

FIGURE 27. Stratigraphic sections of Upper Cretaceous, Paleocene and lower Eocene strata in the San Juan Basin, New Mexico, and their vertebrate fossil (mostly mammal) horizons.

cal expedition to China for the American Museum from 1901 to 1904. While there he acquired a considerable number of texts on medicine and natural history [54]. Also in 1915, an American geologist, George D. Louderback (1874-1957) discovered fragments of a carnivorous dinosaur in Sichuan Province [55].

Indeed, in addition to his Fayum prognostication in 1900, Osborn that same year also suggested that Central Asia was the place to search for pre-Cenozoic placental mammal development [56]. This came after Russian geologist-explorer Vladimir Afanasevich Obruchev's (1863-1956) find in 1892 of fossil rhinoceros teeth along the old caravan route that ran through the Gobi desert from Kalgan to Urga. More intriguing in some respects was what the German paleontologist, Max Schlosser, published in 1903 on the Chinese fossils one K. A. Haberer had purchased and sent to him [57]. Among them, Schlosser revealed, was a fossil human tooth, a find upon which he based his proposal that the humans had originated in Asia. Schlosser's suggestion, more than anything else, fed Osborn's desire to investigate Asia. Schlosser, it will be recalled, also became involved in Fayum primate work and was one of Granger's stops during his European tour in 1911-1912.

By 1920, Borissiak was able to hypothesize that Cenozoic and possibly Cretaceous fossils would be found in the Gobi [58]. Osborn,

always thinking globally, had been following the developments, looking forward to the day when his staff would hunt for some of the vertebrate fossils in Central Asia they had been finding in the American West and Europe. As he later wrote:

The history of northern Asia remains unknown until the period of the Ice Age, when man first appears; yet theoretically we are certain that it was part of a broad migration and dispersal belt which at one time linked together the [faunal] colonies of France and Great Britain with those of the Rocky Mountain region of Wyoming and Colorado. Though the kinds of animals which we find in these two far-distant colonies are essentially similar and every year's discovery increases the resemblance and diminishes the difference between the life of Europe and the life of the Rocky Mountain region, connecting links are entirely unknown. It follows that northern Asia must be the unknown migration route between these two far-distant colonies [59].

Granger returned to the Eocene of New Mexico and southern

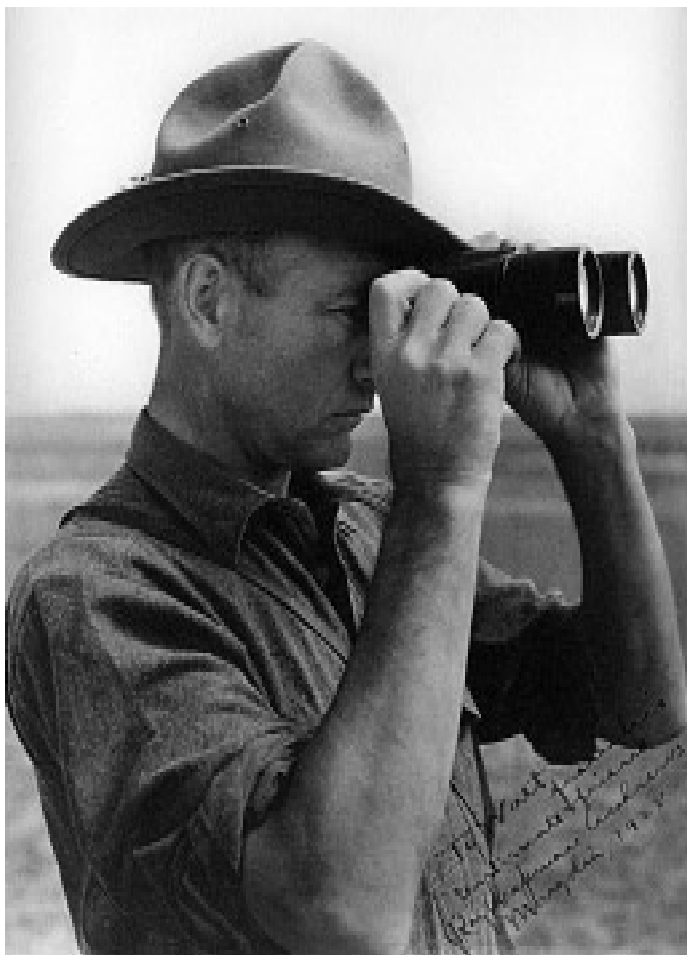


FIGURE 28. Roy Chapman Andrews, 1884-1960.

