert of animal cloning even in the bio-medical subfield. The technique of Somatic Cell Nuclear Transfer (SCNT) was at that time generally thought to be near impossible in mammals such as cow among veterinary specialists. It is after

¹¹ His doctorate thesis was published only in a proceeding paper in a seminar organized by VCM.

the announcement of the cloning of Dolly the sheep in 1997 that he convinced the value of SCNT techniques in the cloning of mammals and tried to apply them. In trials, many incidents occurred mostly from his intentional announcement of uncertain experiment results, as follows:

- (1) The affair of ‘Yeonglongi’ as a so-called cloned cow: in February 1999 he announced the birth of a so-called SCNT cloned cow¹² to journalism and further presented the result officially before the former President DJ Kim (1998-2002) two months later. This was his first achievement which became the base for further SCNT ES research. But there were numerous skeptics who were doubtful later after the announcement, because of no relevant academic publication and even no scientific evidence. If all of Hwang’s claims had been true, the so-called cloned cow, which is still alive, would have been made world ranking scientific news, given that Dolly had died much earlier.
- (2) The affair of the so-called bovine spongiform encephalopathy (BSE)-resistant cow: after the BSE affair occurred, Hwang tried to produce a so-called BSE-resistant cow, of which prion protein, generally known as main reason of BSE, was modified genetically in fertilized egg, and announced its success officially in February 2003. Once again, skeptics wondered why there had not been any relevant academic publications. Moreover, his description of the cow as BSE-resistant during scientific controversies regarding the fact that prion protein is a reason of BSE, and additionally his controversial attitude about using genetically modified animals for food created dissent.

Besides these cases he continued to apply SCNT to various wild animals and produced cloned animals such as tigers, wolves etc. In most cases, whether his experimentations were successful or not remained obscure because of no clear scientific evidence. A series of these happenings show us not only his continuous interest in animal cloning but also his public relations-oriented mind and the deficiency of scientific attitude including the lack of data keeping.

Third point is a dramatic change of Hwang’s academic career in extending his research area to human stem cell research. A shocking news in December 1998 may have motivated him to conduct human stem cell research. Professor Bo-Yeon Lee’s team at *in vitro* fertilization (IVF) Clinics of Kyunghee University made a surprising announcement that they had tried to apply SCNT to human eggs and even culture them into 4-cell embryo, at the pre-blastocyst stage.

¹² Used by the uterus cell, while the birth of “Jini” as a so-called SCANT cow developed by using an ear cell, was announced. Dae-Jung Kim, the nation’s president during that time approved of his accomplishment and named the cloned cow as “Jini,” a name whose source was a famous traditional talent “Hwang Jini,” a historical figure from 600 years ago.

The Korean Society for Medical Science organized a committee of ethical inspection on this experiment.¹³ As a member of that committee, Hwang could have overseen the experiment results and gained a firm confidence about the application of SCNT techniques to human eggs. In September 1999 there was already his explicit acknowledgement in a seminar¹⁴ that he himself had initiated such a project, and his announcement of some experiment results.¹⁵

However, extending his interest to human stem cell research was not an easy task. This was not only due to the softer and more fragile human eggs in characteristics, but also to Korean academic specificity whereby regardless of animal stem cell research, human stem cell research was dominated by medical practitioners in hospitals of obstetrics and gynecology including IVF clinics, even with the help of medical scientists. At the end of the 1980s IVF clinics were commercially grown and became more competitive for the higher likelihood of pregnancy. Because of such a strong competition and additionally the lack of related legal frame too much human eggs from an infertile woman were extracted in comparison to other countries, so that many surplus embryos remained after the pregnancy.¹⁶ The surplus embryos laid a foundation for the development of human stem cell research. Various fine crafts for dealing with human eggs in the fertilization process such as micro-manipulations were developed there and began to be published as internationally advanced results in academic journals in the 1990s and at the beginning of the 2000s.¹⁷

Analysis result of researcher networks in ‘Stem Cell Research Center’ with the largest funds in biomedical field of Korea (Kim 2007), as is shown in Table 1, demonstrates the

¹³ Korean Society for Medical Science under the auspice of Korean Association of Medical Doctors organized a subcommittee of life cloning in order to inspect the accident, of which members were professor Jeong-Sun Suh (Chair), Shin-Young Moon, Woo-Suk Hwang and Dr. Kyeong-Kwang Lee (Institute for Bio-Engineering).

