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Wong Wen-hao: A Prominent Geologist Pursuing Politics[1]

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Abstract: As a member of the last generation of *xiucai* 秀才 (one who passed the imperial examination at the county level) in the Qing dynasty, and as the first Chinese national to hold a Western doctoral degree in geology, Wong Wen-hao made significant advances in the theoretical study of China's geological structure and metallogeny, especially while serving as long-term director of the Geological Survey. He established himself as the founder of modern Chinese geology and geography and a leader of the Republic of China's scientific community, enjoying much international prestige along the way. In the 1930s, faced with an increasingly grave national crisis, Wong resorted to a career in politics, relinquishing his geological studies. During wartime, he served as the highest economic administrator in the Chinese government, committed to exploring every avenue for the advance of national industrialization. In the postwar years, Wong assumed the office of president of the Executive Yuan, and presided over the failed currency reform. After a stint of exile after the Communist Party of China came to power in 1949, Wong returned to China, though he was relegated to obscurity due to his association with the Nationalist regime.
Keywords: Wong Wen-hao, geologist, leading scientist, scholar pursuing politics

1 Who is Wong Wen-hao?

On February 16, 1934, a car crash took place on the Shanghai-Hangzhou road: the driver lost control and crashed into a roadside bridge railing, leaving one passenger unconscious with a fractured skull. The wounded passenger was immediately raced to the hospital in Wukang County, Zhejiang, and was later transferred to the Hangzhou Guangji Hospital. The next day, upon hearing the news,

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Chiang Kai-shek, leader of the Republic of China, telegraphed an order to the relevant governmental personnel to dispatch the most prestigious surgeons nationwide to Hangzhou for emergency surgery and treatment. Through the joint effort of those involved, the patient's condition eventually stabilized. He was afterwards relocated to the Peking Union Medical College Hospital, at that time the best equipped facility in China, for treatment and recuperation. This patient, whose condition had roused the attention of Chiang Kai-shek himself, was Dr. Wong Wen-hao 翁文灝 (Weng Wenhao, 1889–1971) (Figure 1).

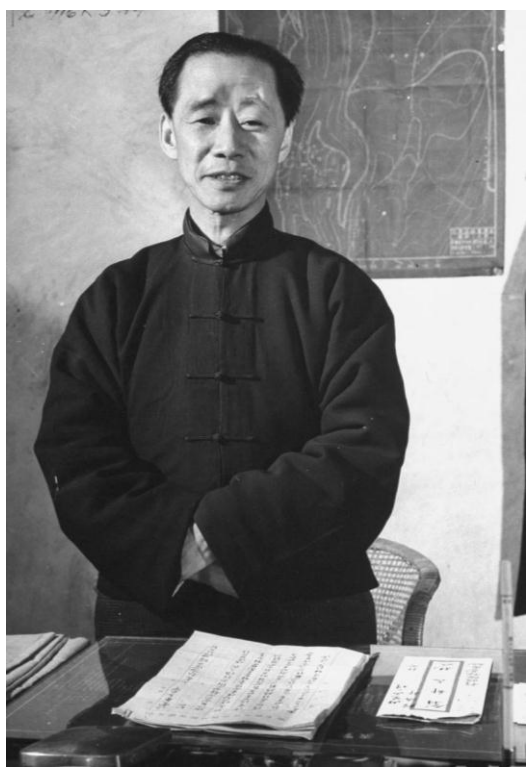

Figure 1: Wong Wen-hao after the car accident.

Wong Wen-hao (courtesy name Yung-ni 詠霓) was born in Ningbo, Zhejiang Province. In 1913, he obtained his doctoral degree from the University of Louvain, Belgium. He was largely responsible for the introduction of modern geology and geography into China and the localization of these disciplines. Under his leadership through much of the first half of the twentieth century, the Geological Survey yielded scientific accomplishments of international significance. These ranged from the geological investigation of China's strata, mineral resources, mining industries, and soil, to studies on Chinese paleontology, including the excavation and analysis of the Peking Man fossils and the compilation of *Zhonghua minguo xin ditu* 中華民國新地圖 (New

Atlas of the Republic of China). "In the years before 1949 the Geological Survey was a source of great official pride to the Chinese" (Furth 1970, 56).

Wong Wen-hao was the initiator of the Geological Society of China and the Geographical Society of China, and was elected president for both societies multiple times. In addition, he assumed a wide spectrum of posts, including president of the Science Society of China, the Chinese Institute of Engineers, and the Chinese Institute of Mining and Metallurgical Engineering, respectively, as well as board member of the China Foundation for the Promotion of Education and Culture, acting president of Tsinghua University, and director of the Palace Museum. All these testify to his role as a leader among Chinese scientists in the first half of the twentieth century. He was also granted a multitude of academic titles, such as vice president of the International Geological Congress in 1922 and 1937, academician of Academia Sinica, foreign correspondent academician of the German Academy of Sciences Leopoldina, foreign honorary member of the Geological Society of London, honorary member of the Society for Mining, Metallurgy and Exploration, and foreign academician of the American Academy of Arts and Sciences. The meteorologist Chu Ko-chen 竺可楨 acclaimed Wong as "the first Chinese scholar to be granted so many world honors" (中國學者得世界榮譽之第一人) (Chu 1922).

In view of Wong's academic reputation and outstanding administrative capabilities, Chiang Kai-shek recruited him for national leadership roles. Beginning in the early 1930s, Wong assumed the following positions in succession: secretary of the National Defense Planning Committee (later restructured as the Resources Commission), general secretary of the Executive Yuan, minister of the Ministry of Economy, and vice president of the Executive Yuan. While bolstering China's economic growth in the rear area during the War against Japanese Aggression, Wong dedicated himself to contemplating and exploring avenues for national industrialization. In 1948, he became president of the Executive Yuan, taking charge of the failed currency reform. After a twist of fate, Wong was identified as a "principal war criminal" by the Communist Party of China, causing him to flee the country. In 1951 when he returned to Beijing from Europe, Wong, with the reputation as a "war criminal," had not been rehabilitated by the Communist Party of China, and thus his suffrage was forfeited in the election of people's deputies of Dongdan District, Beijing. He was later persuaded to make a public self-criticism and to acknowledge the current regime, which was published in the newspaper. Consequently, in 1954, he became a member of the Second National Committee of the Chinese People's Political Consultative Conference, empowered to participate in social activities.

As the Chinese revolution settled down, Wong, like many other prominent figures of his time, vanished from public view. On his journey from a geologist to president of the Executive Yuan to "war criminal," Wong Wen-hao underwent a series of twists and

turns that demand much historical reflection.

2 From a last-generation *xiucai* to a geological doctorate

Wong Wen-hao was born in 1889, back when Chinese men still adopted the Manchu queue hairstyle. Wong came from a family of wealthy merchants, who owned multiple stores where they lived in Ningbo, one of the earliest Chinese ports open to foreign trade, as well as in Shanghai. In 1902, at just thirteen years of age, Wong managed to pass the entry level of the imperial examination, winning the title of *xiucai*. In 1905, due to the abolition of the imperial examination and the promotion of a new school system in the Qing dynasty, Wong continued his studies at the Aurora University of Shanghai 上海震旦學院, a school founded by French Jesuits. In 1908, he seized the opportunity to study overseas in Europe through a selective exam. Later, in 1913, Wong received his doctoral degree from the University of Louvain with his dissertation titled "Contribution à l'étude de la porphyrite quartzifère de Lessines" (Contribution to the study on quartz porphyrite in Lessines). He studied at that time under the dean Canon Henry de Dorlodot, thesis adviser Prof. Felix Kaisin, and Prof. Jacques Thoreau, a student of the French geologist Louis de Launay.