Colorado for the 1916 season, from June 24 to October 22. He collected with Olsen, Martin and George J. Ingraham that season, but he did not publish. In 1917, he did not go into the field, but published four papers, including one with William K. Gregory on a revision of the Eocene primates of the genus *Notharctus* and two with Matthew on the giant flightless bird from the Eocene, the *Diatryma steini*. He also published "Notes on the Paleocene and lower Eocene mammal horizons of northern New Mexico and southern Colorado."

Granger was, by this time, deeply involved in the study of mammalian evolution, as well as the collecting of fossil primates. His 1911-12 winter European tour had emphasized determining what the European paleontologists were doing in evolutionary and primate studies. He was producing many mammal and primate fossils from the American basins and had produced a fossil primate forehead bone from the Fayum as well, though it ultimately languished in the basement of the Museum many years before it was analyzed. Part of the reason for that oversight might well have been Osborn's personal discomfort with accepting that man was descended from ape, though he permitted the rest of his department to pursue the thought [60].

Gregory and Matthew were as fascinated with the study of primates as was Granger. While in Europe, Granger had visited with Professors Max Schlosser in Munich and Eberhard Fraas in Stuttgart to sketch and photograph the anthropoid primate finds Markgraf supplied them. He later wrote to congratulate Markgraf:

My Dear Herr Markgraf:

I received your letter of last January when I returned from my trip to the European museums this

winter. While I was in Europe I saw Prof. Fraas and all of the splendid specimens which you have collected for him, and those at Munich... [61].

Indeed, while Granger was in Europe, Matthew was at the December, 1911, meeting of the Geology Society of America leading a symposium in praise of Granger's Fayum finds and expressing excitement about Fraas's work on Fayum primates. But Fraas's and Schlosser's fossil primate work in Germany became more threatened as World War I raged. Even Osborn joined to request Markgraf to find more primate fossils in the Fayum and send them to America. But by early 1915, a financially and physically depleted Markgraf advised:

In regard to Professor Osborn's wish regarding my collecting further for the small forms such as Schlosser has described, I should like to do so provided Professor Osborn can make it possible [financially]. I cannot undertake this work on my own account because it is too risky. The place from which most of these small things came is almost exhausted. Only the place from which [Pro]pliopithecus teeth and rodents came will possibly yield further specimens;... [62].

Contact with Fraas and Schlosser became more sporadic, Germany ultimately becoming an American enemy, and within a year Markgraf was dead. Fayum fossil-hunting would cease entirely until 1946 when Wendell Phillips and his party entered the desert hoping to locate Granger's sites and continue the search for anthropoid primate fossils. As to the latter, they were unsuccessful; another 20 years would pass before anyone tried again [63].

In the meantime, work on evolution and primates continued apace at the American Museum thanks to the significant and abundant fossil collections Granger had collected in the American West. It was fortunate that he had done so because the First World War now affected further fieldwork by the Museum for financial reasons. Granger did not go into the field in 1915, nor would he in 1917 or 1919. In 1918, he spent mid-July through mid-September collecting dinosaurs at Denver basin localities in Colorado [64]. He also published two more papers: one on a new tillidont skull from the Huerfano Basin, Colorado and the other with Matthew on the fossil mammals of the Tiffany beds in Colorado [65].

A deep personal blow struck on May 1, 1920, when Granger's mother Ada died in Rutland at age 73. Granger was 48 and still extremely close to both parents, especially his mother. He did not go into the field that year, but his mother's death was not the sole reason. Andrews was recently back from a second Asiatic zoological and big-game hunting expedition to China and Mongolia with some fresh news. J. G. Andersson (Fig. 29), a highly dedicated Swedish geologist working as an adviser to the Chinese government, was trying, based on his recent fossil finds, to persuade the Swedish government to mount a major scientific exploration of China and Mongolia.