¹⁴ The seminar, named as consensus conference of life cloning technology, was initiated by the Korean committee of UNESCO. There he announced that embryo was developed into pre-blastocyst stage after the fertilization of somatic cell of a 36 year-man into cow egg.

¹⁵ His announcement was that an embryo had been produced through the implantation of a somatic cell from a 36 year old male into an egg and cultured almost into the blastocyst stage.

¹⁶ After the success of familial planning policy in Korea in the 1960s and 1970s infertile women were rather considered as a crucial problem among Korean peoples because of their strong consciousness of the conservation of the bloodline even in small families. Since the mid 1980s many IVF clinics were established and raised revenue from relatively expensive medical treatment for infertility. However in the 1990s competition between these clinics became intensive as they aimed to promoting technical development. The yardstick in the competition was based on the rate of success in pregnancy. In order to increase the rate of success and compete against other clinics, an excessive number of eggs, for example 13-15 eggs, were often extracted from an infertile woman for a time after super-ovulation injection, and 4-5 embryos were implanted into the uterus despite the danger of multi-fetus pregnancy (The average number of implanted embryos each time were reported as 3.45 and Korea was in the top 3 in 1998 by paper of Adamson/Lancaster et al. (2002), while other fertilized eggs were conserved in an ice box for later implantation and often used for scientific research such as stem research after a successful pregnancy. This process demonstrates how the competition for the rate of success in IVF clinics led to the production of many surplus embryos, which were then used for embryo stem cell research (Ha 2006).

¹⁷ Publications included “The Development of the IVF technique by Using Immature Eggs” (1988), “The Development of the Transplantation Technique of Embryos through the Uterine Wall” (1991), “The Development of the Selective Pregnancy Method for Habitual Abortive Patients by using PGD” (1995) etc. in relevant international journals.

Table 1. The Index of Centrality in Stem Cell R&D Network in 2004 and 2005¹⁸

2004				2005			
No	Researcher	Degree	Closeness ¹⁹	No	Researcher	Degree	Closeness
1	JW Lee	22	0.102623	1	SY Moon	40	0.221086
2	YH Kim	2	0.101691	2	HS Yun	15	0.212243
3	BW Yun	19	0.100624	3	WS Hwang	33	0.201656
4	CH Lee	2	0.100324	4	SH Baik	2	0.194897
5	YS Sohn	10	0.097982	5	GC Wang	2	0.194897
6	MJ Kim	2	0.096992	6	BW Yun	23	0.189333
7	JY Lee	3	0.094534	7	SH Kim	11	0.186669
8	HS Yun	20	0.093482	8	HM Chung	22	0.182574
9	YB Park	34	0.08914	9	SH Oh	2	0.17858
82	WS Hwang	10	0.076938	10	KI Park	20	0.17843

Source | Reproduced from Dohhoon Kim (2006: 80-6).

dominance of medical doctors in stem cell research at the beginning of 2004, before publishing his article in *Science*. The majority of top 10 researchers such as JW Lee (Yonsei Univ.), BW Yun (SNU), HS Yun (MizMedi), and YB Park (SNU) belonged to medical college. It is clear that Hwang's academic position in stem cell research was peripheral as a researcher ranking 82nd. Consequently, it was inevitable for him to seek collaboration with SY Moon (medical college, SNU), and SI Roh (MizMedi) as medical doctor of obstetrics and gynecology, which occurred at the end of 2002.

With the publication of his article in February 2004 in *Science*, Hwang's reputation was dramatically improved; his ranking of 82nd skyrocketed to that of 3rd. The publication of his achievement in a globally prestigious magazine, called *Science*, was a symbolic monument for proving the potential of SCNT ES cell research and for recognizing him as a leading scientist among biomedical scientists.

Therefore his status in scientific communities rose. He, who had held the position of vice-dean of college of veterinary medicine (CVM) and vice-president of Korean Society for Veterinary Clinical Medicine (KSVCM), became a board member and later vice-president of Korean Society of Molecular and Cellular Biology (KSMCB), which include not only veterinary scientists but also bio-scientists and medical scientists.

