National Park Service
U.S. Department of the Interior

Natural Resource Stewardship and Science

National Park Service Paleontology Program

Oral History Interview – George Billingsley

Natural Resource Report NPS/PALEONTOLOGY PROGRAM/OHI—2020/008

ON THE COVER

May 1999: USGS George Billingsley standing on the Moab Fault at Arches National Park; Paleozoic carbonate rocks on left and Mesozoic siliciclastics on right in sharp contrast.

National Park Service Paleontology Program

Oral History Interview – George Billingsley

Natural Resource Report NPS/PALEONTOLOGY PROGRAM/OHI—2020/008

Vincent L. Santucci[1] and Tim Connors[2]

[1]National Park Service
Geologic Resources Division
1849 "C" Street, NW
Washington, D.C. 20240

[2]National Park Service
Geologic Resources Division
12795 West Alameda Parkway
Lakewood, CO 80228

June 2020

U.S. Department of the Interior
National Park Service
Natural Resource Stewardship and Science
Fort Collins, Colorado

The National Park Service, Paleontology Program publishes a range of reports, plans, oral histories and other documents that address a range of paleontological resource topics. These reports are of interest and applicability to a broad audience in the National Park Service and others in natural resource management, including scientists, conservation and environmental constituencies, and the public.

The NPS Paleontology Program disseminates comprehensive information and analysis about paleontological resources and related topics concerning lands managed by the National Park Service. Given the sensitive nature of some paleontological resource information, such as the specific location of fossil sites, some publications are intended for specific audiences and are maintained as restricted access. When appropriate, sensitive information is redacted from reports in order to allow greater access to these reports by NPS staff, partners and the public. This work supports the advancement of science, informed decision-making, and the achievement of the National Park Service mission.

This oral history transcript is available in digital format and is maintained within the NPS Paleontology Program Archives and Library through the NPS Geologic Resources Division. If you have any questions regarding this transcript, please email vincent_santucci@nps.gov.

Please cite this publication as:

V. L. Santucci. 2020. National Park Service Paleontology Program: Oral History Interview – George Billingsley. Natural Resource Report NPS/PALEONTOLOGY PROGRAM/OHI—2020/008. National Park Service, Fort Collins, Colorado.

NPS 2020/008, June 2020

Background

Interview with George Billingsley: This interview was conducted on Monday, June 1, 2020. The primary speakers are interviewee George Billingsley (GB), Vincent L. Santucci (VS) and Tim Connors (TC) as co-interviewers. George is a geologist (now emeritus) at the U.S. Geological Survey in Flagstaff, Arizona. One area of George's research involves the large-scale mapping of Grand Canyon National Park and vicinity. Earlier in George's career he worked for the Museum of Northern Arizona and conducted geologic mapping at Canyonlands National Park, Capitol Reef National Park, and Petrified Forest National Park. He joined the USGS in 1979 and mainly focused on Grand Canyon mapping and research. He has also mapped Wupatki National Monument, Pipe Spring National Monument and portions of Grand Canyon-Parashant National Monument. George shares information about his work in these NPS areas.

This interview was conducted over the telephone from George's home near Flagstaff, Arizona and both Vince (Gettysburg, Pennsylvania) and Tim (Littleton, Colorado) were at their home office locations due to the 2020 Coronavirus Pandemic. At the time of the interview, Vince was the NPS Senior Paleontologist and Paleontology Program Coordinator and Tim was a Geologist; both for the NPS Geologic Resources Division. The interview was recorded on a digital audio recorder and an "MP3" file was created. A written transcription of the interview was produced from the digital audio recording and this document contains the discussion during the interview. George signed a release form for the National Park Service for the preservation and use of the interview in the future. PII has been omitted.

GB = George Billingsley

VS = Vincent Santucci

TC = Tim Connors

Transcript

[START OF INTERVIEW]

VS: Today is Monday, June 1, 2020. We will be conducting an oral history interview with geologist George Billingsley (GB) from the US Geological Survey (Flagstaff, Arizona). George is of interest because over his career he conducted geologic mapping in numerous National Park Service areas (Canyonlands, Capitol Reef, Petrified Forest, Wupatki, Pipe Spring and mainly Grand Canyon) and so we are going to try to capture some of that history and his experiences.

My name is Vincent L. Santucci (VS), I am the Senior Paleontologist / Paleontology Program Coordinator with the National Park Service. Today I am in Gettysburg, Pennsylvania, where we are recording this interview over the telephone.

00:00

GB: We will give it a try.

VS: That sounds ok with you?

GB: Yea.

VS: Ok, perfect. Well I'm going to go ahead with just a background statement and then we'll jump into some questions. So today is Monday June 1st, 2020; my name is Vincent Santucci, I am the senior paleontologist for the National Park Service paleontology program. Today we are interviewing geologist George Billingsley from the US Geological Survey regarding his work in numerous National Park Service areas. Today George is interviewing by telephone from his home in Flagstaff, Arizona and we're joined today with Tim Connors, geologist, from the National Park Service Geologic Resources Division in Colorado. So, are you ready George?

00:55

GB: Yea, I think so.

VS: Ok, we're going to start with the easiest question at the beginning: Can you tell us when and where you were born and growing up some things of interest; where you went to school up to the time you went to college.

01:13
GB: Ok, I was born in England and I came over to this country with my mom and dad when I was 2; grew up on a ranch in Day Creek, Arizona. Went to grade school at Congress Junction school. Wickenburg high school, then graduated in '63 and went to Arizona State College at Flagstaff, which has been renamed since. Anyway, that was in '63. And then the name changed to Northern Arizona University in '67 and I started in geology in 1963 there and got a BS degree in '68 and a Master's degree in geology in '71. Am I covering it ok?

02:28

VS: Perfect. So, a couple of quick questions. One is just a personal interest: were you in England– was your family in England because of World War II or for other reasons?

GB: Yea, my dad was a pilot on an airline — er a bomber plane.

