thought-over program it was possible during three days to look closely at the issues like Soviet experts in the Chinese Academy of Sciences; Sino-Soviet cooperation in natural resources surveys; distinctive features of academic mobility in today's Russia; pharmaceutical hunger and medicinal plants: mobilization of the botanists during Word War One; the Russian Academy of Sciences' expedition and exploration of China in the first half of the XIX century, and so on.

The following contributors — among others — were of outmost importance for Russian participants: Jiuchen Zhang, Wang Yangzong, Zhang Li, Guo Jinhai, Wang Lina, and Professor Shu Miao as interpreter helped a lot to discuss in detail each paper in lengthy debates. No doubt that not only did that meeting strengthen our cooperation but also raised it to a new level. Thanks to hospitality of the conference organizers, and first of all Professor Baichun Zhang, Russian historians and sociologists of science were able to familiarize themselves with a unique culture, to appreciate generosity and friendliness of the Chinese hosts. But the main thing was that once again we saw that the Chinese case of science reforms, which enabled China to become one of the leading scientific powers in a very short time, could be invaluable for Russia.

In conclusion, I would like to express my sincere gratitude to Professor Baichun Zhang, his wonderful staff, especially Wang Fang who took care of us in Beijing and helped us solve various problems. We will do our best to make the conference *Traditions and Innovations* planned for October, 2013 fruitful and useful as well.

Yangzong Wang

Professor
Institute for the History of Natural Sciences
Chinese Academy of Sciences
Beijing, China
e-mail: wangyz@ihns.ac.cn

The History and Institutional Characteristics of the Chinese Academy of Sciences: a Sketchy Account

The Chinese Academy of Sciences (CAS) was founded on November 1, 1949. Over the past six decades, CAS, as China's most important scientific research center, has embarked on a unique road of development with distinctive features. Its history and system are rarely seen in the world history of science and technology.

Keywords: The Chinese Academy of Sciences(CAS), historical sketch institutional features, unit system.

I. A Brief Introduction to the History of CAS

The development course of CAS falls into the following six stages.

The first one, from 1949 to 1955, is a pioneering stage. In 1950, CAS set up its first research institutions on the basis of former institutes of Academia Sinica, the former National Academy of Peiping and other research institutions in China's mainland. After

consolidations, the first 15 CAS research institutes and preparatory offices for three other institutions were inaugurated. In addition, some brand-new laboratories were established in line with the needs of national reconstruction through the recruitment of outstanding overseas S&T professionals. By 1955, the number of CAS research institutes went up to 47. In the mean time, in light of experience of the USSR Academy of Sciences and the China's S&T development, CAS established the Academic Divisions (CASAD) comprising four divisions: physics, mathematics and chemistry; biology and earth sciences; technological sciences; and philosophy and social sciences. It put in place a system whereby different Academic Divisions supervised various research institutes, laying a foundation for the academic leadership at CAS.

The second stage, from 1956 to 1966, witnessed a rapid growth of CAS. In early 1956, the Central Committee of the Communist Party of China (CPC) called for a "march toward science." On behalf of the CPC Central Committee, Premier Zhou Enlai set the keynote for the accelerated advancement of CAS by advocating: "pooling the most outstanding scientific workers and college students to conduct scientific research, strengthening CAS with enormous efforts, and building it into the locomotive of the nation's scientific research and education." The formulation and implementation of the National 12-year Long-term Plan for S&T Development ushered in a phase of amazing development for CAS. To address the needs of national defense and industrial reconstruction, a batch of new institutes for advanced technologies were founded. Furthermore, to enforce the planning for academic disciplinary development, some CAS institutes for basic and applied sciences were inaugurated. In addition, a system of postgraduate education was introduced to CAS in 1956. During the economic and social campaign of "the Great Leap Forward" from 1958 to 1961, CAS branches and their research institutes mushroomed across the country, bringing the total number of CAS institutes up to a record 242. Later, during the shake-up of national institutions from 1961 to 1962, the central authorities abolished all the provincial branches of CAS and colleagues run by institutes, and many research institutes were abolished or consolidated. By 1962, the number of CAS institutes was reduced to about 100, forming the geological and academic landscape of CAS in the later stage. Meanwhile, with the launch of "the third line" construction campaign, considerations were made to relocate CAS institutes from big cities such as Beijing and Shanghai, into inland places, and site selection was soon started in Shannxi, Shanxi, Hubei and Sichuan. However, most of the attempts were abandoned during the Cultural Revolution starting from 1966. Nevertheless, because of the move, some CAS institutes came into being in the northwest and southwest China.