The 2004 *Science* article paved, however, no stable way to academic reputation, because of

¹⁸ The data of co-authors from Stem Cell Research Center was analyzed by network analysis.

¹⁹ "Closeness" means the extent to which an actor is close to or can easily reach all the other actors in the network. It is usually measured by averaging the path distances to all actors. A direct link is counted as 1 while indirect link receives less weight. 'Closeness centrality' is an extent to which an actor is central to the network based on the measure of 'closeness.'

continuous doubts of ethical problems and of a possibility of parthenogenesis.²⁰ Ethical controversies would have broken down social foundation of his research itself, while scientific doubts would have threatened his scientific reputation. Other barrier to his reputation came from little industrial value of it with extremely low degree of effectiveness: developing only 1 cell of SCNT ES by using 242 human eggs. The latter was serious for persuading non-special bureaucrats and journalists and for developing his SCNT ES cell research as national agenda. These scientific and industrial doubts about the value of 2004 *Science* article pushed him to develop more improved research results as soon as possible.

CHARACTERISTICS OF DR. HWANG'S POLITICS OF SCIENCE (2): RESOURCE POLITICS

First point of his resource politics is a dramatic change according to growing his position inside and outside of the science field. His resource power was dependent on his initial position as domestic veterinary academician. He himself confessed clearly, "I applied to various governmental offices for a financial support of my research every year since I became a professor in 1986, only to be rejected due to my major in veterinary science, passed over for those in the natural or medical sciences or even pharmacology."²¹ The size of his research fund, obtained from Ministry of Agriculture & Forestry (MOAF) and Ministry of Education and Human Resources (MOEH), was very small. The biggest research study he had conducted before 1998 was the about mass production technique of fertilized eggs of the superior Korean cow in support of MOAF, which amounted to less than US \$18,000²² for the period 1997-99.²³

It was from 1998 on that Hwang received massive government support. His resource power rapidly increased in support of HC Lee, Minister of MOEH (3.1998-5.1999) who was his friend and companion, and CH Kang, the Minister of Science and Technology (MOST) (3.1998-3.1999), his high school alumna. Their assistance provided an opportunity for the presentation of so-called cloned Korean cow before the President DJ Kim in April 1999. It was only three months later that he was appointed as a member of the policy expert committee under the auspice of the Presidential Advisory Council on Science and Technology (PACST). The policy expert committee, which was composed of 15 directors of offices in related ministries and 13 civil members, is amongst 5 advisory committees a pivotal committee of drawing up policies of science and technology; there he seized a good chance to input his own research program into national R&D plan and programs.

²⁰ He himself confessed to have received many questions regarding whether it would be a stem cell of parthenogenesis and the low degree of effectiveness in international meeting of related scientific communities, and to have been embarrassed at it (Kang et al. 2006: 141).

²¹ In his lecture for the 2nd program of 'Science 21 Adventure' in Cultural Hall, SNU on December 6th, 2004.

²² US 1\$ = 1,250 won normally in 1997-1999

²³ See Annexed Table 2.

Table 2. Dr. Hwang's Career and Main Positions

	1997	1999	2001	2003	2005
In Scientific Community	===	Director of SNU Animal Hospital			
		Vice-dean of CVM =====			
		Vice-resident of KSVCM =====			
				(Dean of CVM)	
			Board Member/Vice-president of KSMCB =====		
			Board Member of KOFST =====		
			Director of World Stem Cell Hub =====		
In Agency of Resource Distribution	=====	Adviser of MOAF			
		Adviser of MOST =====			
			Adviser of MOHW =====		
				Board Member of KSF =====	
			National Top Scientist =		
In Agency of Policy-Making		Member of PACST =====			
			Member of NSTC =====		
				Member of CMIA =====	

In 2001 Hwang became a member of PACST, and two years later a council member of National Science & Technology Council (NSTC), who is equivalent to national minister. The higher his position, the greater influence he had on scientific and technological policies relevant to the bio-medical field. He did a leading role for providing political permission of SCNT embryo stem (ES) cell research and even had a monopoly of it in establishing the Act of Bioethics and Safety and launching a bio-medical policy plan preferable to animal cloning and SCNT ES cell research. In the NSTC he was additionally in charge of the Subcommittee of Heterogeneous Organ/Organ-Transplantation, which gave him the power of deciding the guideline of supporting related projects including his own projects. His position took an interest conflict. His leading role in Committee for Medical Industry Advancement in Ministry of Health and Welfare (MOHW) was similar, because his powerful influence to hospital management facilitated a collaboration with medical doctors in his stem cell research and its vision. In sum, the powerful positions that Hwang held in scientific and technological policy-making, demonstrated his financial and institutional resources.