VS: Ok, and then growing up, was there anything that got you interested in geology before you went to college?

03:00

GB: Well on the ranch where I grew up of course there was a lot of work, but nonetheless there was rocks everywhere and I got curious about the rocks and so I wanted to know more about them. They were pretty interesting, and I thought there was a story here, but I didn't want to study them and nobody could tell me anything about them—until I got to college.

VS: Did you go to college with the intention of studying geology?

GB: Yes, I did.

03:31

VS: Ok, and so during your time in school, either undergraduate or graduate school were there particular mentors or professors that you worked with?

03:52

GB: Yea, my advisor was Dr. Stanley S. Beus and then I was working part-time to help pay my way through school at the Museum of Northern Arizona Geology department and where I met Bill Breed and he helped me quite a bit; he was the curator of geology at the time, and then he lined me up with projects with Dr. Edwin D. McKee, who was the Grand Canyon geologist and he could tell me a lot of things; I just didn't know anything about the Grand Canyon and then I got to go with him as a field assistant to help measure sections for much of his work and he's a paleontologist as well, and a lot of the fossils he'd find, he'd show me how to find them and then he'd tell me in the rock, and then we'd sit on the outcrop and look in all directions we can see the changes from where we were last and figure out the geology and so it became quite a fascinating time machine for me with the help of other people.

05:04

VS: That's very exciting. Did you develop a master's thesis?

GB: Yes, I decided to go and explore Grand Canyon where nobody had even been at the time that I could find anybody. So, I decided to go to Tuckup Canyon, but I couldn't find anybody that had been in there, so I went in there and explored and finally got in and out ok. And it was fascinating, and I began to recognize several formations, but they were much different then where I studied in eastern Grand Canyon. And Dr. Stan Beus came with me a few times and he's a paleontologist and he told me again, like Eddie McKee did, how to find things in the rocks and look at the rock very carefully with a hand lens and figure out what it is telling you so I had to

learn to read rocks from various people. And Harvey Butcher was the one who hadn't been down there, and he followed me shortly afterwards and we got together on various things he was the hiker of Grand Canyon, he'd been most everywhere by that time.

06:33

VS: Very good; and your master's thesis research topic?

GB: Geology of Tuckup Canyon, Grand Canyon National Monument [Park], Arizona, or something like that.

06:46

VS: Did you work on a dissertation project at all?

GB: Yea, that was my—Well I'm not sure, you mean like for the masters?

07:02

VS: Did you go on for a PhD after the masters?

GB: No, I didn't. I just simply didn't have time. I got involved with Grand Canyon mapping through the Park Service and the University of Wyoming funding and the Northern Arizona University funding and the National Science Foundation funding but mostly park service natural history association funding and so that got me started in mapping the Grand Canyon and I wasn't going to do the whole thing I was just going to get started and learn it and as time went along projects kept going and other projects popped in from other parks and I was awful busy so I didn't have time to go for a PhD.

VS: So, when you graduated after your masters did you work anywhere before the US Geological Survey or did you go to work for the survey right away?

08:02

GB: Oh well the Museum of Northern Arizona through various science projects funded by different parks in Grand Canyon, Capitol Reef National Park and Canyonlands National Park so that was the funding from them that kept me going on various projects all over the country.

08:27

VS: Ok. So, your transition from the Museum of Northern Arizona to the USGS; when did that occur?

08:39

GB: 1980. Well, 1979. I'm hired part-time by the USGS and eventually for full-time. Various geologists who had projects going to have money to help pay my way.

09:00

VS: So, let's focus a little bit more on your work at the Museum of Northern Arizona. So, how long were you at the Museum of Northern Arizona?

GB: 1967 through 1979. Yea—I'm sorry, No let me repeat that: 1967 to 1969.

VS: Ok for 2 years. Ok. And what were the primary projects you were involved in while at the Museum of Northern Arizona?

GB: Mapping of the Eastern Grand Canyon, and Canyonlands National Park geologic mapping, and Capitol Reef National Park geologic mapping.

VS: Ok.

GB: Those were the major projects that were funded.

VS: So those were all funded while you were at the Museum of Northern Arizona?

10:00

GB: That's correct. At least that was my office. And I might repeat that the thesis was "General Geology of Tuckup Canyon, Central Grand Canyon, Mohave County, Arizona".

VS: Ok, perfect. So, sticking with the Museum of Northern Arizona for a few minutes, can you tell us a little bit about Breed?

10:30

GB: He was the Curator of Geology at the Museum of Northern Arizona and he would organize a lot of these projects because he knew so many people in various places. He was one of these guys who loved to organize and get funding and then he'd say, "Ok, here's your jobs and you can do it" and that's how I got involved with a lot of them. And so, we were kind of stretched for time in a lot of cases. But Breed was the main guy, the "go-to guy" as far as organizing and getting projects started.

VS: Ok, and I believe he is—he's buried at the Grand Canyon cemetery, is that correct?

11:12

GB: I think so; I'm not real sure where. I think he is up there, yes.

VS: And when you were at the Museum of Northern Arizona did you have opportunity to work with Ned Colbert at all?

11:26

GB: Yea, we shared an office together sometimes; but mainly he was the paleontologist who helped me a lot when I was started mapping Petrified Forest National Park, he was the paleontologist that went with me and helped me identify what's going on over there as far as dinosaurs and all that other material there.

11:50

VS: And so, he went out in the field with you at Petrified Forest; did he go to any of the other parks with you?

GB: No, just Petrified Forest. He was a pretty busy guy writing books.

12:00

VS: Sure, absolutely. And what was it like going into the field with Ned Colbert at Petrified Forest?

12:12

GB: It was a real interesting project because he could find things that I couldn't recognize very well but he knew what he was looking for and I'd begin to finally see bones and few other things that were there that were not very obvious. Where I'd find plain old dirt, he'd find things that wasn't.

12:38

VS: Were any discoveries made while you were in the field with him.