During this period, the CPC Leading Group at CAS proposed to conduct research into three key tasks (later known as the "three grips"), namely cutting-edge science and technologies, major S&T issues concerning national economy, and basic scientific questions. Centering on nuclear weapons (A-bombs, satellites and missiles), CAS researchers made outstanding contributions to China's cutting-edge science and technology development. At the same time, they scored large numbers of applied research results for the development of national major research projects for agricultural and industrial development and natural resources surveys. In addition, breakthroughs such as synthesis of bovine insulin were made in basic research.

In the third stage, from 1966 to 1976, CAS was badly disrupted in the political upheaval of the "Cultural Revolution:" some major CAS leaders (such as Zhang Jinfu, Pei Lisheng and Du Runsheng) were toppled; a large number of scientists suffered greatly; and many key departments were controlled by activists. In addition, many research institutes for national

defense were put under other administrative systems. Later, under the incorrect guideline of "open-door scientific research," which encouraged researchers' intensive and direct participation in political movements and productive labor, a host of CAS institutes were transferred to other departments or local governments, and some were even dismantled. For a time, only 10 research institutes of natural sciences remained directly under CAS. The sound research foundation built up over the previous 10 years or so was almost destroyed completely.

In 1972, under the personal intervention of Zhou Enlai, basic research in China was somewhat revived. In 1975, Hu Yaobang and Li Chang carried out a short-lived rectification campaign in the Academy. Although the two were soon criticized, what they had done to restore research order, to readjust the policies on the intelligentsia, and to improve work conditions for researchers, laid an important foundation for promoting the advent of the "Spring of Science."

The fourth stage, from 1977 to 1980, saw a revival of CAS. At the end of May 1977, Mr. Hua Guofeng, then General-Secretary of CPC Central Committee, decided to convene the National Science Conference. CAS did a great amount of preparatory work for this convention, which ushered in the "Spring of Science." After resuming his leadership position in June 1977, Mr. Deng Xiaoping took the initiative to take charge of national S&T development with great attention on CAS. Entrusted by him, in early August, CAS and the Ministry of Education jointly held a symposium on education and science. In March 1978, the National Science Conference took place. In this way, CAS not only led restoration of the normal S&T order in Chinese S&T community, but also played an important promotional role in bringing order out of chaos and implementing the policies on the intelligentsia throughout the country.

This period also saw rapid restoration of research order at CAS. A large number of S&T bodies were either reorganized or renewed. In October 1977, China's first graduate school system was established at CAS. In early 1979, CASAD resumed its academic activities. A total of 12 CAS branches were also established or renewed across the country in such places as Shanghai, Chengdu, Xinjiang, Lanzhou, Hefei, Guangzhou, Shenyang, Changchun, Wuhan, Xi'an and Kunming. By 1980, the total number of CAS research institutions hit 117, and that of its employees reached a record 84,000.

The fifth stage, from 1981 to 1997, is a period of reform and exploration for CAS. In line with the advancement of the national S&T system reform, CAS continuously adjusted its administrative guidelines and orientations. A series of reforms were attempted in terms of science administration, funding and personnel systems. On the basis of the CASAD system, an academician system was set up. In spite of a spell of severe financial difficulties, CAS led the national S&T system reform by introducing such measures as setting up open laboratories and a science fund open to the whole country; and introducing a contract system of employment for all staff, a director responsibility system at institute level, and the Hundred Talents Program, a cross-century scheme to recruit qualified personnel. At this period, technological development became an important task of CAS. Several hundred high-tech spinoffs were started at CAS. However, few of them were as successful as today's Lenovo Group, and most were later closed or left the Academy.

This period witnessed the launch of a host of big-science projects at CAS, including the Beijing Electron-Positron Collider, the Lanzhou heavy-ion accelerator, the National Synchrotron Radiation Laboratory, which has promoted basic research of CAS. From the 1980s to the 1990s, CAS established a large number of national key laboratories, accelerating the academic disciplinary development and scientific research. In terms of basic science, CAS scored a batch of outstanding research achievements, including the development of a symplectic geometric

algorithm of Hamiltonian Systems; breakthroughs in superconductivity, precise measurement of τ lepton mass, synthesis of new nuclides; the development of a solar multi-channel telescope and an astronomical telescope with aperture of 1.56 m; and the construction of a high-resolution physical map of the rice genome for the first time in the world. In addition, many research achievements were scored in the fields of environment, resources, information technology, materials and space science and technology.