Andersson, along with another geologist, former Columbia University professor, author, and American expatriate Amadeus W. Grabau (1870-1946), as well as Chinese geologist V. K. Ting (Ding Wen-Jiang, 1887-1936) and others, had been working diligently to promote geologic and paleontologic endeavors as China continued to revolutionize following the overthrow of the Ching Dynasty in 1912.

It was Ting who invited Grabau to leave the United States and come to China to teach at the Peking University. After seven years of study abroad, Dr. Ting had returned to his homeland in 1911. He had intended to study politics, and first went to Japan to do so. But, upon his return to China, he bore degrees in zoology, geology and geography from European institutions [66].

To sweeten the deal, Ting also offered Grabau the position of

Chief Paleontologist of the newly formed Chinese Geological Survey. Grabau accepted both and moved to China in 1920. His move was actually a boon to American scientists; he became the first direct link between them and China. Grabau's instant rapport with his former colleagues at Columbia University and its sister institution, the American Museum of Natural History, held promise for a smoothly paved way to expanded scientific study of Central Asia. The American Museum, with its renown for expeditions in paleontology and geology, was in a unique position to do it.

Andersson also had experience with expeditions: he had been a member of a Swedish multi-disciplinary scientific expedition to Antarctica from 1901 to 1903 under Otto Nordenskjöld (1869-1928). The range of technical expertise included a geologist (Andersson), a fossil-collector, two zoologists, a cartographer, a hydrographologist and meteorologist, a bacteriologist, a botanist, a landscape painter, and a man to run the meteorologic, magnetic, astronomic and hydrographic equipment [67].

The Swedish Antarctic expedition was a considerable success, and Andersson now realized he had a chance to repeat the approach in a China and Mongolia now more open to exploration and just as vast and remote as the Antarctic. Western scientists, in particular, were curious about its geology, paleontology and the like. But few were situated as was Andersson; actually located in China to study it as well as Mongolia. He later wrote:

During his journey across the Gobi desert from Urga to Kalgan, in 1892 Obrutcheff [Obruchev] found [south] of the salt lake Erdene Dabbas, teeth of a Rhinocerotid which was determined by Suess as a Rhinoceros or Aceratherium. As will be shown in the following pages, fragments of Rhinoceros and Aceratherium teeth have been found in large numbers in certain localities within the area which I examined. In 1916, I commenced [investigation], with the support of the [Chinese] Geological Survey...[1918]...and I consequently decided to carry my investigations into Inner Mongolia during the following summer. In the early spring of 1919 I asked Mr. F.A. Larson, the well-known expert on Mongolian affairs... [68].

In addition to finding a variety of vertebrate, invertebrate and paleobotanical fossils in Mongolia at Ertemte, Andersson had yet another lead developed by 1919: Evidence of an intriguing fossiliferous site at Zhoukoudian (Chou-Kou-Tien) near Beijing. He quickly realized he was faced with great potential discoveries and in dire need of staff and financial assistance to make them. His error was to disclose all of this to Roy Chapman Andrews.

Neither a paleontologist or a geologist, Andrews spent considerable time ascertaining Andersson's ideas and plans before returning to New York. Andersson's understanding was that his conversations with Andrews would be protected. When he realized what Andrews was really up to, it was too late. By the close of 1920, Andrews and the AMNH announced their intention to commence a large-scale, multi-disciplinary scientific exploration of China and Mongolia.

Andersson's presence in Central Asia and various estimates of the paleontological potential of the area were nothing new to paleontologists at the American Museum. They were corresponding with him by early 1919, before Andrews decided to return to the United States later that year. Missionaries were reporting finds to whomever would listen. In fact, it was well known that the Chinese had been grinding fossils into powder for medicinal use for thousands of years. Lei Hiao wrote in 400 AD that if one washed a "dragon bone" twice in hot water, then reduced it to powder and placed it in a thin bag with two young, eviscerated



FIGURE 29. Johann Gunnar Andersson, 1874-1960.

swallows for one night, and afterward mixed it in with a medicinal preparation, it would provide an "effect...as if it were divine" [69].