GB: I don't recall. There was a lot of things we picked up and a lot of it is preserved at various museums.

VS: We'll probably save Eddie McKee for the end so we can talk with you about what it was like to work with Eddie McKee, but any other individuals that you remember working with while you were at the Museum of Northern Arizona?

13:08

GB: Well, um, there were other students, but I don't remember all of them; but Peter Huntoon was one of the principal students and we did a lot of the mapping together. And we were both young enough to get in and out of the canyon without killing each other, and experienced some very difficult times, but we learned that it's better to have at least 2 to 3 people because so many things can happen when you're hiking in the Grand Canyon remote areas and we had no communications. He also helped get funding.

VS: Any other students that you can recall?

GB: Jim Sears was also working in the Grand Canyon doing Precambrian geology. There are several others, but I don't recall them right off-hand. There was sort of always somebody coming from somewhere, but everyone contributed to my general interest and knowledge of what I was learning. As time went on, what I thought I knew, I didn't know and then I began to realize I really didn't know as much as I really thought I did know.

14:30

VS: Do you know the name Christine Turner?

GB: Oh yea! Christine was one of the students who got started in geology. I showed her how to get started in her thesis area. We kept in touch. She was very good at what she was doing, and I

learned from her. And the same with any other students that I got stuff started in the Grand Canyon. They all kept in touch and I learned from their work.

15:00

VS. So then after the Museum of Northern Arizona, did you move on and become hired by the US Geological Survey or did you work elsewhere?

GB. I was hired by the US Geological Survey in 1979 and then project money through the survey began to pile up and so we got continued mapping projects in the Grand Canyon like other USGS people here in Flagstaff and in Denver, Colorado. I'm kind of blank on names right now, but nonetheless it was all [unclear] different projects that dovetailed and I began to see more and more of the Grand Canyon and realized it's really a big, big place and the more I learned the more I began to get excited about the discovery and [unclear].

16:00

VS: When you worked for the survey, did you work in Flagstaff or did you work in Denver?

GB: I worked in Flagstaff. Karen Weinrich was one of the go-to people in Denver who was at USGS and she helped fund a lot of projects and got to help me see more because she had helicopter support.

VS: So, when you worked for the US Geological Survey, what branch did you work in?

16:51

GB: Geologic Division.

VS: And your primary mission was mapping?

17:00

GB: Yea, the mapping project that the survey wanted to fund in any of these national parks, mainly in Grand Canyon area would help, and different projects would come along so I'd help them do it and I got to see more and more and more, it was the thrill of discovery of new information where places I hadn't been and anybody else and kept going and need to know and want to know. That's how I discovered a new rock formation in the canyon through one of those projects. And then of course river running trips was a summer job before I joined the US Geological Survey. That really kept me going through seven years of river running.

17:47

VS: Would you say that a big portion of your work was field related—involved in field work?

GB: That's right. I had to sit down at the desk and do writing too, which is kind of a chore, but I had to learn it and everything that had to be done. You had to prove or show, anyway, what you got paid to do. And that was important to me to get that information out so that peers could recognize "ok, yea he did this, and he did that and that's great; he's on track".

18:20

VS: Perfect, well what I'm going to do if it's OK is I'm going to step through one park at a time that you worked in, and if you can share with us any information that you have about that; people that you were working with, park service staff if you recall, if they had an integral part, and what the scope of the project was. So, for example, you worked at Wupatki National Monument, can you tell us about Wupatki?

18:54

GB. Yea, that was part of the mapping project of the Cameron [30x60] quadrangle. But I had made a separate publication of the Wupatki National Parks because the folks there wanted to get a more detailed map then they had at the time and I had found and discovered these small lakes where a large village of ancient people used to live by, and it turns out that was important because that was the main water source and the reason the people were out there to begin with and then there were lots of animals and other things along with it because water was important and you'd even have to hike all the way to the Colorado River just to get a drink. And so that information came out in the park map and helped interpreters figure out why the people were living where they were living.

19:55

VS: And was there anything that stood out about that project that you found to be important or interesting?

GB: The water; the source of the water, the small lakes, about three or four of them that no one knew about before, so—but the evidence was still there, and that like I said was the reason most people were living out there and why it became a national monument because it was preserved; the heritage of the people that lived there.

VS. When you were mapping at Wupatki, did you ever come across any fossils?

20:50

GB: Yea, the rock formations have fossils there. I got new dates on the lava flows out there. A good part of geology is reconstructing the landscape as it developed formations of rocks through time and so there were a lot of neat rocks out there that helped fill in some time gaps.

21:18

VS: You had a mapping project at Pipe Springs National Monument?

GB: Yea, I got permission through the monument and the people – the Kaibab tribe I guess it is – anyway, The Indian tribe up there gave me permission to map the monument because it is on the reservation at the time. And so, they published the geologic maps I made of that monument, but it is not on the more recent Fredonia [30x60] quadrangle because administration of the tribe changed, and they didn't want to publish it anymore. And you know you got to go through the politics of everywhere you're at to get permission to do anything from anybody whoever the land is in control of – or whoever is in control of the land I mean.

22:16

VS: So, let's see, one of your big projects was Canyonlands National Park; can you share some information about Canyonlands?

22:30

GB: Bill Breed was instrumental in getting that going through the Grand Canyon, or Canyonlands Natural History Association—or museum association, I can't remember the name of it—but anyway, and they helped fund it, that's the reason they got those maps. But it was a real interesting geological lesson because it taught me a lot about facies changes within rock formations; how you could stand in one spot and look back where you were and see whether you were looking towards a land surface, an ocean, a beach, a river floodplain or whatever in any direction and this helped me picture geologic time through time as a time machine and how the rocks changed and that park had the most interesting facies changes of most formations and that taught me a lot about the next few parks—especially Grand Canyon and Capitol Reef, those two parks up there really had a good lesson to learn from the stratigraphy point of view.

23:33

TC: Sort of like the light bulb coming on kind of experience?