In 2005 he became a board member of Korean Science Foundation (KSF), the main agency of research funds in basic research field. Moreover at the end of this year he became a board member of Korean Federation of Science and Technology Societies (KOFST) which includes all of scientific and technological associations in Korea. His career inside and outside of scientific communities had grown, eventually positioning him as a 'third generation' of leading science politicians²⁴ relevant to the age of biotechnology.

Second point is that Hwang tried to be compensated for his academic achievements by his resource power. He remained unsatisfied with his position as an influential policy-maker or a leading distributor or mediator of resources. His power to monopoly financial resources as is shown in Annexed Table 2, facilitated his scientific achievements to be a veritable top-level scientist. Academic recognition of his achievements was a prerequisite for realizing his ambitious desire to be a leading politician of science, especially for him as a non-mainstream academic. After proposing new vision of SCNT ES Cell research against other types of stem cell research, he himself should have scientifically broken through its new way and have proved its potential as national agenda of bio-medical R&D and industry. His publication of a 2004 *Science* paper showed the first, while that of a 2005 *Science* paper accomplished the latter. It was finally after the publication of 2005 *Science* paper that he was selected as “National Supreme Scientist” and so more strongly recognized as a leading science politician. This recognition led to an increase in his institutional and financial resources, including a massive governmental support of US \$3.33 million²⁵ each year for a period of five years. When debunking Hwang scandal, the Board of Audit and Inspection (BAI) inspected his funding and announced that his funding amounted to \$47.77 million from the governmental sector and \$10.4 million from the civil sector,²⁶ until October 2006.

It's clear that his resource power came not only from governmental support but also from civil society. For the first time in Korean society, a civilian support committee for an individual scientist was organized by individual supporters in the industrial and civil sector nationwide. That was the so-called “Dr. Hwang support committee” which resulted in his receiving \$3.7 million. Furthermore, another civilian support committee, the “Gwanak-gu support committee” was composed by residents of an area near his campus, and they donated \$0.32 million. He rose in the power of financial resources and additionally in social power including social prestige, which was demonstrated especially after the publication of his paper in *Science* in 2004, as follows:

February 2004	Announcement of globally the first extraction of cloning embryo-stem cell
June 2004	Awarding ‘Chang-Jo Sang’ as the supreme decoration medal of government
June 2004	Chairman of Review Board of Health and Medical Technology under the Minister of Public Health and Welfare
September 2004	Began to receive protection from police etc. equivalent to protection

²⁴ See Annexed Table 1.

²⁵ US 1\$ = 900 won normally during 2003-2006.

²⁶ It was inspected and announced by the Prosecutor Authorities (PA) that it amounted to 40,705 million won and 9,724 million won from each sector.

	provided to National Ministers
September 2004	His appointment as a Pohang Steel Co. (POSCO) funded professor of SNU
October 2004	SNU's announcement of the construction of an 11,000m ² wide Hwang Woo-Suk Institute costing \$1.55 million to build
November 2004	POSCO's announcement of a donation of \$0.33 million every year for five years

A series of financial and social supports, with many suspects of scientific and industrial value of 2004 *Science* article, gave him great psychological pressure in that he felt they should be rewarded with more achievements.²⁷ Accordingly, he boldly fabricated data of so-called patient-specific stem cell 'which will be a possible result only after ten years'²⁸ and published a faked paper in *Science* in May 2005. The publication of the 2005 *Science* article helped to accelerate governmental and civilian support towards him. Included was a protection service from police equivalent to that provided for the president of the national assembly after becoming top scientist, which continued ironically just before debunking data fabrication.