But it was Andrews' report on the extent and scope of Andersson's work and assessment of how to approach exploration that caused Osborn to realize that an excellent opportunity was at hand, and that time was of the essence. On August 10, 1920, Andrews wrote Osborn that:

Dr. Matthew thought that you would consider having Mr. Granger go over with us for at least a beginning in the localities which Dr. Anderson [sic] has already discovered... Anderson [sic] is especially interested in making reconnaissance over large areas, and this summer is in Mongolia where he expects to continue work next year. His great hope is to find human remains and he is testing various localities with that end in view... Since Dr. Anderson [sic] has barely touched the fields which he has already discovered, and is not a palaeontologist who is familiar with the fauna which he has unearthed, I am quite sure that Mr. Granger would be able to carry out further investigations with a great deal of profit [70].

Andersson confirmed that further exploration was indeed his aim. In a letter to Matthew dated October 4th, 1920, he wrote:

[A]n immense field of research waits for the explorer in the arid regions of central Asia. During the two summers in Inner Mongolia I have just had the chance to pick up some samples at the very edge of the desert area. I am now busy to prepare a geological description

of these vertebrate deposits in Inner Mongolia and I sincerely hope to have a ready manuscript at the time of Dr. Granger's arrival in Peking... I certainly hope that I will see Dr. Granger here before my [third trip] to Outer Mongolia... [71].

But ill will soon developed. On December 6, 1920 Andersson wrote to Andrews to say he had just read Andrews's article in *Asia* magazine and "[felt] sorry" about Andrews' statement that "China has no national institution where natural history objects [fossils] can be studied."

...I think it had been desirable to mention that the Geological Survey of China exists as an active scientific institution... It is true that we have not so far made any public announcement on the existence of the survey... But I brought you together with the Director and vice-Director of the Survey in order to make you acquainted with this institution. When you spoke of your scheme to create a natural history museum in China, I pointed out the existence of a geological museum in connection with the Geological Survey and invited you to come to see this museum [72].

Andersson went on to say that he had written an article about the Chinese Geological Survey to make it better known, which he wanted Andrews to have published in *Asia* magazine "at the earliest possible occasion." He also intended to have it published by the Geological Society of Stockholm. But Andersson went further:

I felt not a little surprised to read in your article that you had changed your plan so far that extensive palaeontological work will be done in China proper, that is the region where I, in closest cooperation with the Geological Survey and with your full knowledge of all the facts, have been active collecting fossil mammals for monographic research during the last four years.

I very well recollect how you told me once about the perfectly charming manner in which President Osborn approached Ch. W. Andrews before starting his expedition to the Fayûm desert. I have not been able to see the difference between our case and that of Andrews, except that the latter had already left the field, whereas we are at the height of our collecting activity [73].

GRANGER IN CHINA AND MONGOLIA

Granger stepped onto the platform at the Peking train station in late June of 1921 as the chief paleontologist and second-in-command of the Third Asiatic Expedition (Fig. 30). As he assisted Anna off the train, J. G. Andersson and a small group pressed forward to greet them. Andersson was glad to see Granger, despite events with Andrews having taken a sour turn. Granger's knowledge and skills were important to Andersson. Use of Western scientific methods was still new to Asian scientific culture. Adaptation of western scientific techniques was critical if the apparent vast range of Asian fossil fields was to be fully and properly developed. Andersson offered Granger a hands-on opportunity to do so at Zhoukoudian (Fig. 31) and agreed to share his valuable insights about other work in China and Outer Mongolia. Granger accepted and "very kindly offered to acquaint us with the extraordinarily developed technique of excavations which had been one of the factors in the phenomenal progress of the American vertebrate paleontologists" [74].