GB: Yea, that does turn on information when working in other parks or places. From what I learned there I could apply anywhere else; it was a great learning park.

VS: What was it like doing field work in Canyonlands? Any experiences you'd want to share? Did you get on the river and ride the river?

24:02

GB: Yea, did the river. But mostly just hiking and much easier hiking; you could cover many, many miles. And great views and great exposure of all the rock formations – like I said, you could hike any canyon and see how the rocks change from one mile to another and why if you get up there and examine them; it was easy to get around in the park. But like I say it was an extremely good learning lesson in stratigraphy.

24:36

VS: Do you recall fossil occurrences while you were working in Canyonlands?

GB: yes, there's a few but not as many as where there are limestones like in Grand Canyon or Petrified Forest where there is fossil material, but they had quite a few. Capitol Reef was similar to Petrified Forest National Park; it had similar fossil types and so that's where I began to look for more dinosaur material and discovered quite a few there. And in Petrified Forest, when I was mapping there, I found several dinosaur materials that were important, and they're stored in the Museum of Northern Arizona—some of them. Now when I start talking about these different parks, I get confused about where I was some of the time so you kind of have to take this with a grain of salt here—I don't have it all organized as well as I thought I did.

25:42

VS: Oh no that's fine, you're doing very well. So, stratigraphically, Canyonlands doesn't preserve some of the later Mesozoic rocks that you see at Capitol Reef. You're looking more at middle-lower Mesozoic and Paleozoic for Canyonlands? Is that correct?

GB: That is correct; younger rocks than Grand Canyon.

26:13

VS: Were there any new geologic units that you identified in Canyonlands?

GB: I don't recall any new ones. There were formations that hadn't been mapped and where they were before, so I just made a better map which was used by Park Service personnel to go study other projects in geology.

26:42

VS: When you were in the field in Canyonlands did you go out for a week at a time or longer or shorter?

GB: Generally, no longer than a week; that was about all I could get the steam up for. It's a lot of walking—these parks are all fantastic—and so you walk and walk and walk and I kept records of a lot of my trips. And so I have journals of all these trips in the Grand Canyon and all the national parks.

27:18

VS: Did you have field assistants that went out with you into Canyonlands?

GB: Yea, there would be students from NAU and other schools who would come along and want to learn more about a particular park they were interested in like Canyonlands. There were too many other people that came along, and I don't recall them right now, but they were students and they went on from there with their projects. I was basically introducing them to the parks.

27:50

VS: Shifting to Capitol Reef, anything stand out in regards to your work at Capitol Reef?

28:02

GB: Not really, it's a fantastic lesson in again, stratigraphy and structural geology makes a play and the Waterpocket Fold and the Henry Mountains are there. All these things came into play as far as the development of the landscape in the national park itself and why things became and folds and mountains are where they are.

28:32

VS: And any fossils at Capitol Reef that you recall?

GB: Not as many as the other places, but there were some there—there were a few, yes in places: the Blue Desert and the Red Desert areas had quite a few. And I worked with Pete—or Fred—Peterson, Pete Peterson—whichever his name, and Christine Turner and we then shared a lot of

their knowledge of the area as well, so working with other geologists who knew about these parks in various places I learned from them as much. That's why it was important to work with other geologists who knew the areas.

VS: And then anything else stand out from Petrified Forest?

29:32
GB: Not really. The park—that map—I made a park map and it was never published and still owned by the park Natural History Association. I'm not sure why they never published it. But they did make a lot of blueprint copies and sold those to visitors. I don't think they do that anymore. All the other parks were published; Petrified Forest was never really published.

30:08

TC: George, so on Petrified Forest, when you did that map, it fit the "old" boundary correct? You didn't do like a bigger area? Because they've expanded the area since then.

30:18

GB: No, I did a square area. I did a square outline along the park boundaries where they included adjacent areas to the park as well. It mostly was the park boundaries itself; I can't remember I'd have to get the map out; it's been awhile since I did that.

30:50

VS: So, this is a little more in-depth question: do you remember approximately the dates that you worked in each of the parks we've talked about; for example, do you remember what year you worked at Wupatki?

31:07

GB: Not right off the top of my head, no. I'd have to look at all of them—1980's for a lot of these, 1970's. I'd have to look at all the maps to get the dates. I'm sorry my memory is not very good at that. I've got 77 geologic maps published and I can't remember all of them.

31:42

TC: Vince, Wupatki was published in 2007. Canyonlands was published in 1987—no, Capitol Reef was 1987. Canyonlands was published in 1982. So, years before that I'll assume, he [George] was doing the mapping, obviously. Pipe Spring was 2004.

GB: Ok, yea.

32:13

VS: So, Tim can you read those back, one at a time, in chronological order; the oldest map to the most recent map?

32:21

TC: Canyonlands 1982. Capitol Reef 1987. Wupatki 2007. And Pipe Spring 2004 fits in there. And lots of Grand Canyon stuff in between, for sure.

GB: Started in 1971; that "Blue Dragon" map.

32:48

VS: So, then since you seem to have the longest tenure at Grand Canyon, can you share with us sort of in a chronological sequence your earliest projects at Grand Canyon and then up through your most recent projects at the canyon.

33:11

GB: Oh, there's a lot of them and I don't think I can do that. We started with eastern Grand Canyon first. That became what is known as the "Blue Dragon" map; 1971 it was published. And then 20,000 copies were published every few years too. They kept selling them for a long time. I think there's 100,000 geologic maps of eastern Grand Canyon were sold. And then I went and expanded eastward—I mean westward—to breccia pipe studies for the USGS in Denver through Karen Weinrich and western Grand Canyon geologic mapping with Peter Huntoon. It scattered back and forth, but eventually—I didn't intend to map the entire Grand Canyon—but eventually I ended up finally covering all of it, all 18,000 square miles! And it's a really big canyon and even so and if it wasn't for helicopter support I would have never gotten those maps published because I just didn't have enough—too many blisters on my feet. I covered 3800 miles on foot in the Grand Canyon only and a lot of hiking in the other parks as well—Grand Canyon was a big one—but then again, like I said, I never saw it all. If it wasn't for the helicopter support. They would take me and drop me off somewhere in a remote area and then leave me and in three days come back and find me and take me back. That's the way I did a lot of it. So, I couldn't have done it without—but even so, it's a big park, and aerial photography became of use and color aerial photography and stereoscope use. That was important. One of the most important tools because you could pretend to be in the Grand Canyon flying over all the time in your office for as long as you wanted so I could see details and I'd make notes on my maps next time back out to go here go there and see what that is, what's this and so forth and make sure I was right.