Third, his continuously growing power became to intensify a tension and conflict in changing dominant paradigm and actors in bio-medical science: first source of tension was related to building a collaboration for SCNT ES cell research against adult stem cell and IVF surplus ES cell research. In order to challenge the scientific and technological frontier in the 21st century, the Korean government launched 23 research centers so-called the '21st Century Frontier Research Project Team' in 2001, one of which is the 'Stem Cell Research Center' (SCRC) for studying the industrial and commercial potential of stem cell in bio-medical field in the 21st century. SCRC is a research center with massive governmental support amounting to \$168.9 million during the period of ten years (July 2002-June 2012),²⁹ so it would have a superpower of resource distribution in biomedical field. SCRC was naturally dominated by medical doctors and the top position of this team was designated to SY Moon, a professor in SNU's medical college, who is known as the first producer of an IVF baby in Korea. However, conflict arose related to the hegemony for resources in stem cell research, that is, adult stem cell research vs. embryo stem (ES) cell research. The adult stem cell research team argued the relative safety in its differentiation and treatment, and raised ethical problem of ES cell research including a danger of reproductive cloning, while the ES cell research team asserted its pluripotent potential in the differentiation. Hwang did a leading role as an advocate for ES

²⁷ Young-Jun Lyu, M.D., the first chief of Dr. Hwang's stem cell research, had an interview with a Journal titled 'Yunhap News' on May 12th, 2006. During this interview, he revealed that the scandal came from a temptation of material interest and power, and a surrender to the pressure to speed up the production process.

²⁸ M.D. YJ Lyu testified.

²⁹ Among them 124 billion won was generated from the governmental sector, and 28 billion from the industrial sector.

cell research against adult stem cell research, and later for SCNT ES cell research against IVF ES cell research. These hegemony conflicts had seemingly intensified bioethical controversies, especially after launching SCNT ES cell research successfully through the collaborative work of main partners such as WS Hwang, SY Moon, and SI Roh, the owner-manager of MizMedi much experienced in IVF ES cell research. A 2004 *Science* article shows how they collaborated for SCNT ES cell research: the acquisition of human eggs was SI Roh's responsibility, SCNT cloning & its cultivation and isolation were overseen by WS Hwang and SI Roh, and the testing of stem cell occurred under the supervision of SY Moon and SI Roh. Thus its co-authorship was a product of their collaboration, although it was distributed more strategically.³⁰

The second source of tension came directly from a conflict of interest within the collaboration. Hwang's growing hegemony in the collaboration was met with various tensions regarding co-authorship, awarding, patent registration³¹ and social role play. Behind these conflicts lay additionally structural interest: (1) the hegemony conflict of newly constructing a 'school of medical sciences' within the medical college during a high point of bio-medical research. Hwang's power had conspicuously grown, as was shown in the cases of Gacheon Medical College and Medical College of Hanyang University. In Gacheon Medical University he had a superpower for recruiting academics particularly in newly established fields of medical sciences and awarded Ms. JM Koo, graduate student who was a Ph.D. candidate, a professor position. In Hanyang University he supported professor JH Hwang to move from the outskirts campus into the Seoul campus, where the medical college was located, and he convinced not only Dr. KS Kim but also Dr. HS Yun in Mizmedi Hospital to take a professor position in the medical college. Such his growing power motivated Dr. Sun-Jong Kim, one of his collaborator in 2005 *Science* article, to even participate in a conspiracy of data fabrication and falsification.³² Another structural interest is (2) competitive situation between medical college and veterinary college of SNU for a hegemony of biomedical science. The amount of power that Hwang wielded in the biomedical sciences had led to a conflict between two colleges inside SNU and even within the SCNT ES cell research alliance. This tension and conflict was shown partly in the construction of so-called Hwang Woo-Suk Medical-Bio-Engineering building in the veterinary college, and in the construction of the 'World Stem Cell Hub' as an international network center of stem cell bank and research in the medical college

³⁰ Included was Professor Ki-Young Park, who later became the presidential advisor of scientific & techno-logical policy and was listed as the 13th coauthor of the 2004 *Science*, though it was later proven that she had not contributed to it actually.