The CAS post-graduate education made rapid progress in this period. A large number of graduate students were trained to become the main research forces of the Academy. The Hundred Talents Program, which was started in the 1990s, recruited and fostered many outstanding young researchers, laying a solid foundation for filling in the generation gap of CAS S&T personnel.

The sixth stage, from 1988 to today, is a period for implementing the Knowledge Innovation Program (KIP) and the Innovation 2020. CAS conducted research into China's strategy for S&T development in 1997 and at the end of the year, presented to the central authorities a report entitled *Building the National Innovation System to Usher in the Knowledge Economy Era*. On February 4, 1998, the General Secretary of CPC Central Committee Jiang Zemin made an important instruction on this report. In June 1998, at the first session of the National Leading Group for S&T Development, the Academy was given the green light to spearhead KIP. One month later, a launch meeting for this Program was held at CAS. The KIP pilot program falls into three phases: launch period (1998–2000), overall implementation period (2001–2005), innovation and overlapping period (2006–2010). Over the 10 years or so, CAS adopted a series of measures, including crystallizing S&T objectives, adjusting S&T layout, reforming management system, improving research conditions, expanding cooperation through opening to the outside world, and fostering innovation culture. CAS was downsized as the number of its autonomous research institutes went down from 123 in 1997 to 100 in 2009. Many big science facilities were also launched, including Large Sky Area Multi-Object Fibre Spectroscopy Telescope, Shanghai Synchrotron Radiation Facility, the Daya Bay Neutrino Laboratory, and China Germplasm Bank of Wild Species. Renovation was made to Beijing Electron-Positron Collider and the Lanzhou Heavy-ion Accelerator. CAS has dramatically improved its research and education conditions and environment, and remarkably upgraded its innovation capacity. Outstanding research findings were made in basic science, strategic high-tech development and sustainable development studies with rapid increase of the numbers of research papers and patents. Over the past decade, CAS has played a leading and demonstrative role in building the national innovation system, giving impetus for China's S&T reform to enter a new stage focusing on developing a national innovation system with Chinese characteristics. At the same time, it promoted the increase of social innovation awareness, and improved CAS position in the international S&T community.

II. Features of the CAS System

1. Orientation of CAS

In its early years, in addition to serving as the national center for scientific research, CAS was a governmental department under the Commission of Culture and Education of the State Council, which is conducive to its rapid development. Nevertheless, due to its own

limitations, it was difficult for CAS to fulfill its role as a government organ. In the *Organic Law of the State Council* adopted at the First Plenary Session of the First National People's Congress in September 1954, it is clarified that CAS would no longer serve as a component of the State Council, but it would still be subject to the direction of the State Council. Thereafter, the role of CAS has changed from a government administration to an institution directly under the State Council.

The Academy's role as the national center for scientific research was beyond doubt at first. In fact, the establishment of CASAD in 1955 was a major step toward this goal. However, in the "march toward science" campaign, scientific research received increasing attention from universities and research institutes under industrial departments, which intensified their competition with CAS in terms of S&T personnel and other resources, and led to the doubt over the central role of CAS. The dispute was only mediated by the intervention of top state leaders such as Mao Zedong and Zhou Enlai. It was then that China's S&T system and the role of CAS were officially clarified. Premier Zhou Enlai made it clear in his government report in June 1957 that "China's system of scientific research is made up of four components: CAS, universities, research institutes under industrial departments, and those under local governments. CAS is the academic leader and key research center of the system while universities and research institutes (including laboratories of factories and mines) under industrial departments and local governments are extensive bases for China's scientific research. It is the organizational principle of China's S&T forces. Leaders of various departments should promote partnership in the spirit of coordination and to overcome the unhealthy undertaking of departmentalism."