35:36

TC: Who supplied the helicopters?

GB: Grand Canyon Helicopters is who we contracted out with. Wayne?—not Wayne, Dana Morris was the guy who did most of the pilot work and I trusted him because he could figure out where we were in the Grand Canyon as well as I could, and he would usually remember where he dropped me off if he left me for a few days.

TC: Well, that's good!

GB: I had a little signal mirror and that was it and if the sun was shining and I'd hear him coming somewhere from miles away I could flash him with the signal mirror which was one of the greatest communication devices we had. He could fly around and all the sudden then see a bright light and say, "now I know where he is". So, it was exciting.

36:40

VS: Can you tell us about your work on the Surprise Canyon Formation?

GB: Well, I discovered it as an odd looking rock in 1973 on a river trip and thought I've got to go back and see what that looks like when I got out of the canyon—and Art Allanson, he was a pilot at the time and a little plane we flew, he said, "I'll fly you back out there and we'll take a look at it" . We flew over it and then I discovered it was channel, a huge river channel filled with a new rock formation that I hadn't seen before and as we flew around more and more I saw more and more of them and eventually I got helicopter support to go in and look at them and realized that with the fossil material that this was a new rock that hadn't been described so I went from there and Eddie McKee got excited and he was helping me do it and he was a paleontologist and he knew the fossils and told me it was a late Mississippian rock age and if I could keep him from throwing the fossils in the helicopter we would get too overloaded and we couldn't get out of the canyon so while he was throwing rocks in one side of the helicopter, the pilot was on his side throwing them out; it became quite interesting and he said 'if you want to get out of this canyon in any shape you've got to throw these out. It became a weight issue and it was pretty close a couple of times. We learned to fly right along the cliffs where the updrafts were; not in the middle of a canyon because that's where the downdrafts were; you'd never get out. It was a learning experience both for the pilot any everybody and Eddie and Stan Beus were the worst culprits as far as collecting fossils and we had tons of them. Anyway, I learned from all that information from them about what we were looking at. Eventually Eddie McKee passed on in the middle of the project of the Surprise Canyon Formation study and Stan Beus took over and helped me complete it so that's why that took a long time.

38:53
VS: Very good. So, let's see, were there park staff that you worked closely with at Grand Canyon? Any National Park Service staff that you worked with closely?

GB: Not really. I'd run into various people but mostly Bob Uhler who was an archeologist. I'd give him all the information about Indian ruins I'd find, and paintings and squalls—anybody else that was there was just an acquaintance basically.

39:45

TC: Did you do much work with Allyson Mathis or Carl Bowman?

GB: I knew them—I knew them both, but I didn't work with them very much. There's a whole bunch of other people. Seven years of river running—that was 90 river trips—so I got to do a lot of the studies through those, but that was with this river company: Grand Canyon Expeditions.

40:18

VS: Can you tell us a little bit more about a typical river trip and what experiences that you were able to engage with on those river trips?

GB: Well, I went the first time down the river with Hatch River Expeditions—I paid for that trip and it was 1968. And I got to see there was going to be a lot more trips involved after that because there were things I just hadn't been to before. But to explain geology to people at the

time—they really enjoyed it and then as time went on Grand Canyon Expeditions they wanted me to go down as a geologic interpreter on a couple trips which really people loved it so much and said you've got to come back and I learned how to river run from them; the other boat running river trips. My wife, Susan, was with me and she would help with the river trips. We ran as a team together for many years. She would help interpret geology as well, because she learned from me. I don't know, I'm mixing this all up. I'm sorry. I'm not keeping it very straight. But there were a lot of people involved with the river trips; USGS and other institutions that were involved but I can't name them all right now—and that's OK.

41:50

VS: Were they 10-day, 2-week, or longer field trips?

GB: They were 10-day river trips—9-day river trips; each one. And that was through Grand Canyon.

42:08

VS: A very different perspective of the canyon on the river.

GB: Yea, and I'd convinced people that it's OK to camp here folks and I haven't been here before but it looks like there's enough room and I wanted to explore this canyon and if you all want to come up and they were all chomping at the bit to go and we'd all explore the canyon together and I had to learn more and map as I went along.. didn't happen every time, but that's how I got to see a lot of the canyon and kind of weird—the place to camp that is.

VS: This will be a hard question because there's probably many experiences, but any particular fossils stand out of particular interest to you?

42:55

GB: The nautiloids in Nautiloid Canyon were interesting. Eddie McKee—I took him on a river trip, and he showed me that one. It taught us to know Nautiloid Canyon and fossil squids and I began to recognize those now in most of the canyons I was hiking in and Kanab Canyon has really huge, beautiful 3-foot long complete nautiloids in there. Those were unique fossils and Mississippian in age. There were a lot of fossils – I can't name all of them. The new formation, the Surprise Canyon Formation, was the most fossiliferous unit in the Grand Canyon because it not only had marine fossils, and river floodplain and canyon deposits; there were log jams I found that were literally rapids formed by logs and well preserved lepidodendron trees and like I said when Eddie or Stan Beus went with me, getting them out of the fossil beds was almost an impossible task; you had to almost tie them up to get them away. And like I said if we didn't overload the helicopter, we'd never get out of there. That was the most exciting part as to how many fossils were in the Surprise Canyon Formation; not only land fossils but estuary fossils as the land canyons began to be flooded and they also filled in caves adjacent to the river channels in the surprise canyon, and in those cave fossils were bones of creatures we didn't even know what they were but land creatures, like rib bones of various things; we don't know what they were. It goes on from here but if you read about the Surprise Canyon Formation you'll find that's the most complete fossil unit in the Grand Canyon.