³¹ Hwang, Moon and Roh decided that among all patent income of the 2004 *Science* article 60% would be to SNU, and 40% to Roh, on the inform condition that the latter 40% would be distributed in equal way: 13.3% each person, and that registration fee was burdened to Roh. But later known was the fact that the maximum 60-70% of SNU portion would be to Hwang, so consequently Hwang's portion would be too much to 50-55% of entire patent income.

³² Hwang pressured him frequently by saying "I have no further desire than this!"

of SNU, in October 2005. Without these conflicts we cannot understand debunking process including active allegations made against Hwang and the helps of 3 authors of the 2004 *Science* article. These tension and conflicts deny a claim of the continuance of a strong alliance inside related scientists (Kang et al. 2006), and rather support a weak tie or loose alliance.³³

CHARACTERISTICS OF DR. HWANG'S POLITICS OF SCIENCE (3): OTHER SOCIAL POLITICS

First point of Hwang's other social politics is his active stance for legitimize his own research vision and projects, and for persuading various stakeholders such as bureaucrats, journalists and even opinion leaders even by using his private social networks. Stem cell research was legitimated as a leading field of the biotech age against degenerative diseases popular in the aged society, and as a powerfully growing industry with a market size of \$66.7 billion.³⁴ The commercial and industrial value of Hwang's SCNT ES cell research was assessed and legitimated as \$22.2 billion in 2015 (STEPI 2005). Two critical points among these activities were his presentation of so-called cloned cow before former President Kim in April 1999 and his invitation of former President MH Roh (2003-2007) in December 2003 to his lab, in which Roh spoke out explicitly that he was "shocked and contaminated" by Hwang's passionate research and its vision.

These eventful activities were facilitated from his private networks such as the alumni network of Daejeon High School and the college of veterinary medicine in SNU. One of them was the "72 meeting group" (meeting group of incomers to SNU in 1972), which included powerful politicians such as DY Jung as a leader of the ruling party,³⁵ and HC Lee as the Prime Minister later, and even proposed an ironical policy such as offering protection service from police. There a private power network was constructed between WS Hwang, BJ Kim (chief presidential advisor of policies), KY Park (presidential advisor of science & technology) and DJ Jin (minister of MOIT) for politically launching SCNT ES cell research as national agenda; this alliance was well known as Hwang-Keum(Kim)-Park-Jui(Jin), which meant "golden bat" in Korean. Otherwise, he often visited individual fund-raising events of powerful national assembly members and gave them even support money amounting to several million won. Additionally, he continued for a long time to invite stakeholders and opinion leader groups at the end of year to parties on his farm where he served them grilled beef and distribute beef rip sets to them as gifts. He even had his researchers attend and serve at these parties.

Second point is an active attitude in communicating with journalism and the public. He had

³³ In such a way, not so-called "alliance of silence" (Kim et al. 2006) but a "cooperation of silence" (Han 2006) can be considered to have been dominant in scientific field at the time.

³⁴ See the homepage of Stem Cell Research Center.

³⁵ He was presidential candidate of the ruling party in presidential election of 2007.

known well ethical controversies of his cloning stem cell research and had much more active mind for using journalists. His skill to deal with journalism was amazingly prominent. In each case he sincerely prepared data for journalistic publication and had foremost a consideration of journalism; this included releasing data to match the time for news deadlines. He often used embargoes on news publication and even slipped the word about research publication to journalistic officials in order to stimulate a competition between journalists. Additionally, he offered news materials even in lecture meetings and even showed his real research lab to journalists.

More attention should be given to Hwang's communication skill of using easily understandable words. Social discourse has very significant role in politics of science, that is, to justify his research project and to persuade various stakeholders inside and outside scientific field. Especially strong communication skills are necessary for scientists in order to communicate with journalists and reporters, who are non-specialists regarding biomedical science. Additionally it is critical to utilize one's speaking skills, especially when discussing a newly emerging and socially controversial research area such as stem cell research. Hwang spoke out and explained the importance of bio-science and -technology research to the public by using understandable words in a simple way, so he was at that time a popular speaking guest at non-special seminars and journalistic events.

Hwang's stance to the public and exaggerated metaphoric words were often contrasted with those of HS Choi as first generation of leading politician of science,³⁶ who received generous support from authoritarian government, and was never directly in communication with the public. In comparison to Choi, who was recognized as a privileged but ethical scientist,³⁷ Hwang was often blamed as an unethical pseudo-scientist and as a liar especially in debunking process, like Professor Gerald Schatten at Pittsburgh University and Professor Alison Murdock³⁸ at New Cattle University, who were engaged in much more active communication with the public.