In his dissertation, Wong determined that the surroundings of porphyrite in Lessines belong to Cambrian strata. He recorded and analyzed the structures and mineral composition of the rock, examining them both with the unaided eye and under a microscope. He reached the opinion that, according to its structure and mineral composition, the rock should be referred to as quartz porphyrite, which belongs to the category of pyroxene-porphyrite. Wong also analyzed in detail the differences and similarities between feldspars in enclaves and those in porphyrite as well as the reasons for their distinction, and noted the composition and formation of acidic enclaves. Furthermore, he made special records and analyses of the alteration of rocks, drawing the following conclusions:

> The study on alteration also shows that while the same mineral can be transformed into diverse species, highly different minerals can produce similar products. . . . In summary: aluminum, magnesium, and potassium seem to be the most resistant elements to elimination, while calcium, iron, and especially sodium tend to decrease as a result of alteration. (Wong 1913, 316, 318)[3]

Finally, Wong elucidated the differences and similarities between porphyrite in

3 "L'étude de l'altération montre ainsi que, si un même minéral peut se transformer en diverses espèces, des minéraux très différents donnent souvent des produits semblables. . . . En résumé: l'aluminium, le magnésium et le potassium semblent les éléments qui résistent le mieux à l'élimination, tandis que le calcium, le fer, et surtout le sodium tendent à diminuer par suite de l'altération."

Lessines and in Quenast. He held that:

> Thus, while the characteristics of porphyrite itself appear remarkably analogous to those known of the congeneric rock of Quenast, the study on the enclaves in Lessines shows more than one difference from this latter deposit; this difference is probably due to the diversity of conditions in which eruptions in the two regions occurred. (Wong 1913, 322)[4]

Considering how Belgian scholars had generally neglected the study of igneous rock, Wong Wen-hao's research was of great novelty. Moreover, "Wong made a microscopic observation" (鏡研方法有所發展) (Wong 1953) of the rocks in Lessines, which was even unprecedented for Belgian experts. His thesis was classified by the University of Louvain as the best among his counterparts, and was published in *Mémoires de l'Institut Géologique de l'Université de Louvain*.

The comprehensive science education provided during his overseas studies in Belgium transformed Wong Wen-hao from a Chinese *xiucai* into a geologist. To have succeeded both in the imperial examination and in obtaining a foreign doctorate was a cultural circumstance unique to the transition period of modern society in China. The integration of ancient Eastern civilizations and modern Western sciences was embodied to the highest degree in Wong Wen-hao.

3 Founder of modern Chinese geology

Upon his return to China, Wong Wen-hao was faced with an occupational decision. He received an offer to become chief engineer at an enterprise, which seemed appealing from a financial perspective, as the Wong family business had failed. Nonetheless, Wong deemed "engineering a poor match for his learning in geology" (學的是地質，去做總工程師，學非所用) (Wong 1946a, 65), and "was of particular unwillingness to assist foreigners" (不願意幫助外國人) (ibid.) in vying for local Chinese resources. After declining the invitation, he resolutely left for Beijing and took a teaching position at the Geological School 地質研究所, a three-year geological school established by the Ministry of Agriculture and Commerce. In collaboration with V. K. Ting 丁文江 and H. T. Chang 章鴻釗, who had both returned from studying abroad to China earlier than he had, Wong devoted himself to training Chinese geologists, teaching subjects such as general geology, petrology, ore deposit geology, and optical mineralogy, and served part-time as an adviser for geological

4 "Ainsi tandis que les caractères de la porphyrite elle-même apparaissent remarquablement analogues à ceux que l'on connaît de la roche congénère de Quenast, l'étude des enclaves de Lessines montre plus d'une différence avec celles de ce dernier gisement; cette différence est probablement due à la diversité des conditions dans lesquelles se sont produites les éruptions des deux regions."

fieldwork. The Geological School was China's first professional school in geology. As Wong stated: "The establishment of this institution marks the onset of Chinese students being admitted by a Chinese school and conducting Chinese geological studies under Chinese teachers" (Wong 1916, 3).[5]

Traditional Chinese intellectuals, called *dushu ren* 讀書人 (literally, reader), had a reputation for persevering in their reading despite hardships, and for poring over the classics until their hair turned grey. As Western learning spread to the East, a diverse assortment of modern experimental sciences, widely distinct from traditional Chinese knowledge systems, was gradually introduced into China, posing new challenges to bookwormish Chinese scholars. The primary skills needed for geological research are those relevant to field investigations, and the German geologist Baron von Richthofen believed that:

> The Chinese literati are heavy-handed, are persistently resistant to rapid movement, and cannot free themselves from the prevalent prejudice about decorum. Walking is in their eyes humiliating, and the employment of a geologist would be a direct abandonment of all human dignity. (quoted in Ting 1919)[6]

Motivated by such remarks, Wong and others, who championed the cause of Chinese geology, took great pains to reverse traditional Chinese customs of research, and to foster students' capacity for making arduous journeys and enduring hardships while conducting fieldwork. Wong played an exemplary role in leading students to the neighborhoods of Beijing, Shandong, Jiangxi, and other regions for field trips, constantly reminding them of Richthofen's statement as a kind of motivation. Chinese Geology was in dire need of pioneers. Wong and Ting drastically adjusted the Geological School's curriculum after the fifth semester of study, highlighting the techniques of geological and mineralogical field investigations. Specifically, more opportunities and time were provided for students to engage in fieldwork; they were assigned to various places for performing independent surveys and writing reports as their final graduation results. Wong's rigorous comments are documented in the students' reports, which are preserved to this day.

His remarkable contributions to teaching were extolled by H. T. Chang, director of the Geological School, who stated in his commencement address that "Dr. Wong Yung-ni, who has assumed a teaching position here after returning from his studies in Belgium, is working to advance vital branches of learning. In light of his contributions,

5 "以中國之人，入中國之校，從中國之師，以研究中國之地質者，實自茲始。"

6 "Der chinesische Literat schwerfällig ist und für die schnelle Bewegung ein fortdauerndes Hindniss [*sic*] bietet, und sich von den landesthümlichen Vorurtheilen über das Decorum nicht frei machen kann. Zu Fuss zu gehen ist in seinen Augen erniedrigend, und die Beschäftigung des Geologen ein directes [*sic*] Aufgeben aller menschenwürde."

Mr. Wong is indeed the spearhead of our faculty" (Anonymous 1916).[7] Johan Gunnar Andersson, the former director of the Geological Survey of Sweden who was in China at that time, declared: "The excellence of the graduates this year reaches such a high level . . . [that they now] parallel their Western counterparts after three years of education. . . . This marks the first glory of science in China" (ibid.).[8] With this, the first cornerstone was laid for Chinese geology. Despite the fact that the Geological School discontinued teaching activities after its first crop of students, a dozen experts emerged from the school, making them the first generation of modern Chinese geologists, including Hsieh Chia-jung 謝家榮 and Wang Zhuquan 王竹泉. They sowed the seeds of geology all around the country, later becoming leading scholars at Chinese universities and research institutes.

In the early twentieth century, geologists around the world were largely unfamiliar with Chinese geology. As Wong Wen-hao stated,

> Our fundamental knowledge of Chinese geology is largely derived from earlier observers—Richthofen and Loczy, who visited China about half a century ago, and Willis and Blackwelder, who came at the beginning of the present century. (Wong 1924, 75)

In 1913, when the government of the Republic of China established the Geological Survey, the basic shortage of professional geologists impeded the development of practical study. In 1916, eighteen graduates from the Geological School joined the Geological Survey, where the original dormitories were converted into offices, and Wong, together with the other faculty and students, became the first geological investigators in China. This signified the beginning of systematic research on China's geology. Wong, who was then the section chief of mining at the Geological Survey, became acting director in 1921, a position that was later formalized in 1926.