45:11

VS: There's a young paleontologist by the name of John Paul Hodnett. Do you know JP?

GB: No, but I've heard the name though.

VS: He's been working with Dave Elliott to publish the Surprise Canyon fossil sharks. Very rich assemblage of fossil sharks from that unit.

45:39

GB: Yea, and Dave Elliot named a fossil fish after me from that unit. So anyway, the list goes on and a lot of people have gotten into it and there's a lot more to be done by all means. I didn't get through every Surprise Canyon outcrop; it's a very big canyon and it took a lot of work and helicopter support to do it.

VS: A different question; do you recall seeing fossil footprints?

46:14

GB: Coconino Sandstone was full of them; two different types that I could recognize anyway—and I couldn't tell you the name of them but ones a cat shape; kitty cat type fossil print; very common; claws and everything and a bigger one with about the size of your hand and some big 4-legged creature that would walk up and down the sand dunes. And these were coastal sand dunes at the time, so the creatures were walking and leaving sand prints or prints in the wet sand because of the fog I'm assuming and that's why there's so many tracks in that unit all over the Grand Canyon except the far west where there is no Coconino.

47:06

VS: And how about caves themselves? Did you come upon and go into any caves in the canyon? and if so, did you find any Pleistocene-Holocene remains in them?

47:20

GB: No; explored the one cave for about a mile and that was as far as I went. I don't like caves. If I didn't have Peter Huntoon or Karen Weinrich with me, I'd have never have gotten out of thing. But there were things in there—it was interesting BUT caves and I did not mix so I stayed out of them. And there's a lot of big caves in the canyon. And there were not fossils but creatures like some kind of a sheep with the horns still preserved in dirt in the cave that used to live in Grand Canyon—no longer there. That kind of thing. Not real old, old fossils.

48:10

VS: Are you familiar with Rampart Cave?

GB: Yea, I went into Rampart Cave once and there was a lot of fossil sloth dung in there and again, I didn't stick around. I saw it and it was interesting and I came back out as soon as I could.

48:32

VS: Let's see—I wanted to just focus a little bit on Eddie McKee for a second. He's sort of a legendary and since you had a chance to know and work with him, we'd like to pick your brain about Eddie McKee if you don't mind.

48:53

GB: Sure, I'll try anyway.

VS: Do you recall when you first met him and the circumstances?

49:00

GB: It was 1967 and he came to the museum. And I happened to be there, and he and Bill Breed were talking about something and you need to get into the Grand Canyon and then they both came in my office where I was working and they said would you like to go in the Grand Canyon with Eddie and become a packer. So, he hired me as a packer which means I carried all the rocks or as many as I could, but it was an opportunity to learn from him what he was doing and how we was doing it so I really learned a lot of stratigraphic information from Eddie McKee. and then his wife was always on the trip too, Barbara McKee, she had great meals after climbing out of the Grand Canyon. We'd go over there and she'd always have a good meal cooked up wherever we were.

49:50

VS: Do you recall your first journey into the canyon with Eddie McKee?

49:58

GB: I've got it all written down. I've kept a record and written journal of all of these trips with everybody and it's four thousand eight hundred pages long and it's all in the Cline Library at special collections and anybody can access it through special collections. They have the journals and several people use those to go where I went or at least read what was there; what I did—like I said it's a pretty big canyon—journal is too much to publish. I didn't want to publish it, but anyone can access it through the special collections at the Cline Library.

50:50

VS: Have they been scanned or digitized?

GB: Yes. They scanned and digitized all of them. They are all there. You need to get a Peter Runge, librarian for special collections—he's head of special collections—he can help get you that information. And the dean of the library—can't remember her name right now—she can also help you get them.

51:18

VS: And you said Peter. What is his last name?

GB: Peter Runge. R-U-N-G-E. I think that's the way it is spelled. So, everything that I did in Canyonlands, Capitol Reef, or no—Grand Canyon and Canyonlands too and all the river trips. All that is recorded. And people I was with, what we did, and what we saw and found—Harvey

Butcher got me started doing that after a few trips. He said, "if you don't write down what you did and where you went, you're going to forget" and he was right! I owe Harvey Butcher a great debt of thanks because if it wasn't for him, I'd never figured out what I did or where I went. And four thousand eight hundred pages is a lot of information!

52:20

VS: So, when you went out in the field with Eddie McKee was he a good teacher; did he explain things well, or was he serious and have his nose focused on the rocks?

52:34

GB: Both. But then he'd look show me the rock and hand me the rock and look at that and tell me what you think—and I'd tell him—and I'd look again and he'd say see if you can see this and sure enough he would teach me what I was looking at and that's how I learned to read the rocks because there was so much more there then I ever thought and we could spend all day at an outcrop 'til it got hot or cold. And it would get really hot sometimes but nonetheless he's the one who taught me how to read the rocks and all the geologists I went through in the Grand Canyon or anywhere else would do the same thing because it's a learning process and if you don't share the information you're not going to learn.

53:25

VS: Did Eddie McKee have a good sense of humor?

53:30

GB: Oh yea, yea. Well, I mean he would joke but not all the time. And he was serious about his work—when you get into a fossil bed, serious stuff and you couldn't budge him.

VS: And he was pretty well connected?

GB: We'd be there 'til you couldn't see.

54:00

VS: And I assume you camped in the canyon with Eddie McKee as well?

GB: Oh yea, we had helicopter support. The helicopter pilot camped with us as well.

VS: And he was pretty close to the staff at Grand Canyon?