Third point is that Hwang's skillful capability in speaking with the public was often oriented towards a mobilization of civil society rather than a sincere communication with civil society. He talked to the public about the legitimacy of his research partly by showing its vision and partly often by exaggerating its experiment results. His overtone was seen clearly in overestimating treatment potentials of SCNT ES cell research and in boldly planning to implement its human experiments without clinical trials. In a lecture he invited a disabled famous singer before a large number of audiences and professed clearly the complete cure of

³⁶ See Annexed Table 1.

³⁷ On his gravestone, the researcher's virtue is written: the first item is that there is no liar in science, while the second item is that a researcher should never seek wealth, etc.

³⁸ The research alliance between Miodrag Stojkovic (medical scientist) and Alison Murdog (medical doctor, head of center for Life Fertility Clinic) was collapsed in 2005, in a way similar to the hurried publication of the experiment results.

his spinal disease in the near future by using SCNT embryo stem cell.

Furthermore, his communication with the public was developed into a stage of mobilization of civil society by his frequent use of nationalistic words. Such words were intended to stimulate a sense of nationalism in the public and gather their support. He said rhetorically to the public, “Now my mind was to stick a national flag at the high point of biotechnology” (Feb. 18, 2004), and “There are no people who can grab beans with iron chopsticks except Koreans” (Feb. 18, 2005). This recalls the statement “For science there is no national boundary, but for scientists a national boundary” (June 7, 2005), which was said by L. Pasteur in France. Even in debunking the scandal he claimed frequently to the public, “SCNT ES cell technique is ‘our’ own technique”, and “It was ‘our’ own original technique,” although there was no real existence of a SCNT ES cell anywhere. These nationalistic discourses were echoed in journalism and reverberating across the country (Suh 2005). Finally it motivated continuous support from civilians vindicating his innocence even after the debunking of the scandal and continues in part even until now.

CONCLUSION

To reflect Hwang scandal as a simple scientific misconduct, I focus on his politics of science within a broader context and reveal the scandal as an intermixing phenomenon of individual activities and social-structural setting, on the basis of Bourdieu’s comprehensive politics of science. Bourdieu’s politics of science demonstrates more exploratory power to comprehensive politics of science in newly emerging biomedical subfield of science although frequently reducing even norm or culture into interest.³⁹

Findings in this paper can be digested as follows: first, Hwang’s academic position was relatively fragile although he was known as an expert of animal cloning and therefore used his political power to obtain resources and promote his research interest. It was not until the publication of the 2004 *Science* article that he was recognized as a ‘real’ scientist. Thus, his own idea of SCNT ES cells could have been realized only through a collaboration with other mainstreamers. His desire to lead stem cell research as national agenda pushed him to publish a 2004 *Science* article and to develop it into a 2005 *Science* article unreasonably showing commercial and industrial value of SCNT ES cell. However, his growing power and the hegemony of SCNT ES cell research intensified a tension between various stem cell researchers and between main scientists in bio-medical field because of its revolutionary characteristics. Second, his active mind and additionally his prominent skill to communicate

³⁹ Bourdieu’s politics of science has a theoretical merit of revealing a meaning of individual scientist in a broader context within science field, although in the critics of Nico Stehr against it, a special symposium of Robert K. Merton’s Theoretical Contribution was published into a book (Clark et al. 1990).

with the public led to legitimate his idea and projects, and to consolidate his position as third generation of leading politician of science during an age of new biotechnology. However, it was often oriented to a mobilization of civil society by frequently exaggerating research results and by using nationalistic words.

The viewpoint of the politics of science contributes to making its stabilization mechanism more flexible and to clarifying a relation between Hwang's individual activities and the broad social setting. It offers a critical perspective to national policies against the scandal, which focus on institutional establishment of research ethics. Research ethics can't work well without changing the social and institutional setting of science such as appointment of scientific positions and evaluation system, decision making process of distributing resources, economic growth-oriented scientific policies and culture etc. Even contemporary universities are depended on research resources and become an institutional interest conflict with its duty of ethical monitoring (Greenberg 2001; Wood et al. 2002). To rebuild social and institutional setting of science including ethical infrastructure in Korea also implies a globally significant meaning for global governance of science at the age of global competition in science and technology, because more heterogeneous scientists under various research environments will participate in exploring scientific frontiers.