In March 1956, the State Council formed a Commission for Science Planning. Although an *ad hoc* agency for blueprinting the 12-year Long-term Science and Technology Development, the commission remained functional after the formulation of the planning. In May 1956, the State Council set up a National Commission for Technology as a permanent agency. On basis of the two commissions, in November 1958, the State Science and Technology Commission (SSTC) was established. Later, local governments followed the suit to set up its own S&T committees, thus forming a unified S&T management system from the central authorities to local governments.

While the administrative role of CAS in the S&T community was further weakened after the establishment of SSTC, its function as the national center for scientific research never changes. To minimize the setback suffered by S&T research during the Cultural Revolution, Zhou Enlai said that China has to rely on CAS for S&T research. In 1970, SSCT was merged into CAS, which reinstated CAS's formal role as both the science center and an administration for China's science enterprise. The situation changed in September 1977 when SSTC was resumed.

In its early years, CAS was a comprehensive academic institution engaged in natural sciences, applied technology and social sciences. To strengthen the ideological leadership over institutions for social science, after the Anti-Rightist Movement starting in 1957, the CPC Central Committee Propaganda Department took over the academic guidance of the 10-odd research institutes under the Academic Division of Philosophy and Social Sciences, leading to a gradual independence of the Division and its institutes. In May 1977, the Academic Division of Philosophy and Social Sciences was renamed as the Chinese Academy of Social Sciences, thus becoming fully independent of CAS. Since then, CAS has been defined as the national comprehensive research center for natural sciences. In January 1981, CAS proposed to the Central Committee of CPC to build the Academy

into the nation's highest academic body and a multi-disciplinary research center for natural sciences. This was further confirmed in its *Tentative Constitution* adopted by CAS later this year. In the same year, however, the central government set the guideline for S&T development, stating national economic development must rely on science and technology, science and technology must serve national economic development. This made the newly-defined CAS mission and guiding philosophy seemingly behind the current requirements of the central authorities. Although CAS adjusted the guiding principle for running the Academy in 1983, its mission remained unclear in a rather long period of time.

In January 1994, during the annual conference of CAS, Jiang Zeming sent his congratulatory message, saying that CAS should strive to blossom into a scientific research base up to the international advanced level, a training base for high-caliber S&T professionals, and a base for promoting China's high-tech development, making further contributions to China's modernization. The line was reiterated in Jiang's greetings to mark the 45th anniversary of CAS later on, further clarifying the objectives and role of CAS.

The Constitution of the Chinese Academy of Sciences, which was adopted on December 28, 2005, stipulates that CAS is composed of CASAD and various subordinate establishments. It is China's highest academic institution in natural sciences, the top S&T advisory body in this country, and the national comprehensive research and development center in natural sciences and high technologies. Its development objective is: Striving to build itself into a center of excellence in scientific research, high-caliber S&T personnel training and high-technology development noted for first-class attainments in scientific research, benefits, management and talents. This newly defined vision and objectives embody the development experience of CAS over the past decades. However, they have yet to be endorsed by the government in the form of law.

2. Major Tasks and Administrative Guidelines

The fundamental differences between CAS and former Academic Sinica are not only in their orientations, but also their major tasks and administrative guidelines. Since its establishment, CAS has emphasized its services to the people and the national reconstruction. In 1950, it specified, in the Directive of CAS President Guo Moruo, that the cardinal principle to reform the previous S&T institutions should be based on the culture and education policies prescribed in the Fifth Article of the *Common Program of CPPCC* (the Chinese People's Political Consultative Conference), so as to train talents for science development, and enable scientific research serve the national undertakings in industry, agriculture, healthcare and national defense. Accordingly, the major tasks of CAS included the following.

(1) Establishment of Scientific Research Directions:

• Holding the viewpoint that scientific research should serve the people and integrate with practice so as to shake off the old style of being divorced from practice or doing whatever one likes;

• Conducting theoretical and experimental research in a planned way in line with modern scientific development trends and by learning international experience in science so as to catch up with the world advanced level; and,

• Stressing planning and collectiveness in scientific research so as to strengthen the organic relationship between various disciplines.

(2) Training and Rational Distribution of S&T Professionals:

• Promoting political studies among S&T workers so as to enable them to master the viewpoints of Marxism and Leninism;

• Making an overall planning for talent training by strengthening cooperation with universities and other training organizations;

• Making a nationwide survey on S&T talents so as to distribute and replenish them in a planned way; and,

• Encouraging and assisting overseas scholars to return to their motherland.