Against the backdrop of constant conflicts between warlords, the central government became financially insecure, and as the premier of the cabinet and ministers of various ministries were perpetually replaced, few remained who had a solid grasp of the state of China's scientific development—thus, few saw it as a priority. Out of an annual budget of 68,000 yuan specified by the Ministry of Agriculture and Commerce and approved by the parliament, the Geological Survey received a mere 42,000 yuan: 30,000 yuan for the annual salaries of the whole staff and 12,000 yuan for research costs, including outdoor investigations, books and instruments, and the publication of books and periodicals. Even after setting such a low standard, the government frequently failed to make payments, posing straitened circumstances for

7 "留比博士翁詠霓先生歸國充任教務，於是各種重要科學得以循序漸進。翁先生實本所最有功之教員也。"

8 "此次卒業生之成績極佳，其程度甚高，……實與歐美各大學三年畢業生無異。……为中国科学上第一次光彩。"

scientists and their families. In 1921, V. K. Ting, no longer able to provide for his family, was forced to leave his post as director of the institution to become general manager of a coal mine.

In 1922, the government streamlined its departments to reduce expenditures, and the Geological Survey was set to be terminated. Wong Wen-hao, as acting director, sought every possible means to reverse this situation. He enlisted the support of three former ministers of the Beiyang government (including Liang Chi-chao 梁啟超) and five presidents of renowned universities (such as Tsai Yuan-pei 蔡元培). They jointly wrote to the Ministry of Agriculture and Commerce, stating that the Geological Survey

> since its establishment, has attained spectacular achievements in mineral investigation. With regard to academic research, the Geological Survey has produced multiple innovative explications of Chinese geology, nearly on par with international counterparts. It receives recognitions not only from Tsai Yuan-pei and others, but also widely from experts at home and abroad. . . . Not only is the Geological Survey a trailblazer among domestic counterparts, but it is also closely correlated with our international cultural reputation. It is said of this institution that it adopts rigorous standards for employing staff, that it embodies great conscientiousness in performing its duties, and that it is truthfully the only exemplary governmental organization of recent times. . . . It seems unjustifiable to eliminate the Geological Survey, considering how long ago it was established and its extraordinary accomplishments ever since. (Liang et al. 1992)[9]

Eight important personages exerted their influence in the political and academic circles of China, ultimately resulting in the Geological Survey's survival. Wong's efforts saved both the Geological Survey and China's nascent geology from near dissolution.

4 Propounding the Yenshan movement theory

Wong Wen-hao was himself a theoretical geologist principally pursuing theoretical studies on geological structure and metallogeny in China. In the 1920s, he proposed the "Yenshan movement" theory, which holds that during the Jurassic and Cretaceous periods there existed large-scale orogenic movements in Eastern China. The theory was soon recognized by the international geological community and endures to this day.

In October 1926, during the third Pan-Pacific Science Congress in Tokyo, Japan, Wong presented his paper "Crustal movements in Eastern China," which immediately drew the attention of many peers. Here Wong proposed the novel idea of a "Yenshan movement," prior to which the geological circle had little knowledge of crustal

9 "自設立以來關於調查礦產方面固已成績昭然，即關於學術研究方面，尤能於中國地質多所發明，幾足與各國地質機關相頡頏。此非元培等之私言，實爲中外專家所公認……不特爲國內研究機關之嚆矢，亦實關國際文化之名譽，且聞該所用人極嚴，辦事認真，洵爲近時官立機關中所僅見……該所辦理有年，成績昭著，似不應在裁減之列。"

movements in Eastern China in Mesozoic or later times. In the mid-1920s, Wong devoted considerable efforts to structural geology, undertaking a comprehensive and systematic review and theoretical exploration based on the results of field surveys and laboratory research accumulated by the Geological Survey over the previous decade, as well as on pertinent investigatory reports from foreign geologists. Wong also conducted attentive research on the structural characteristics and periods of tectonic movements in Eastern China, especially in the regions east of Liupanshan 六盤山, and published a series of papers, such as "Crustal Movements and Igneous Activities in Eastern China since Mesozoic Time," "Étude tectonique de la région de Pei-piao et ses environs" (Tectonic study on the Pei-piao region and its surroundings), and "The Mesozoic Orogenic Movement in Eastern China." The "Yenshan movement" stood out among his achievements.

During his travels in Europe, the Mesozoic and Paleozoic unconformity left a deep impression on Wong Wen-hao, then an overseas student. After returning home, he was astounded by the results of a geological survey, which showed that evidence of the typical Mesozoic and Paleozoic unconformity in Europe was scarce in Eastern China. The Western geologists who had previously visited China, however, all attributed the formation of China's mountain ranges to some tenuously related periods such as the Hercynian and Himalayan. With extensive investigation and in-depth research, Wong performed analyses of Chinese geologists' survey results concerning a variety of regions, including Xishan (Hsishan or Western Hills) in Beijing, Datong (Tatung) Basin, northern Shaanxi, and western Hubei.

> The disconformity at the base of the Lower Jurassic coal series is a small one but distinct and general enough as to have been noticed where-ever careful observation has been made. . . the pre-Jurassic erosion has either produced an irregular contact between the Jurassic and the Triassic beds or resulted in the partial or complete elimination of the latter. . . . More generally however the Triassic is not completely eroded, and then it is always in parallel position with the Jurassic, no angular discordance between them has ever been recorded. The relation above outlined between the Triassic and Lower Jurassic beds suggests a movement of no negligeable [*sic*] importance at that interval. (Wong 1927, 12)

Surveys conducted in multiple regions of Eastern China revealed that most strata before the Lower Cretaceous have evident unconformities.

> This pre-Cretaceous unconformity becomes even still more marked in the eastern extension of the Tsinling range in southern Honan. . . . The pre-Cretaceous unconformity is therefore of rather general occurrence in eastern China. . . . It is too young in age to be still correlated with the Hercynian orogenic period and too old to be Himalayan. . . . As it was first recognized in the Western Hills near Peking where stratigraphic evidence has been better worked out, it will be referred to here-after as the Yenshan movement. (Ibid., 13)

> . . . the whole sequence from the Sinian (non metamorphic Pre-Cambrian) up to the Jurassic or in some regions to still higher horizons is remarkably conformable with no or little sign of angular discordance. . . . The Mesozoic movement has therefore a great importance in Chinese geotectonics and should be more carefully studied. (Ibid., 9)

Wong further researched and described the orogenic zones during the Yenshan movement period. In his view, in "the eastern extension of the Tsinling (秦嶺) range," there exists "the marked unconformity . . . below the tuff-conglomerate in south-eastern Honan" (ibid., 14).

> All these mountains on the north and northwest of Ordos are known in Chinese geography under the general name of Inshan (陰山) range. . . . In the Tatsingshan range north of Kueihua[10] and Paotou . . . the strata from Carboniferous up to the Jurassic sandstone are more folded with extensive thrusting faults. . . . Between these two orogenec [*sic*] zones, the Inshan range on the north and eastern Tsinling on the south, much gentler but still distinct folding is also developed. (Ibid., 16)

He also deemed that in Zhejiang Province there exists "a great unconformity below the Kienteh conglomerate and sandstone and the overlying porphyry of the Cretaceous age" (ibid., 18). The aforementioned are all manifestations of this orogenic movement. Wong later divided the Yenshan movement into two phases: phase A (late Jurassic or early Cretaceous) and phase B (middle Cretaceous or late Cretaceous). Furthermore, he brought forth essential ideas concerning the Yenshan movement, such as igneous activities and metallogeny.