Granger went to Zhoukoudian a few weeks later, in August,

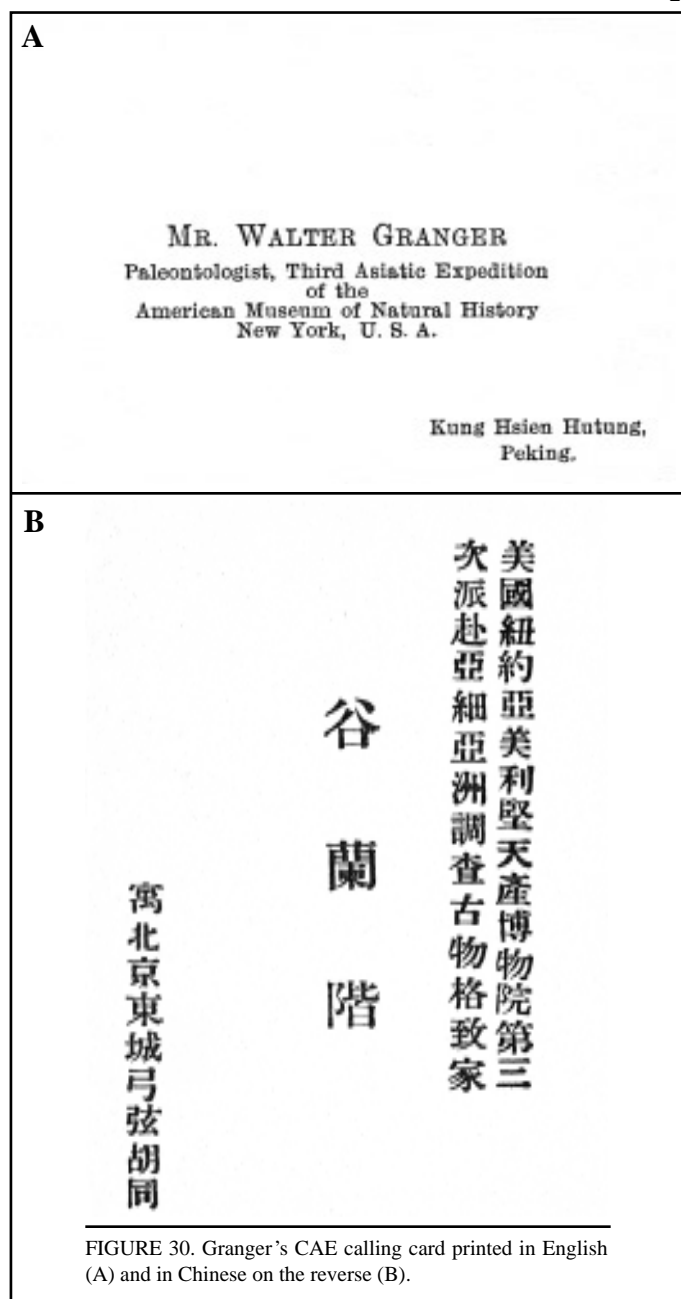


FIGURE 30. Granger's CAE calling card printed in English (A) and in Chinese on the reverse (B).

with Andersson and his assistant, Austrian paleontologist Otto A. Zdansky (1894-1988) [75] (Fig. 32). Their success was immediate. Shortly after they began prospecting at a site in Zhoukoudian called "Chicken Bone Hill," they were approached by a local man who advised, "... Not far from here there is a place where you can collect much larger and better dragons' bones" [76]. Andersson inquired of the man further "knowing well that in the matter of search for dragons' bones in China we must never neglect any clue." Based on further information from the man, they collected their things and followed him to the greatly fissured face of a limestone cliff in an abandoned quarry just to the north (Fig. 31). After only a few minutes search they found a jaw of a pig "which showed that we were in the presence of a discovery with much greater possibilities than Chicken Bone Hill" [77].

The next day's yield was even more fruitful. It "exceeded all expectations" as fossil remains of stag, rhinoceros, hyena and bear were found. That evening Andersson, Granger and Zdansky celebrated with confidence that they had identified a site sure to lead to finds of enor-



FIGURE 31. Granger (standing center left in dark clothes with left hand on hip) and Zdansky (standing far left in white shortsleeved shirt) with eight Chinese workmen at Zhoukoudian in August of 1921. (This photograph was inadvertently reversed in Mateer and Lucas, 1985.)

mous importance:

When we raised our glasses at the beginning of dinner, our happy trio was able to drink to a certain discovery. Dr. Granger had during the course of the day instructed Dr. Zdansky and myself in the excellent American bandaging system and we now decided to leave the completion of our discovery to Dr. Zdansky, who probably had weeks of work in front of him on this spot [78].

Andersson's account of their jubilation of a discovery not yet consummate--i.e., "...our happy trio was able to drink to a certain discovery...we now decided to leave the completion of our discovery to Dr. Zdansky, who probably had weeks of work in front of him on this spot..."--hints to what else they noticed amid the fossil remains of pig, stag, rhinoceros, hyena and bear: "...pieces of quartz, which had often such sharp edges that they might well have been used as cutting tools" [79]. The belief then formed in August of 1921 was that Zhoukoudian might hold hominid remains, and that is precisely what Zdansky was asked to continue searching for after Granger and Andersson returned to Peking.