GB: Yes, very much. A lot of people knew him. He was considered THE Grand Canyon geologist when I was a student. And I've always been a student; I've always been learning, even now.

54:36

VS: Was there anything that you can recall that Eddie did with students that was sort of a

humorous thing that maybe he did with young students that he's taking into the canyon that may have been funny or interesting to recall?

54:56

GB: Not really. because he was always fairly serious. He wanted to learn more than anybody—getting him out of the rockpile was really a challenge sometimes. It would just get too dark.

55:17

VS: Were there any important observations or discoveries that were made when you were with Eddie McKee in the field?

55:26

GB: Yea, but I don't recall what they were—every formation I helped him collect and measure a lot of the rocks from the Supai Formation it was called, and he subdivided it into four formations and I got to help him do that so I helped him write the papers as well. Mainly, I was the collector of rocks that he wanted, and I wrote notes constantly—I was always writing the notes and I had to write them good enough so at least he could read my writing. That was basically it. Writing the information down helped me learn it as well; so, he called me "the scribe".

56:15

VS: Any other memories of Eddie McKee that are worth sharing?

56:22

GB: He had to check himself in the sun; he had lots of problems with skin problems. So, Barbara his wife always got him a big floppy hat that he'd wear that was pretty neat, but he was always battling the wind with that one, but he'd always keep it on because he had to do it; otherwise he was cooking himself.

VS: So, Eddie McKee is another individual who is buried in the Grand Canyon cemetery.

56:55

GB: Yes, he's buried there and his wife and on one of the trips I did after he passed away I landed at Pumpkin Spring in the western Grand Canyon and I picked up a nice boulder of sandstone from the river polished right along the river there; it was about 40 pounds—30 or 40 pounds. And I collected that and put it in the helicopter and he said we could take it out, barely, and that's the stone used to put Eddie McKees plaque on at the cemetery. And I didn't get permission to get that but people at the park said, "that's fine. Bring it; we'll use it". And I always appreciated them letting me do that.

57:43

VS: I always wondered about that because I visit his gravesite every time I go to the park and I was wondering—

GB: Yes, it's river polished Tapeats Sandstone; it's from Pumpkin Spring.

57:57

VS: That is really great to know—thank you for that. What an honor to be able to do that for Eddie McKee.

58:10

GB: Yea his wife, Barbara, and son Ted McKee, both appreciated the use of the boulder so they wanted to use it and the park service let them use it so that was good—next time I'll get permission.

58:21

VS: On any of your river trips or any of your back country hikes or helicopter excursions you ever have any issues where anyone was injured or there was some near miss accidents?

58:40

GB: Not seriously injured—and as far as near misses yea, at one time a thunderstorm while I was mapping Blue Mountain Canyon, Diamond Creek area we had to set down because the thunderstorm was coming up from all directions so we sat down and waited it out and then we wanted to go we wound up and the helicopter took off and all of a sudden it took off by itself and the pilot goes "whoa" and then a big huge wind came up out of nowhere and lifted the helicopter and we went flying towards the wall and he turned it just enough to go down through a slot canyon and the blades barely got through and then we come out into the canyon through the Redwall slot and barely enough room to get the helicopter through the slot and the pilot was doing all he could to keep it flying and we weren't full power because of the wind but we made it and we got through there—he was sweating to death and we all thought that was really close, we just about ate it right there. But it's dangerous you know. You have to be careful and there's other times when the hydraulic system went out and we lost control of the blades and everything but fortunately we were near the ground and up on the plateau and got down ok barely but he was in radio range to get another helicopter to come out and bring more fluid so he could fly the thing back to get it fixed. But you lose your control for the pitches and blades and everything and directions and you don't have any control at all—it gets pretty hairy.

1:00:36

VS: I can imagine. Any final thoughts about Eddie McKee? I'm just curious, never having a chance to have met him, he's kind of a hero.

1:00:52

GB: Yea, he's really a great guy to learn from and I really appreciated him letting me come with him all the time, or if I could find money to go and bring him he would come and we would get in the canyon because there was a constant learning process with Eddie he knew so much and the more I knew, the more I didn't know. Or the more I thought I knew, the more I learned. he was great. We'd do a lot of hiking. He was a pretty good hiker by the way too. But it was touch and go with Eddie. He would climb things—or if he couldn't make it, he'd send me up. And if I couldn't make it, we'd guess.

TC: Did he die in 1982? Has he been gone that long?

GB: I think so, yea, that's about right. We were in the middle of writing the stuff on the surprise canyon formation and he died and I had to have more work that's where I asked Stan Beus to help out and he was glad to do that.

VS: Any other questions Tim from you?

1:02:16

TC: No, I guess I just have a few statements to interject. One of the neater publications I've seen come out recently George was a USGS General Information Product 189 called "Geologic Field Photograph Map of the Grand Canyon Region" and I just want to commemorate you on them finally getting all of your, basically brain and images in a publication; that is a fantastic log of where you have photograph points and just all of your history from Grand Canyon from 1967 to 2010; a really good publication. I think it's fantastic!

1:03:00

GB: Well, thank you Tim I really appreciate that. I only had so many photos. Most of the time I ran out of film or the camera didn't work. So, I was lucky to get any pictures at all. But I had a lot of pictures and I was really happy to be able to get out so students could use that information to maybe go visit somewhere and do more studies

1:03:27

TC: The sections are fantastic; good stuff. And then one thing I just wanted to mention too: I first met George I think back in 1999 when we started doing our geologic resource inventory assessments for the various parks and just began to really appreciate George's knowledge of parks and geologic mapping. He was very instrumental in a symposium I attended in 2000 on the age of the Grand Canyon and I know that was one thing; one project that you were always trying to get more and more better information and get everybody to kind of come to the table on how old is the Grand Canyon and let's get this documented and so I commend you on your early efforts to really make people come together and get organized about that and try to publish their dates and to come to some general consensus on how old is this thing. I've learned a lot from you over the years in that regard and I really appreciate you for organizing that symposium in 2000 and then subsequent symposiums since then, so good stuff; GREAT STUFF!