The discovery of the Yenshan movement was an achievement of immense significance in the regional geology of China and the Pacific in the twentieth century, which completed the global concept of a "circum-Pacific tectonic domain," augmenting it to correspond more closely to geological realities. On the centennial anniversary of Wong Wen-hao's birth in 1989, Huang Chi-ching 黃汲清, a Chinese geologist, reaffirmed the great significance of "the Yenshan movement established by Wong and pertinent theories on igneous activities and metallogeny" (Huang 1989, v);[11] he referred to these as "tremendous contributions to the geology of China," and added that "the ensuing influence is far-reaching" (ibid.).[12]

It was also noted by Wong that after Richthofen and others put forward the theory that plateaus were the most common geological structure in China, Chinese and foreign scholars studying Chinese geology would always resort to the explanation of normal faults when it came to the unnatural boundary between two strata. Their inclination

10 [Modern Hohhot.]
11 "所创立的燕山运动及与之关联的岩浆活动和金属矿床之形成的理论。"
12 "他对中国地质学的重大贡献，其影响是深远的。"

was to believe that the faults in Eastern China were primarily normal faults or vertical ones, and this opinion reached a near consensus in the geological circle back then. In spite of his earlier reports which employed this conclusion, Wong's attitude shifted from doubt to denial over the course of his extensive research. He was of the opinion that the transverse pressure in the orogenic belts in Eastern China was so intense that overturnings and overthrusts were produced. An example can be found in the case of the Helan Mountains:

> The overthrust faults of Helan Mountains ranges from west to east. . . and thus its horizontal movement is beyond doubt. (Huang 1989, 257)[13]
> North of the Yellow River, the structure of Scheiten Ula (包爾騰山) and Ula shan (烏拉山) has been also studied. . . the lateral compression had a northward direction. (Wong 1929a, 35)
> The southern overthrust in Ta-ching-shan . . . is called . . . the Pai-shih-tou-kou (白石頭溝) thrust and has a [*sic*] E-W extension. . . . The more northern one named Yin-shan thrust has an extension twice as long. (Ibid.)

In his opinion, these were by no means a local accidental occurrence, but rather were of profound significance to structure. For instance, in the south of Xuanhua, Hebei, "overthrusts are particularly evident in Huangyang Hill and Jiming Hill" (Wong 1989, 258).[14] In the past, authoritative conclusions all attributed such cases to vertical faults, although some geological phenomena could not be explained by mechanics. Wong was the first to break away from this tradition, asserting that these were the manifestations of overthrust faults. His conclusion was later confirmed by detailed field observations from other Chinese geologists.

Despite Wong's belief that "pure scientists should not be confined only to research, without attending to practicalities," (Wong 1930b, 2–3),[15] he placed a high premium on scientists' duty to seek the truth, as encapsulated in his statement that "Those scientific researchers, regardless of and unaware of the practicality or non-practicality of research, will receive the highest reward from the results of their research, as long as they delve into what is available for research" (ibid.).[16] However, the Geological Survey's near-termination in 1922 imposed constraints on its research trajectory: in a bid to prove their worthiness, the Geological Survey made a special effort to study realms directly pertaining to the national economy. Under his leadership, the institution channeled a vast majority of their efforts into the investigations on mineral resources in

13 "此山之逆掩断层自西而东……其横移运动之显明殆毫无可以疑义。"
14 "黄阳山、鸡鸣山一带，逆掩构造甚为显明。"
15 "不能說純粹的科學家，是只知研究不管實用的。"
16 "研究科學的人，不管它無用有用，也不知什麼叫有用，什麼叫無用，但只知道我可以研究的東西拿來研究，研究的結果便是研究者最高之獎賞。"

China, such as coal, iron, and petroleum.

Wong Wen-hao was also among the first Chinese geologists conducting geological investigations on petroleum. His *Zhongguo kuangchan zhilüe* 中國礦產誌畧 (Gazetteer of China's minerals) published in 1919 comprehensively and systematically presented the metallogeny and production of various minerals in China, highlighting the terrestrial facies of petroleum. He deemed that

> After the Jurassic period, the land of China already solidified, all the inner lakes and shallow seas were evaporated and dried up, which gave rise to gypsum salt and oil deposits. Thereafter, apart from secondary minerals, there were no other deposits being produced. (Wong 1919, 16)[17]

Wong also claimed that the Jurassic strata in Shaanxi Province, which are located north of the Wei River and west of Hexi Corridor, extending westward to Xinjiang, contained petroleum, and that the Mesozoic Erathem in Southern China was widely distributed, the most valuable of which was the petroleum on coal seams in Sichuan Province. Wong was the first Chinese geologist studying the theory of terrestrial facies of petroleum. In the 1920s, he assigned Hsieh Chia-jung to Yumen, Gansu for a geological investigation of petroleum. In the early 1930s, he successively dispatched Hsieh Chia-jung and Wang Zhuquan to north Shaanxi for exploring petroleum, and sent Sun Jianchu 孫健初 to Yumen, which led to the discovery of the exploitable Yumen petroleum deposit. In 1930, the fuel laboratory was established for specialized chemical and physical research and experiments on a variety of fuels, such as coal and petroleum.

In addition, the Geological Survey established China's first earthquake laboratory and the first soil laboratory. The Cenozoic Research Laboratory was jointly founded with Peking Union Medical College, and resulted in the excavation of the Peking Man, which made the Geological Survey the most successful scientific institution in China at that time. Notwithstanding the fact that the Geological Survey's success was largely attributable to its emphasis on practicality, to large amounts of private funding, and to smooth collaborations with foreign scholars, the former director V. K. Ting was perfectly aware that "the institution would not have succeeded, should the director have made no sacrifices" (Ting 2008, 106).[18]

5 Initiator of modern geography in China

Wong Wen-hao is famed for his dual identities as both founder of modern geology and

17 "侏羅紀之後，中國陸地業已鞏固。所有內湖淺海亦復蒸發乾涸。而膏鹽油礦，亦於是焉成。嗣是厥後，除次生成鑛外，無復鑛床生成矣。"

18 "若是没有一个很牺牲自己的所长，地质调查所也决不能有今日的成功。"

initiator of modern geography in China. Early in 1922, Wong published "Zhongguo dishi qianshuo" 中國地史淺說 (Discussion on the historical geology of China), the cornerstone for China's modern geography. He held the belief that "All the hills, rivers, mounds, and ravines in geography can all be ascribed to inevitable causes from historical geology" (Wong 1930c, 43),[19] and that what is known from geological history can be "applied to geography, especially to explicating modern situations" (Wong 1930c, 43–44).[20] He explored certain natural geographical phenomena, such as changes to China's coasts as well as the flooding and diversion of the Yellow River, and from a geological perspective elucidated the formation and changes of mountain ranges by employing modern geological theories and making reference to a wide variety of local gazetteers that had been published over generations.