(3) Adjustment and Augmentation of Scientific Research Institutions:

• Consolidating similar institutes and strengthening them step by step by centering on institutes in the fields of natural sciences and based on the existing organizations for the time being;

• Consulting governmental departments in charge of national economic and finance development, and setting up close links with them so as to set priorities in line with the current national reconstruction demand and pooling forces to address practical issues; and,

• Making plans for the steady development of scientific research in the fields that is still a virgin territory in China but urgently needed by the country.

This cardinal task laid a good foundation and showed the way for the initial development of CAS. In early 1954, the Central Committee of CPC made instructions on a report of the Academy, stating that as the national center for scientific research... CAS is to address the theoretical questions of basic science and key science issues with important bearings on national economic development. Scientific research institutions under various production departments should focus on technological issues in productive practice. Universities could carry out studies on either basic science theories or science issues from production practice in line with their conditions." This statement was later reiterated by the central authorities in the *Instructions on Current Work of Natural Science Research Institutions* (also known as the 14 Articles): "CAS institutes should mainly conduct research into basic science theories and key S&T issues with important bearings on national economic development and defense. Research institutes under industrial departments should focus on S&T issues concerning the production in their own sectors, application and development of new technologies, and necessary theoretical studies. On the basis of this division of labor, each institute should have its own priorities, and give full play to their own advantages. They should also have close relationship and cooperate with each other."

However, in the first 30 years of its development, due to the affection of political campaigns and changes of its central work, CAS made frequent changes in its major tasks and research directions, proposing such different policies as "promoting theoretical studies through problem-solving research tasks", "attaching great importance to research in three aspects: cutting-edge science and technology, major S&T issues concerning national economy, and basic scientific questions", "catering to factories, countryside and schools", and "open-door scientific research". Due to a lack of stable administrative guideline, research tasks and directions of CAS often changed with various political situations and nation's central work, posing severe negative impact on its stable and sustainable development.

At an expanded Executive Meeting of CAS held in October and November 1979, consensus was reached regarding the directions and tasks of CAS: "They should be kept stable... In line with the division of labor in China's science enterprise, CAS should stick to the principle of placing importance on basic science and scientific excellence and serving the national economic development and defense. At the same time, it should help industrial departments in solving major and comprehensive S&T problems. Thereafter, "placing importance on fundamental research and capability improvement with an objective of serving economic reconstruction and national defense" was specified as the guiding principle of

CAS in a report to the Central Committee of the CPC on January 29, 1981. However, the principle was questioned by then Premier Zhao Ziyang. In 1983, the Secretariat of the Central Committee of CPC pointed out that CAS "should greatly strengthen applied research and active participation in selected aspects of technology development with a sustained emphasis on fundamental research". In fact, this instruction vetoed the administrative guideline proposed early by CAS. In that case, CAS had to take this order from the central authorities as its "guideline' in the new period.

In early 1987, facing the situation of reform and open-up and gearing scientific research toward economic development, then CAS President Zhou Guangzhao called for mobilizing the main S&T forces of CAS into the drive for national economic reconstruction while maintaining a picked team to conduct fundamental research and follow-up studies of high-technology. The next year, the Academy put forward the policy of "one Academy, two operational mechanisms" to promote synergy between the system of scientific research and the system of technology commercialization both under CAS by introducing different operational mechanisms, management measures and evaluation criteria for the two systems.

The policy of "one Academy, two operational mechanisms" was implemented for more than 10 years. In January 2002, at the CAS annual conference, then CAS President Lu Yongxiang proposed a new administrative guideline to meet the needs of S&T development in the 21st century and the national strategy of Invigorating China through Science and Education. This new guiding principle for running the Academy, which is still being implemented today, states: Catering to the national strategic demands and aiming at the frontiers of world science, efforts will be made to promote indigenous innovation in scientific research and the innovation and integration of key technologies, so as to scale the heights of world science and technology, and make fundamental, strategic and forward-looking contributions to China's economic growth, national security and sustainable development. It is stipulated at *the Constitution of the Chinese Academy of Sciences* which was promulgated in 2005 with only a slight change in wording.