Annexed Table 1. Comparison between Generations of Leading Politicians of Science

		First Generation	Second Generation			Third Generation
		H. S. Choi (1920-2004)	Y. B. Chae (1937-)	K. M Jung (1939-)	M. Oh (1940-)	W. S. Hwang (1952-)
Birth Region		Kyeong-Nam		Chung-Nam	Seoul	Chung-Nam
High School		Daejeon	Kyeongbok	Kyeonggi	Kyeonggi	Daejeon
Special	Univ.	Waseta Univ.	Seoul N. Univ.	Seoul N. Univ.	Military Academy	Seoul N. Univ.
	Ph.D.	Minnesota Univ.	Munchen Univ.	Michigan S.U.	S.U. New York	Seoul N. Univ.
	Major	Chemical Metal.	Chemistry	Physics	Electronic Eng.	Veterinary Med.
Position	Acade- mical	KIST Director KOFST President KSF Chair. KSA President	KSA Vice-President KOFST President	KSF Chair. KSA President		KOFST Director
	Policy Mak Ing	MOST Minister	SIBT Chair. MOST Minister	MOST Minister	MOP Minister MOCT Minister MOST Minister	SIBT Director NSTC Member
	Other				DAD President	

Annexed Table 2. Hwang's Main Governmental Projects according to Research Areas

	Animal Cloning	Organs Transplantation	Stem Cell
-1997	<p>“Cultivation of nuclear trans-plantation ovum of <i>in vitro</i> fertilization cattle” (1993-99, 127 million won)</p> <p>“Mass production technique of fertilized ovum of Korean cow of superior quality” (1997-99, 219 million won)</p>		
1998-2002	<p>“Cloning production of superior milk cow by using its somatic cell” (1998 -01, 1,600 million won)</p> <p>“Development of mass production technique of superior milk cow by using technique of transplantation of fertilized ovum” (1999-00, 200 million won)</p> <p>“Development of BSE-resistant cow” (2001-04, 4,300 million won)</p>	<p>“Development of cloning of pig for heterogeneous organ transplantation” (1998-99, 37.5 million won)</p>	
2003-2006	<p>“Construction of cloning research infrastructure” (2004-05, 2,000 million won)</p> <p>“Construction of infra-structure of primate research” (2004-05, 4,000 million won)</p> <p>“Research on practical use of animal cloning and stem cell” (2005-06, 3,000 million won)</p>	<p>“Production of bio-organs and transplantation by using cloning technique for changing its character” (2003-05, 2,000 million won)</p> <p>“Research on cloning pig and cloning infrastructure” (2004-05, 1,500 million won)</p> <p>“Development of production technique of aseptic cloned mini-pig” (2004-05, 3,000 million won)</p> <p>“Construction of breeding facilities for aseptic cloned mini-pig” (2005-06, 8,000 million won)</p>	<p>“Research on practical use of animal cloning and stem cell” (2005-06, 3,000 million won))</p> <p>“Construction of building and facilities for Medical bioengineering” (2005-6, 12,500 million)</p>

Abbreviation

DAD	<i>Dong-A Daily</i>
KSVCM	Korean Society for Veterinary Clinical Medicine
KSMCB	Korean Society of Molecular and Cellular Biology
KOFST	Korean Federation of Science and Technology Societies
KIST	Korean Institute of Science and Technology
KSA	Korean Science Academy
KSF	Korean Science Foundation
MOAF	Ministry of Agriculture & Forestry
MOCT	Ministry of Construction and Transportation
MOEH	Ministry of Education and Human Resources
MOHW	Ministry of Health and Welfare
MOIT	Ministry of Information and Telecommunication
MOP	Minister of Post and Telecommunication (changed into MOIT in 1996)
MOST	Ministry of Science and Technology
NSTC	National Science & Technology Council
PACST	Presidential Advisory Council on Science & Technology
SIBT	Society for Institutes of Basic Technology

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