Though China is a mountainous country, traditional Chinese geography since ancient times has given its greatest attention to waterways while leaving mountains unattended. In 1925, Wong published "Zhongguo shanmai kao" 中國山脉考 (Studies on the mountains of China), his magnum opus on geomorphology that delved into the similarities, differences, merits, and demerits of Chinese and foreign researchers' investigations of China's mountains. He put forward the proposition that to survey the distribution of mountains, one must refer to geological structures, orogenic periods, and endogenic and exogenic forces, because "contradictory and farfetched interpretations will be unavoidably engendered if researchers, both at home and abroad, disregard geology while studying mountains" (Wong 1930d, 229).[21] He particularly criticized ancient Chinese geography for the geomancy that divided mountains into strips, and traced their major and branch lines and the so-called *long mai* 龙脉 (dragon's vein, terrain that looks like a dragon), pointing out the fallacy that there must exist a pure watershed between two bodies of water. It was Wong's opinion that the distribution of folded zones and paleo-land must be ascertained through geological structures, and fold axes and faults were the common contributing factors for mountain formation. He summarized five causes of mountains, such as strong folding, flexure, faulting, volcanic ejecta accumulation, and erosion. He noted that modern geographers should survey mountains by observing geological structures and the sculpturing of earth's surface. Apart from that, Wong illustrated the distribution of China's major mountains and appellations of primary mountain systems from the standpoint of geological structures. Huang Chi-ching was highly complimentary about Wong's informative and insightful review, going so far as to say that "Chinese research on China's mountains or orographic studies had factually offered no novel

19 "今代地理上之一山一川一丘一壑，莫不於地質歷史上有其當然不獲已之原因。"
20 "應用於地理學者，尤在利用已知之地史以說明現代的情形。"
21 "舍地質而論山脉，無論中外，均不免於矛盾穿鑿之病。"

contributions up until its publication" (Huang 1989, 11).[22]

Afterwards, Wong Wen-hao published a series of papers, such as "Zhongguo dilixue zhong zhi jige cuowu de yuanze" 中國地理學中之幾個錯誤的原則 (Some erroneous principles in Chinese geography) (Wong 1928), "Zhongguo dili quyu jiqi rensheng yiyi" 中國地理區域及其人生意義 (China's geographical regions and significance to life) (Wong 1929b), and "Zhongguo de renkou fenbu yu tudi liyong" 中國的人口分布與土地利用 (China's population distribution and land utilization) (Wong 1932b), rectifying non-scientific viewpoints of various kinds in preceding research on mountains. He also traced administrative divisions through the history of China, and explicated the relation between population and geography in China from a macro perspective. He noted that mountains accounted for much of this relation through dividing the natural regions. In his estimation, the arable land covered approximately 1 million to 1.3 million square miles (i.e. four to five billion *mu*), and he pointed out that a surfeit of population and a lack of arable land brought about insufficient farmland per capita, to which the intensity of China's overpopulation could be attributed.

In a bid to address the confusion engendered by the absence of accurate surveying and mapping, Wong shifted his research focus to geography after 1930. Maximizing the opportunity of his new post as "chair professor" of the China Foundation for the Promotion of Education and Culture, he commenced research on the geography and maps of China. He perused and referred to diverse works, such as E. Soueiet's *Observations Mathématiques, Astronomiques, Géographiques, Chronologiques et Physiques, Tirées des Anciens Livres Chinois ou Faites Nouvellement aux Indes et à la Chine* (Mathematical, astronomical, geographical, chronological, and physical observations from ancient Chinese books or newly made ones in India and China) (1729 Paris), J. B. Duhalde's *Description Géographique, Historique, Chronologique, Politique, et Physique de l'Empire de la Chine et de la Tartarie Chinoise* (Geographical, historical, chronological, political, and physical description of the empire of China and the Chinese Tartary) (1735 Paris), Joseph-Anne-Marie de Moyriac de Mailla's *Histoire Générale de la Chine* (General history of China) (1783), Abbé Grosier's *La Chine, ou Description Générale de cet Empire, et des Isles et Divers États Tributaires* (China, or general description of this empire, and isles and various tributary states) (1818), pertinent works by Jean Baptiste Bourguignon d'Anville and Joseph Nicolas de l'Isle and relevant records in ancient Chinese books. In doing so, systematic and comprehensive studies were performed on the history of foreign missionaries' surveying and mapping of China's geography in the early Qing dynasty and associated technical issues (the scope and methods of surveying and mapping and so forth), leading to Wong's publication of "Qingchu cehui ditu kao" 清初測繪地圖考 (On surveying and mapping in the early Qing dynasty)

22 "从那以后直到今天，中国学人对中国山脉，或叫山文的研究实际上没有什么新的贡献。"

(Wong 1930a), which provided solid ground for compiling new maps.

In 1933, *Zhonghua minguo xin ditu* 中華民國新地圖 (New atlas of the Republic of China) and *Zhongguo fensheng xintu* 中國分省新圖 (New provincial atlas of China), co-authored by Wong Wen-hao, V. K. Ting, and Tseng Shih-ying 曾世英, were published by the *Shen-pao* 申報 Press in Shanghai, the former later described as "China's first modern atlas compiled through measured data, and color layers of contour lines" (Hu 1984).[23] Upon publication, the atlases were highly valued and complimented at home and abroad, and were perceived as epoch-making works—the fifth edition of *Zhonghua fensheng xin ditu* was published in 1948. Particularly after the founding of the People's Republic of China, the dire need for maps in multiple realms of national construction "fully unveiled the significance of these atlases" (该图的重要性才充分显示出来) (Huang 1989, 13).

In the name of bolstering ties among geographers nationwide and advancing China's geography, in 1932, Wong Wen-hao, Chu Ko-chen, and V. K. Ting collaboratively proposed the establishment of the Geographical Society of China, which in March 1934 was founded in Nanjing, and was accompanied by the inauguration of *Dili xuebao* 地理學報 (Acta Geographica Sinica) in September of the same year. Wong, given his pioneering contributions to the geography of China, held the office of the president for the Geographical Society of China until 1943, "contributing tremendously to boosting China's geography before the Liberation" (Li 1984).[24]

6 Wong as a politician

The 1930s witnessed a grave national crisis in China. In 1931, Japan's invasion of China's northeastern region exacerbated the hardships of Chinese people. The crisis forced almost every Chinese person to contemplate and sometimes entirely reset their life trajectories. Wong Wen-hao became incrementally more "concerned with the eventual disintegration of the great homeland, and my stamina in conducting research regardless of hardships turned into apprehension for the nation's future and sleepless nights" (Weng 1996, 62).[25] Wong, in collaboration with eight or nine liberal intellectuals, including Hu Shih and V. K. Ting, established at their own expense the weekly journal *Duli pinglun* 獨立評論 (Independent critic), aspiring to "publish the thoughts of each of us in conscientious words" (用負責任的言論來發表我們各人思考的結果) (Hu 1932, 1), while "retaining some independent spirit" (希望保持一點獨立的精神) (ibid.).

Wong, nonetheless, was rarely engaged in the discussion of heated issues such as

23 "我国第一本根据实测资料，按等高线，运用分层设色法绘制的现代化地图集。"
24 "推动解放前我国地理科学的发展作出了巨大的贡献。"
25 "深恐大好河山竟歸破裂，向來安心研究受艱苦而不辭者，至此則為國局前途憂從中來，難安寤寐。"

democracy versus dictatorship and peaceful versus forceful unification. He put more emphasis on accelerating national industrialization to enhance the country's resistance against foreign invasions:

> To explore and resolve practical issues is of more significance than disputes on one-party dictatorship or two-party autocracy, democracy or constitutionalism and the like. . . . The imperative does not lie in seeking and following a ready-made doctrine, but in recognizing and addressing practical issues. (Wong 1932a, 3)[26]

He seemed to be mostly attracted to a form of nationalism which pursued prosperity and power in order to attain national independence. As Wong himself admitted, he "has never meticulously delved into esoteric isms of diverse sorts, and never gained an explicit comprehension of various particular theories" (ibid.),[27] but rather "holds fast to the very belief that regardless of which doctrines to abide by or systems to adopt, we must appoint people by merit, and strive for higher attainments" (ibid.).[28]