3. CASAD and Academician System

In its early years, CAS abolished the institutions of the former Academia Sinica such as its council and academician systems. Instead, a special committee composed of more than 200 experts was set up to execute academic leadership over the Academy, which turned out to be unsuccessful. A visit to the Soviet Union in 1953 opened up a new prospect for CAS. Drawing on the experience of the USSR Academy of Sciences and in light of China's reality, CAS established CASAD in June 1955. The first 233 CASAD Members were selected into four divisions under CASAD: physics, mathematics and chemistry; biology and earth sciences; technological sciences; and philosophy and social sciences. They exercised academic leadership over the whole country as well as the Academy. Meanwhile, a system was built up to bring different research institutes under the academic administration of different divisions. At the same time, preparations were made to set up a system of CASAD Members. However, due to the unspecified functions and powers of these Members, especially after the political movements such as "Great Leap Forward" and "Anti-Rightists," the CASAD Member system existed in name only. As an establishment to contact and manage research institutes, however, CASAD kept functioning and played an important role until it was abolished during the Cultural Revolution. In 1979, CASAD resumed its activities, and in 1987 its offices were changed into different academic bureaus of CAS.

CASAD expanded its membership in a small scale in 1957. In 1980, it held its first large-scale democratic election. The Fourth CAS General Assembly held in May 1981 gave the top decision-making power of CAS to its General Assembly or the Presidium when the Assembly was not in session. This conference also elected the First CAS Presidium, which chose its executive chairman, CAS president and vice presidents, and appointed CAS secretary-general. Each CASAD division elected its standing committee, which chose its director and vice directors. As a result, CAS erected a new system whereby S&T experts exercise the leadership over the whole Academy. However, the system was effective less than three years.

The function of CASAD was changed dramatically at the Fifth CAS General Assembly held in January 1984. It was made clear that the General Assembly was the highest national consultative organization in science and technology, and that CASAD Membership is the highest honorary academic title. The main mission of CASAD would be academic evaluation and consultation, and CAS should institute a presidential responsibility system. Thereafter, CAS president will no longer be elected by the presidium, but nominated by the State's premier, and then approved and instated by the National People's Congress (NPC) or its Standing Committee. In 1985, CAS introduced an institute director responsibility system throughout the Academy. The implementation of the presidential and director responsibility systems, a basic institution still being enforced at CAS today, completed power structuring at both Academy and institute levels. To safeguard the fundamental rights of researchers and staff members, meanwhile, there is still much room for improvement. In addition, the designed role of CASAD as "consultation" has largely reduced its academic leadership over CAS as an "academic committee", "science committee", or "council" which are often seen in research institutions across the world. This institutional problem might accelerate the unhealthy development of the already-existed official-rank-oriented system.

In 1990, the State Council endorsed the CAS proposal on CASAD Member elections. In 1991, after 10-year suspension, 210 new CASAD members were elected. Since then the election was held every two years. In October 1993, it was decided at the 11th Executive Meeting of State Council to change the title of CASAD Member to CAS Member. Also at this conference, decision was made to set up the Chinese Academy of Engineering.

As early as in 1955 when CASAD was established and in 1980 when new CASAD members were elected, CAS conducted studies on the establishment of an academician system. As the academic level of the possible academicians is expected to be fairly high, the number was anticipated to be less than half of the existing CASAD Members. However, the practice of renaming all CASAD Members "CAS Members" has lowered academic levels of academicians. In addition, its institutional faults further diverted this honorary title to an official rank. In recent years, with the improvement of the CAS Member elections, and the implementation of Senior CAS Members, the role and function of both CASAD and CAS Members improved steadily in China's S&T undertakings.

4. The Unit System

CAS and its subordinates are institutions directly under the State Council. Over the past two decades or so, the pace of reform in State institutions is rather slow. Even though CAS has made many reform explorations in personnel and institute management, the "unit" feature of CAS and its subordinates has never changed.

The "unite system" with Chinese characteristics is the fundamental basis of China's research institution system, making CAS unique in the world S&T community. First, it is a big and all-inclusive enterprise, from research institutes, branches, canteens, guest houses,

clinics to kindergartens, elementary and high schools (currently the schools have been separated from CAS), to universities, graduate schools and CPC party schools. Benefits distribution is mainly made within the unit, forming a very close but intense personnel relationship and unit culture. Second, there are many undertakings with multi-objectives and constantly changing demands and situations. Although it may help CAS to implement the guidelines and policies of the central authorities in an efficient and rapid way, making contributions to the country's economic growth, national defense and social development, it could weaken the autonomy of CAS and its subordinates, and making it difficult for a national science academy to pursue its goal of science excellence. Third, the way of running CAS as a government organ, irrational distribution of resources and official status in personnel system lead to the development of an "official rank standard" at the Academy. To address the problem, CAS's own efforts are not enough, and, more importantly, it depends on the national institutional reform in various aspects and the progress of entire society.