Thus it was that Granger helped open and commence excavating the very locality (No. 1) that eventually produced the discovery of Peking Man, or "*Sinanthropus pekinensis*" (*Homo erectus*), and may have helped preempt one of Roy Andrew's original objectives for the Third Asiatic Expedition, to find the trail of "Ancient Man." The scent was



FIGURE 32. Otto A. Zdansky, 1894-1988.

already picked up, a year ahead of him, and the presence of the Expedition's own Walter Granger at Zhoukoudian that August of 1921 may well have been a delicious irony for Andersson (Fig. 33C). It certainly was one of Granger's least documented and, until well after the fact, least publicized endeavors. It still is not well known to this day.

One analysis of this event suggests that Andersson *et al.* were not anticipating finding hominid remains at Zhoukoudian [80]. Evidence for this conclusion is based in Andersson's reassignment of Zdansky to another site just a few weeks after Granger's visit in August. In retrospect, however, this evidence actually suggests otherwise: 1) Zdansky had just arrived in China earlier that summer and Andersson had several sites he had wanted Zdansky to work, not knowing beforehand, of course, that Zhoukoudian would suddenly hold such special promise; 2) once Zhoukoudian's potential was recognized, Andersson speculated that Zdansky "probably had weeks of work in front of him on this spot"; 3) Zdansky's apparent failure to find hominid remains, after a few weeks excavation at Zhoukoudian, reasonably would have caused Andersson to suspend that effort in order to accomplish work at other sites before the summer ended; and 4) the fact is, as expected, Zdansky did find evidence of hominid remains, a tooth, at Zhoukoudian within days of Andersson's and Granger's departure and withheld that vital information from everyone! Zdansky's apparent rationale, perhaps not unreasonable, was his fear that Andersson or someone else would preempt his publishing on this find.

The obvious result of Zdansky's willful failure to disclose his discovery to Andersson, however, was that it misled Andersson into believing the site had not yet produced as expected and would apparently require a more prolonged effort. With Zdansky's remaining time in China