It was at this time that Chiang Kai-shek, who wielded the power of the Nationalist government, was painstakingly enlisting the services of scholars and experts. In the summer of 1932, Wong was invited to Mount Lu to deliver lectures for Chiang. This encounter left Chiang with a striking impression and admiration of Wong's professionalism and knowledge—his understanding of the country's mineral resources, and of the fertility and barrenness of water and soil, as well as his insights on national construction. On June 19, 1932, Chiang wrote in his diary: "Wong is indeed a knowledgeable and exceptional talent" (Chiang 1932).[29] Hence, Chiang did his utmost to get Wong to join the Nationalist government. Leaving his study room and devoting himself to politics, especially tasks related to nation-building, meant just another avenue for Wong to fulfill his national obligations for the country. In one poem, Wong described his aspirations as a young man: "Albeit young, I am self-exhorting; supporting the waning country, I must assist the resurrection of China" (Wong 1953).[30]

In November 1932, Wong (who still served as director of the Geological Survey) was appointed secretary of the National Defense Planning Commission, a secretive organization of the Nationalist government, and put in charge of the investigation of national conditions and economic preparation for the war. In late 1935, he was officially elected general secretary of the Executive Yuan. Tsiang Ting-fu 蔣廷黻, head of the History Department at Tsinghua University, and Prof. Ho Lien 何廉, director of

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26 "實際問題的研究和解決，比什麼獨裁雙裁、民主憲政等等名詞爭辯更為重要……我們的需要的不是要找到一種現成的主義去信奉他，尤其要緊的是要認識實際的問題去解決他。"
27 "對於各種深奧的主義從未用心研究，各種特別的理論也不十分明白。"
28 "只相信無論信仰什麼主義，或采取什麼制度，都要用好好的人去好好的做。"
29 "翁實（爲）有學有識之人才，不可多得也。"
30 "我雖年少知自勉，須扶衰弱佐中興。"

Nankai Institute of Economics, and some other liberal intellectuals followed suit by taking posts in the Nationalist government. Hu Shih, a Peking University professor and spiritual leader of Chinese liberal intellectuals, quoted the late V. K. Ting's poem in a letter to Wong and others:

> Red and gold foliage contend in autumn beauty, and jade-green glazes glitter at dust;
> I exhort you to emulate the water under Magu Bridge, flowing more limpidly outside the mountain than therein. (Hu 1936)[31]

Hu Shih explained his quotation:

> My friends, I have firm faith in you that after entering the political circle, you will definitely become more dedicated than before, like the water in the poem. My personal opinion, however, holds that at this point, the country is in need of a group of friends and subjects who offer forthright admonitions to the government. (ibid.)[32]

Hu even suggested that they form an advisory group to the government: "You should all deem yourselves as a brain trust who have the daring to speak, and to fight for your stance when having no alternative" (ibid.).[33] It was the Chinese liberal literati's idealistic imagination, and their typical understanding of realpolitik, that they both desired to intervene in actual political operations to practice their own political ideals and yearned for retaining independent individualities. That "fight for one's stance when having no alternative," as a matter of fact, was conceived in Wong's mind, and practiced in his action, while up until this point, the pursuit of idealism was merely confined to Wong's imagination.

Wong Wen-hao, after the outbreak of the War against Japanese Aggression in 1937, was transferred from general secretary of the Executive Yuan to minister of the Ministry of Economy. He was then in charge of the economic administration and industrial construction in the rear area, where he also presided over the construction of industrial centers as well as the inland relocation of coastal industries and mining operations. Wong made enormous contributions to these multi-faceted endeavors. Nevertheless, Wong Wen-hao, against the backdrop of the corruption and internal strife of the Chongqing government, repeatedly attempted to hand in his resignation, while Chiang Kai-shek urged him to stay by restating that "the right-hand man should assist through weal and woe" (股肱相幫，患難相濟), and resolutely denying his applications. Some suggested that he should "cultivate friends" and "forge good relations" with governmental dignitaries. Wong, however, exhibited the true nature of

31 "紅黃樹草爭秋艷，碧綠琉璃照晚晴；為語麻姑橋下水，出山要比在山清。"
32 "我對於你們幾個朋友，絕對相信你們出山要比在山清。但私意總覺得此時更需要的是一班面折廷爭的諍友諍臣。"
33 "皆以賓師自處，遇事要敢言，不得已時以去就爭之。"

scholars (upholding the truths without fear of dignitaries, never drifting with the tide, and insisting high moral standards and integrity) suggested by V. K. Ting's poem in the following paragraph of his diary:

> I shall exert all my strength to serve the country, defying danger and death, while I shall neither support one and ostracize another, nor trim my sail to the wind, nor seek personal gains with power. Under no circumstances will I covet official posts or status. The dissenters and I can part company, but no campaigns shall be attempted to collude. Such is my perpetual belief, whether at the present or in the future. (Wong 1941 [2014], 615)[34]

7 Leader and architect of industrial construction

In 1937, as the secretary-general of China's delegation to the coronation of George VI, Wong Wen-hao made a visit to Europe, but after his return to Nanjing, the full-scale Sino-Japanese war had already broken out. Chiang Kai-shek appointed him minister of the third department (national defense industry) of the Military Affairs Commission and director of the Industrial and Mining Adjustment Administration, thus making Wong responsible for relocating industries and mines away from coastal areas such as Shanghai to Western China. Prior to the outbreak of the War against Japanese Aggression, China's modern industries were primarily concentrated in the southeastern coastal ports opened to foreign trade, while Western China remained unindustrialized. The Nationalist government decided to move the southeastern industrial and mining enterprises to the western rear area, so as to preserve the material power for China's enduring resistance. This was the Chinese version of the "Dunkirk evacuation," and the migration westward included troops and civilians as well as large quantities of industrial facilities, such as boilers, electric generators, pliers, and wrenches. The conditions of China's transportation infrastructure at that time rendered this evacuation arduous. It was said that in total the Nationalist government assisted the migration of 448 private enterprises, 70,900 tons of materials for machineries, and 12,182 technicians (Chen and Yao 1957, 88). The inland move of personnel and equipment helped to overcome the backwardness of the industries in Western China, enabling it to become the economic underpinning for China to sustain a protracted war.

In early 1938, Wong Wen-hao became minister of the Ministry of Economy, chairman of the Resources Commission responsible for state-owned industries, and director of the Industrial and Mining Adjustment Administration, which assisted private enterprises. In 1944, he was also conferred the title of director of the Wartime Production Bureau, making him the highest officer of the national economic

34 "为国服务，鞠躬尽瘁，虽死不辞，但绝不拥甲倒乙，亦决不随风而靡，决不图谋私利。对于为官地位更绝无恋栈之意。不合则分，绝不能有运动勾结行为。耿耿此心，向来如此，现在及将来亦如此。"

administration, in particular for industrial and mining production, in "free China" (自由中國) (used by Western countries as the appellation for Taiwan during the Cold War) during wartime. While presiding over and advancing industrial and mining construction in the rear area, Wong constantly envisaged the potential avenues for reconstructing China's economy and realizing industrialization. In October 1942, the American scholar John King Fairbank, who was in Chongqing at that time, was highly complimentary about Wong, saying that "He may be the rebuilder of China sometime" (Fairbank 1982, 221).