1:04:40

GB: Well, thank you. And that's with the good assistance of a lot other geologists at the USGS in Flagstaff and they're continuing with that information and they're the ones that's constantly updating "how old is the grand canyon question"—so five million, 200,000 years is about the best we can come up with right now; different parts of the Grand Canyon are different ages; so that's when the Colorado River first began to flow all the way through the canyon was about five million, 200,000 but different parts of Grand Canyon are older than that and some are even younger and it's constantly getting younger. I am amazed at the changes and what is going on now it's absolutely incredible and there's much, much more to learn.

1:05:33

VS: So, the youngest Mesozoic rocks in the canyon are Shinarump from the Chinle and Moenkopi; is that correct?

1:05:46

GB: Yea, the Moenkopi formation; then the Shinarump Conglomerate of the Chinle Formation. The petrified forest member is also there on the north rim at Hells Hole. Those rocks used to cover the Grand Canyon but there's only a few left now.

1:06:11

VS: So, the western part of the Grand Canyon is complicated from a number of perspectives, but have you had an opportunity to get out in the field in the area now referred to as Parashant National Monument?

1:06:31

GB : Yes, we hiked through Parashant back in the late 80's—early 80's I mean. We found a body down there at the river at that time of a girl who drowned at Phantom Ranch three or four years before we got there. But that's a really spectacular canyon, a long canyon, its 40 miles long or thereabouts. I'm not sure what your question was—

1:07:02

VS: Mapping projects that are tied with Parashant? Were you involved in any mapping that are now part of that monument?

GB: Yes, Breccia Pipe study through the USGS. That's where I had great helicopter support so I could go in and out of all those canyons. We dropped off and looked at stuff or came back and hiked or whatever.

1:07:28

VS: So, we're almost finished. I wanted to ask you more of a philosophical question to get your perspective because you've really done the field work and the ground work and I'd like to hear your response; the question is: How does paleontology and fossils contribute to your mapping efforts; are they important ?

1:07:56

GB: Extremely important to help provide an age range of some kind to put the fossil formations in order of time—like the nautiloids you know of Mississippian age, so they're Mississippian age.

VS: Charles Wolcott early in his career did work at Grand Canyon and—it's an area of extremely importance of discovery. It's probably one of the most recognizable geologic features on planet earth. How does it feel to be the geologist that basically mapped Grand Canyon National Park?

01:08:52

GB: Well, I'm very happy to have done so and had the opportunity to have done so—it's really important to me. I didn't start out that way but it just ended up that way because projects kept piling up for one thing or another so eventually I got to cover and see most of the Grand Canyon region and that was really a neat thing to do, but just remember this: the message I want to press on is just because I mapped regionally the Grand Canyon area does NOT mean it is finished. There were many areas not mapped in detail. There is so much more to be done, students shouldn't just say it is done and quit; go in there and update. It needs a lot of update information. It's just a tool for students to use to continue more mapping, more detailed information. And get more story to the Grand Canyon.

1:10:00

VS: Perfect. Is there anything that we didn't ask you that you want to share with us that is tied to national parks and your career?

01:10:16

GB: Through it all I'd like to say thank you to my wife (my girlfriend first) and then my wife (Susan); she stuck with me through all of this and gave me an awful lot of support and with our two children they helped get around the Grand Canyon as well. She was most important to the whole project in Grand Canyon and what I've done elsewhere and we're still doing things.

VS: It's quite an accomplishment, it is absolutely an important legacy, and we are very indebted to you for all the support you've provided for the National Park Service.

1:11:13

GB: Well, thank you for that; I appreciate you saying that.

TC: I second that for sure; you have been a great asset on many, many trips that I've been to at several national parks over the years.

GB: And there's so many geologists I didn't mention in this interview that should be mentioned, and I can't remember all their names, but it's all written down in my journals; everybody I did stuff with.

1:11:40

VS: We're just going to have to read all your journals.

GB: Some people use them. They find it in my journal and use that to go in there and learn what I went through because it was not easy.

VS. That's for sure.

TC: There's one thing I just wanted to mention too because George mentioned it to me too, that your daughter also works for the National Park Service today.

GB: She works for Pecos National Park, yea and she used to work for Dinosaur—and she's done river trips through Grand Canyon too.

1:12:25

VS: Where does she currently work?

GB: Pecos, I can't remember the whole name of it, it's in New Mexico; she just started there.

1:12:37

VS: I'll have to send an email of hello.

GB: Yea, and I could send you information too in an email if you need it—like I said Cline Library special collections and they have all my photographs, all my journals, everything; I really appreciate them keeping it and saving it.

VS: Yea, we'll have to look into that, and I assume there are photographs of Eddie McKee and fossils in the field?

1:13:10

GB: Yes, yes and all the other geologists I went with, I only published 1200 photos. There was 5,000 I had to sort through. I selected only 1,200. I'm really grateful the survey went through to publish. All 5,000 are at the Cline Library, and all the geologists I worked with and was associated with and all these mapping projects.

VS: It is. Now on my bucket list of things to do. Well, unless there's anything else I just want to again thank you for everything and really appreciate your time.

1:14:03

GB: Well, thank you for asking—and remember there's a lot of important things out there that other people have done besides me and I want you to know that just because I've been out there doesn't mean I know it all. In fact, I thought I knew it all years ago, but now I realize there's an awful lot I need to learn.

1:14:22

VS: Well very good. Well thanks again and look forward to chatting another time.

GB: Thank you both, and if I messed something up give me a call or an email, OK.

VS: Thank you again.

TC: Thanks, George. Stay well, take care.

1:14:45

[END OF INTERVIEW]


Paleo
NPS PALEONTOLOGY

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

NPS 2020/008, June 2020

National Park Service
U.S. Department of the Interior

Natural Resource Stewardship and Science
1201 Oakridge Drive, Suite 150
Fort Collins, CO 80525