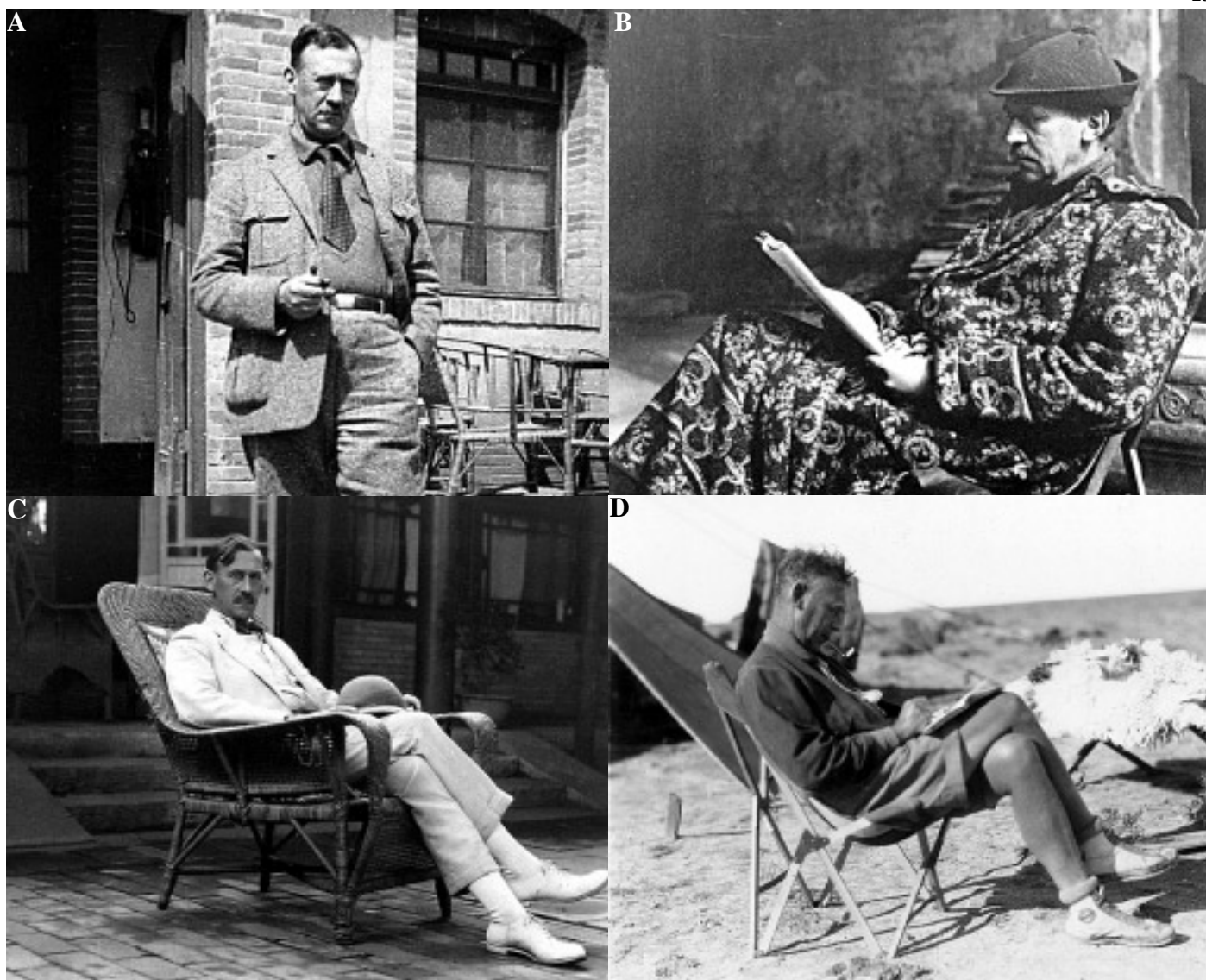


FIGURE 33. Granger in China and Mongolia: A, At the Pioneer Inn on the western edge of Kalgan (1928); B, At the Yanjingou base camp in Sichuan Province, China (1923); C, Relaxing in Peking (1921); D, Keeping a journal in Mongolia (1930).

limited for that season, Andersson may have simply concluded he should spend it at some of the other sites. Zdansky was the only one with a time constraint. Andersson and Zhoukoudian had no such restraint.

Andersson may also have concluded that Zdansky was bored and needed a change. After all, Zdansky was trying to appear as if he'd found nothing after searching for several weeks. Or Andersson may have concluded that Zdansky was not yet up to the task of finding fossil evidence of an hominid. Zdansky was young, his field experience was limited, and his recent training from Granger was still nascent.

Simply put, Andersson's reassignment of Zdansky was induced by Zdansky's material misrepresentation of the situation--that Zhoukoudian hadn't yet produced hominid fossils. Indeed, had Andersson known that Zhoukoudian had already produced evidence of an hominid, it is difficult to believe he would have stopped the digging, irrespective of whether Zdansky was reassigned. Zdansky's failure to report his 1921 find, and to thereby confirm Andersson's (and Granger's) premonition, led Andersson to make a decision he might otherwise not have made. Andersson's judgment, in light of what Zdansky failed to tell him, was not unreasonable--more than one fossil-hunter has encountered a promising site that, in the end, never produced, or wouldn't produce for him or her. More telling is that, despite not knowing of

Zdansky's 1921 find, Andersson never gave up hope for Zhoukoudian. He continued to actively work the site each consecutive season until his departure from China in 1927. It wasn't until late 1926, that Zdansky finally disclosed his original 1921 find, as well as that of another by him at the same site in 1923. Andersson's vindication came unnecessarily late, and was bittersweet [81].

On The Trail Of Ancient Man

Granger's interest in locating trails to "Ancient Man" did not end with Zhoukoudian in 1921. He sensed one also existed in Sichuan Province, even after his colleague, anthropologist Nels C. Nelson, (1875-1964) spent a futile 1924-1925 winter season there looking for proof of it, concluding there would be none. Granger nevertheless remained confident, writing to his father:

...Nelson found, along the [Three Gorges area of the Yangtze] river, plenty of evidences of a late prehistoric people and has collected several hundred pounds of their stone implements, but he does not think that real primitive man occupied that region. Probably the gorges were