Chinese intellectual debate on modernization after the May Fourth Movement tended to focus on the long-term subject of the relation between Eastern and Western cultures. Back then, it was already Wong's belief that "Culture is surely an important element of the national foundation, but no outlet for China can be found solely in culture, given the enormity of the changes and dangers facing China today" (Yung-ni 1933).[35] The eruption of the War against Japanese Aggression struck an immediate and heavy toll on China's small industrial capacity. Consequently, in the turbulent wartime atmosphere, discussions on China's industrialization were stirred up among Chinese intellectuals. Some (such as Yun Daiying 惲代英, Sun Zhuozhang 孫倬章, Yang Mingzhai 楊明齋, Wu Jingchao 吳景超, and Zhang Peigang 張培剛) held that China "must underpin itself with industries" and realize industrialization, while others opposed to industrial construction and advocated "strengthening the nation with agriculture." Publishing a series of articles and giving public speeches, Wong propounded his relatively comprehensive roadmap for Chinese industrialization, based on years of investigation of China's mineral resources, research on China's natural and economic geography, and his experience as minister of the Ministry of Economy. He believed that "only industrialization can lead to a thriving and prosperous China, which will become part and parcel of international economic development" (Wong 1941, 92).[36] "In the course of industrialization," he continued, "we will still highlight the development of agriculture, and simultaneously underpin China both with agriculture and construct it with industry, which is the true and proper guideline for China's economic development" (Wong 1944, 8).[37]

It was of great significance which kind of economic system would be employed during China's industrialization. Wong, after a comprehensive survey of the economic systems of various countries, thought that although the state-owned planned economy of the Soviet Union in the short term made for rapid growth, which was what China needed at that point, it was inopportune for China to fully adopt "the Communist

35 "文化固然是立國要素，但震撼危險到中國今日的程度，專在文化上也決找不到出路的。"
36 "只有工業化才能使中國富强、使中國成爲國際經濟發展中的重要一員。"
37 "我們在工業化途中，依舊注重農業，努力發展，以農立國，與以工建國同時並進，並行不悖，那便是中國經濟建設的眞實方針。"

method of eradicating private property rights and implementing totalitarian and harsh policies" (Wong 1989).[38] Due to the incompleteness of China's social organization and the inconvenience of transportation, it was also impracticable for China to utilize a government-controlled economy similar to Germany or Japan. Wong insisted that China should exploit to the fullest its favorable conditions and avoid unfavorable ones, adopt "the method of the mean" (折衷取法), and assume the "main responsibility for promoting state-run enterprises whose foundations must be laid and for regulating private sectors to fulfill the right trajectories, thus arriving at the same end by different means and rapidly strengthening the nation" (Wong 1942, 137).[39]

As a proactive advocate of state capitalism, Wong insisted that in the economic construction of China, "the priority should be given to state-owned enterprises" (首宜重視者，厥爲國營事業) (Queshi 1943, 130). The reason was that a large proportion of fundamental industries in un-industrialized regions required urgent construction. If private enterprises were allowed to operate for profits at their own will, "the limited amount of cement is exclusively utilized to build theaters and dance halls instead of factories, railways or highways; the even more limited amount of steel is used specially for private recreation, rather than constructing indispensable facilities for production and transportation; skyscrapers unnecessary for this occasion is a pointless waste of national power, bringing nothing but harm" (Wong 1946b, 83).[40] Particularly for railways and steel, which were beyond private enterprises' capacity to construct and produce, the government could in the short term "lay a foundation on the whole" (奠定較大規模之基礎) (ibid.) to build favorable circumstances and conditions for rapid economic development. For industries that constituted the economic lifeline of the country, more endeavors should be made to prevent "private businesses from monopolizing the market, and incurring capitalist abuses" (私人壟斷市場，致釀資本主義流弊) (Wong 1945b, 2). In the meantime, Wong highly valued the development of private enterprises, stating that

> advocating state-owned enterprises is by no means underestimating or hampering private ones. . . but rather, the former could assist and boost the latter, which should be borne in mind every now and then, and achieve a win-win situation by making them supplementary to each other. (Wong 1946b, 82)[41]

38 "共產主義鏟除私人產權，施行極權而嚴酷之政策。"
39 "由政府多負責任，促進國營事業，奠其基本，管制民營事業以正其趨向，俾可殊途同歸，速增國家實力。"
40 "用有限的水泥，不建工廠，不造鐵路、公路，而專建戲館舞廳；用更有限的鋼鐵，不建正當必需的生產及交通事業，而專修私人享受，實非此時必需的高樓大廈，實是國力的無謂損失，有害無益。"
41 "提倡國營決不是看輕民營或妨礙民營……相反的，國營事業正可幫助民營，促進民營．而且應該時時在心，使其互相輔助，共同成功。"

On the other hand, he advocated the appropriate control of private capital, "preventing it from impacting strategies of national construction" (Wong 1945b, 2),[42] guarding against the emergence of private monopoly, and taking precautions against bureaucratic capital, "so as to keep high-ranking officials from all becoming capitalists, and restrict capitalists from coveting high official posts" (Queshi 1943, 130).[43]

Wong also endeavored to introduce new foreign technologies and capital. After the onset of the Pacific War, he turned his attention to the United States, and supported the selection and dispatching of hundreds of state-financed technical and administrative staff in seven groups for training in the United States, which equipped them with new technological knowledge and scientific management methods. After the triumph of the War against Japanese Aggression, he made a further appeal that "we must hold a long-term vision, courageously employing all kinds of novel technologies and scientific management" (Wong 1945a, 6),[44] because "every five or ten years may witness another industrial revolution" (ibid.).[45] Given China's weakness in finance and lack of technical talent, Wong believed that "construction cannot be undertaken easily without foreign capital, which is necessary for China to build itself up" (Queshi 1943, 131),[46] but meanwhile domestic enterprises must be protected conscientiously. "Both striving to protect national businesses and embracing foreign capital as much as possible" was the right track (ibid.).[47]

His thoughts on the industrialization of China proved to contribute greatly to the country's intellectual heritage in its process of modernization.

8 The scientist's disappointment at politics

After the victory of the War against Japanese Aggression, Wong Wen-hao repeatedly submitted his request for resignation to Chiang Kai-shek, and finally was able to step down from his governmental post. He insightfully predicted that the petroleum industry would play a decisive role in the post-war world economy. Thus, he established the state-owned Chinese Petroleum Corporation (currently still operating in Taiwan), and served as president and general manager of the board, committed to spearheading the petroleum industry of China. However, in 1948, when the politicians of the Nationalist government were vying for the presidency of the Executive Yuan, Chiang had no choice but to resort to Wong. Chiang justified Wong's qualification by stating that:

42 "不許其影響於建設國家的方略。"
43 "免使作大官者皆爲資本家，免使資本家皆想做大官。"
44 "眼光要放远大些，一切新式技术和科学管理都要勇于采用。"
45 "每五年、十年可能又是一個工業革命。"
46 "非有外資匡助，不易積極建設，故歡迎外資誠爲建國要舉。"
47 "惟有對於本國事業儘量保護，而對於外國資力充份容納。"

> Wong Wen-hao is an internationally reputable scholar who has acted as a member of the Committee of the Nationalist government and vice president of the Executive Yuan. It is acknowledged that he is in possession of an all-round understanding of Chinese and foreign situations. Particularly, for the last decade, he assumed minister of the third division of the Military Affairs Commission, director of the Wartime Production Bureau, and chairman of the Resources Commission. With regard to economic construction and enriching national defense resources, he dedicated his utmost efforts and yielded outstanding achievements, while attainments were made in multiple significant realms, such as international relations, education, and culture. (Anonymous 1948b, 2)[48]

In July 1946, Chiang Kai-shek, disregarding the craving and expectation of every Chinese for building this nation in peace, launched the civil war, attempting to wipe out once and for all the Communist Party of China by force. Many political parties and liberal intellectuals that had previously been deemed as middle forces (such as China Democratic League) were thoroughly disillusioned with the Kuomintang. Although the incorrigibility of the Kuomintang regime was becoming increasingly evident, Wong Wen-hao, indebted to Chiang for his life-saving favor after the car crash, made a second entry onto the political stage as the first president of the Executive Yuan (commonly referred to as "the constitutional cabinet") of the Nationalist government.