III. Concluding Remarks

Over the past more than 60 years, CAS has contributed greatly to China's S&T development. Since its establishment, it has strived to serve national strategic needs and socioeconomic development by conducting scientific research in line with China's modernization demands and producing many innovative S&T results and laying a good foundation for the development of major academic disciplines in China. By independently developing a series of high-tech fields with strategic importance, it has formed a scientific research system with Chinese features, giving impetus to the development of China industrial technology system, the S&T system for national defense, and the regional innovation system.

CAS is also an important base for China's graduate education. As early as in 1955, CAS took the lead in setting up China first formal graduate system. It established the University of Science and Technology of China in 1958 and China's first graduate school in 1977, introducing systems of academic degrees and postdoc research. Since the start of Knowledge Innovation Program, CAS stepped up its efforts to develop a large scale and high-level graduate education system. Shaping an education system with USTC and Graduate University of CAS as the core and covering all CAS institutes, the two-stage model for graduate education has constantly upgraded its graduate education.

Over the past more than six decades, CAS has pooled and trained a large number of scientists who have greatly contributed to China's S&T undertakings, including many prestigious scientists who founded major S&T disciplines in China and honored with China's top S&T awards. Since the start of KIP, CAS has fostered nearly one thousand S&T leaders and top scientists and technicians, forming a high-caliber innovation taskforce, including 600 chief scientists or principal investigators in national major S&T tasks, nearly 700 winners of the National Science Fund for Distinguished Young Scholars, 53 Creative Research Groups supported by the National Natural Science Foundation of China (NSFC). A total of 900 CAS scientists are currently holding important posts in international science organizations. At present, CAS houses 12 branches, 100 research institutes, more than 100 national key laboratories or engineering centers, and a network of field observation making up of nearly 1,000 stations. It currently has about 50,000 full-time S&T workers.

From 1956, when the national S&T awards were set up, to 2009, CAS have been recognized by more than 1,000 national S&T prizes as a lead performer of research activities with outstanding research findings, including 390 prizes from the State Award for Natural Sciences (accounting for 42 % of the national total), in which 19 were first-class prizes (making up 59 % of the national total); 181 prizes from the National Award for Technological Innovation, in which 4 were first-class prizes; 536 prizes from the National S&T Progress Award, in which 39 were special or first-class prizes. Regarding the number of the awards, it is no doubt that CAS is the top research institution in China S&T community. However, in terms of international S&T awards and world-renowned scientists, both CAS and the Chinese S&T community have a long way to go. In this regard, CAS shoulders heavy responsibility in the years to come.

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Li Zhang

Professor
Institute for the History of Natural Sciences
Chinese Academy of Sciences
Beijing, China
e-mail: lilyzhang@ihns.ac.cn.

Soviet Experts in Chinese Academy of Sciences: Historical review of cooperation and exchange between Chinese and Soviet Academy of Sciences in the 1950s

After the establishment of The People's Republic of China in 1949, to learn from Soviet Union was the most realistic fast way to build a new country. Under the advocacy of Chairman Mao Zedong, the whole China was fired with the zeal of learning from Soviet.

As a whole, in the scientific and technological exchange and cooperation between Chinese and Soviet Academy of Sciences during 1952–1966, there were three most distinctive and representative points. Since 1954, dozens of Soviet advisors and experts came to China in succession to help Chinese Academy of Sciences draw up the plan, establish new research institutes and disciplines, and launch numerous highly effective research activities. Since the signing at the end of 1957, the cooperation agreement between Chinese and Soviet Academy of Sciences had lasted for nearly 10 years and now still plays an active role in the academic progress of Chinese Academy of Sciences. Numerous Chinese students studying in Soviet Union are now the research backbone in each discipline after their return to China, and exert great influence so far. This article will narrate and assess the work of Soviet experts in Chinese Academy of Sciences during this period.

Keywords: Soviet expert in China, planning and organization of the national scientific research, the plan of scientific and technological development, the Chinese Academy of Sciences.