Wong's old friend Hu Shih commended him for his "comprehensive scientific knowledge and administrative experience" (兼有科學知識與行政經驗) (Anonymous 1948a, 2) and believed that through his work "a new ethos of China's politics will be initiated: impractical talks will be eradicated, especially the unscientific ones, in line with his spirit and methods gained from years of accumulated knowledge" (ibid.),[49] and he naively "hoped that special attention and advocacy for technocracy will be drawn under his leadership" (ibid.).[50] The famous political commentator Chu Anping 儲安平 held a different view. He wrote that under the present circumstances "Wong's being elected president of the Executive Yuan may bring out more industriousness among officials in carrying out their duties, mere formalities and set practices in China's officialdom may be reduced a little, and the morale of the administrative departments may be elevated slightly. Nonetheless, pinning hopes on Wong to reverse the trend and transform the situation is a wild wish, if not an illusion" (Chu 1948).[51] He

48 "為國際著名學者，曾任國民政府委員、行政院副院長等職，對中外情形夙稱通達，尤以十餘年來歷膺軍事委員會第三部、戰時生產局及資源委員會首長，凡關經濟建設以及充實國防資源等工作，久瘁心力，丕彰績效，而於國際聯系暨教育、文化諸要端，並多建樹。"

49 "用多年來積學的精神和方法，開中國政治上的新風氣，打倒空談，不科學的空談。"

50 "期望在他的領導下，對專家的政治，得到特別的注意和提倡。"

51 "翁氏出長政院後，做事情也許可以認真一點，一切中國官場的虛文俗套也許可以減少一點，整個的行政情緒也許可以提高一點。但是要希望翁氏來轉捩乾坤，改變一個局面，那假如不是一種幻想，就是一種奢望了。"

even made a piercing remark that "we surely hope for Wong's success to some degree, but should he fail, we would not necessarily ascribe failure to his own doing. The irresistible trend cannot be turned around by few people like Wong" (ibid.).[52] His prediction was closer to the historical outcome.

Though his term as the president of the Executive Yuan lasted only half a year, Wong Wen-hao's name became associated with a grim event in the history of the Nationalist government: the *jinyuanquan* 金圓券 ("gold yuan" notes) currency reform wound up a failure. On November 3, 1948, Wong's cabinet submitted to Chiang their collective resignations. Despite Chiang's persistent urging, Wong insisted that "Should the president of the Executive Yuan believe a policy is unimplementable, or a major mistake be made in implementation, he should proffer the Chairman his resignation. . . . This is a constitutional convention, and complies with the principles of modern politics" (Wong 1948b);[53] otherwise, "the original intention of the constitution will be undermined" (有失憲法原定之精意) (ibid.).

On October 9 of the same year, at the opening ceremony of the joint annual meeting of ten scientific groups, including the Geological Society of China, Wong Wen-hao, utterly exhausted from the currency reform, delivered an address as the annual meeting's honorary president. After analyzing the history of the development of science in China and the impediments it faced, he expressed that it was to be regretted when scientists' research was impacted by their concurrent administrative duties. As Wong poignantly remarked, "scientists would rather starve to death than engage in anything else!" (Wong 1948a, 3).[54] He followed this up with a self-deprecating comment: "Nonetheless, the loss of an unworthy scientist like me, who was designated as president of the Executive Yuan, would naturally cause no detriment to the scientific community" (ibid.).[55] Be that as it may, the audience could still acutely sense the anguish and internal struggle of the speaker.

In the end, politics dealt Wong a bad hand. When Wong Wen-hao was elected president of the Executive Yuan, China had already been in the midst of the civil war between the Kuomintang and the Communist Party of China. In December 1948, the "Christmas present" that Wong received was an announcement by the "authority in northern Shaanxi" (陝北權威人士) of the Communist Party of China that forty-three people, including Chiang Kai-shek, were listed as "nationally infamous first-class war criminals . . . heinous criminals who can be executed by any Chinese person" (Xinhua

52 "我們當然希望翁氏多少有一點成就，但是假如翁氏失敗了，我們也不一定就認為是翁氏個人的失敗。大勢如此，這已不是翁氏等一兩人所能撐支得了的了。"
53 "行政院长院长如认为政策不能施行，或施行有重大错误，均应向总统呈请辞职……实为宪政已定之常规，亦极合近代政治之原理。"
54 "科學家寧可餓死也不能去作別的事！"
55 "不過像我這個不成材的科學家去做行政院長，自然說不上對科學界有什麼損害。"

News Agency 1948, 1),[56] with Wong himself ranking the twelfth.

In early 1951, after many turns of fate, Wong Wen-hao returned from exile in Europe to the Chinese mainland in the midst of a sweeping transformation—People's China (人民中國). Rumors in the West had it that "The Nationalist government today declared former premier Wong Wen-hao a rebel and ordered his arrest. The former geologist Premier who left Paris to join the Peking regale[57] early this year is reported to be somewhere in northwest China exploring uranium ores for Soviet Russia" (United Press 1951, 12). As a matter of fact, Wong Wen-hao did not enjoy such a prominent assignment; in fact, he forever lost the opportunity to rejoin the geological world. The first challenge confronting him was to "reform his thinking." In the hope of returning back to China's geological community, he devoted himself to translating some geological treatises and material as testimony to his "worthiness," while in reality the community did not seem to welcome his arrival. In spite of his public announcement that he had departed from the old regime, and Mao Zedong's commendation of Wong as "patriotic" (有爱国心) in the famous "Lun shida guanxi" 论十大关系 (On the ten major relationships), Mao meant it in the context of "a patriotic member of the Kuomintang army and government" (有爱国心的国民党军政人员) (Mao 1977, 279).

9 Conclusion

The life of Wong Wen-hao, born in the late nineteenth century, illustrates the position of Chinese intellectuals during the country's transition to modernity. In his early years, he received systematic training characteristic of traditional Chinese culture and won the title of *xiucai* "eximious talent"—his initial knowledge structure and value system derived entirely from this educational background. Some contemporary scientists and humanistic scholars also received a traditional cultural education in their early lives, but none of them progressed so far as to obtain traditional scholarly honors such as *xiucai* or *juren* "commendable individual." Intellectuals of the prior generation had earned these scholarly titles, but none had received systematic Western science education—let alone Western doctorates.

Amid a traditional society in collapse, Wong Wen-hao successfully redirected his intellectual trajectory: while studying in Europe, Wong's knowledge structure and values underwent radical changes. The 1910s and 1920s—the period after his return—witnessed the establishment of modern science in China. In the Republic of China's early years, when political volatility prevailed, he surmounted numerous difficulties as head of the country's leading geological research institution, which survived both a severe shortage of funding and once avoided complete dissolution.

56 "全國聞名的頭等戰爭罪犯……是罪大惡極國人皆曰可殺者。"

57 The word "regale" appears in the original *South China Morning Post* article.

With unremitting perseverance and tremendous self-sacrifice, he immersed himself in training geological talent, propelling the localization of China's geological and geographic research. Furthermore, his theoretical studies on geological structure and metallogeny in China yielded accomplishments of international significance, making him one of the most globally acknowledged Chinese scientists of his day.

The Confucian saying that "officialdom is the natural outlet for good scholars" has served as a guide and a means for Chinese intellectuals to participate in realpolitik and fulfill their ambitions over the past two millennia. A leading representative of the first generation of modern Chinese scientists, Wong Wen-hao was in possession of masterful scientific expertise, while still retaining traditional Chinese intellectuals' strong sense of social responsibility. The severe national crisis awakened Wong's patriotism and social accountability, and led him to yet another redirection, from scientist to high-ranking government official. During the War against Japanese Aggression, Wong became a high official of the Nationalist government, contributing significantly to industrial construction and to the strengthening of national defense. He believed that the government was in need of "good men" fulfilling their duties, and was highly convinced that he found the right avenue for achieving China's industrialization. Nonetheless, in a political circumstance of extreme complexity and cruelty, the political experience of an eminent scientist ended in tragedy.

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