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The Princeton Mathematics Community in the 1930s
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HASSLER WHITNEY

(with ALBERT TUCKER)

We are here at the Institute for Advanced Study in Princeton in Hassler Whitney's office on 10 April 1984. The interviewers are Albert Tucker from Princeton University and William Aspray from the Charles Babbage Institute.

Tucker: Well, I guess you must have some recollections of the year that you were at Fine Hall as a National Research Council Fellow. That was '31-'32, wasn't it?

Whitney: I have a very strong feeling about that year. It was a very wonderful year. It may not be quite so easy for me to find the details. I remember one item during the autumn: I think there were seven separate seminars in topology going on at the same time at one point.

Tucker: Was it [James W.] Alexander that supposedly was your supervisor or [Solomon] Lefschetz or [Oswald] Veblen?

Whitney: It was essentially Alexander. I don't remember if there was a formal requirement that I have a supervisor, but he served as one most of the time.

Tucker: The following year or so I was a National Research fellow. I recall that everywhere I went I had to have someone. I think my checks were sent to this person at Cambridge, England, where my supervisor was Max Newman; at Harvard it was Marston Morse, and at Chicago, where I ended up—it was a 12-month appointment—I had G.A. Bliss.

Whitney: I may have seen a lot more of Lefschetz than of Alexander, but I know that Alexander was the one I was most connected with, theoretically and preferably in a sense. After all he was a mountain climber, so how could I help it.

Tucker: Did you ever climb any mountains with him?

Whitney: Oh yes. We had some quick trips together in the summers.

Tucker: Where?

Whitney: In the Alps.

Tucker: He also did climbing, I know, in the Rockies.

Whitney: Georges de Rham, one of the best topologists from Switzerland, my son, and I climbed the Alexander Chimney of the East Face of Long's Peak one time together.

Tucker: Don Spencer said that he knew about that use of the name Alexander long before he was aware that Alexander was also a mathematician.

Whitney: I met Georges de Rham when I was with Alexander, after coming down from the Schallihorn, actually the first full ascent of the east ridge of the Schallihorn. We saw two forms coming down from the Weisshorn, and those turned out to be Georges de Rham and a friend, Nicolet. That was in 1933.

Tucker: Now you said that it was a very wonderful year that you had. Could you expand on that?

Whitney: I remember so much going on. In particular, I know I gave about six talks on the theorem about characterization of the closed 2-cell. After the last talk, while I was writing it up, I hit a snag and found that I possibly had not proved that theorem. There was a severe gap, concerning the basic point, and for two days I was wondering what I could do. I finally got it cleared up and published the paper. Then when I met [Casimir] Kuratowski in Moscow in 1935 he said, "Oh, that paper of yours. That had a proof in it that I had so much been trying to get." That was the point where I had gone wrong at first, then found my way through it.

Aspray: Which of the faculty members did you work with most closely?

Whitney: I wouldn't say I worked with anybody really. I saw a lot of various people and chatted with them, but never really talked mathematically that much.

Tucker: That was the first year of Fine Hall, '31-'32.

Whitney: Oh, I did not know that. I thought it had been in use for some years.

Tucker: And indeed you may very well have attended the dedication ceremony, because it was held there in October 1931.

Whitney: I would think I ought to have been there.

Tucker: And for that occasion some visiting people came: G.D. Birkhoff was there, G.A. Bliss was there, and there was a one-day symposium of mathematical talks.

Whitney: That has entirely gone out of my mind.

Tucker: The dedication ceremony was held up in the library on the third floor. President Hibben and the people who were speaking were in one corner of the library; because of the central court it meant that there were a lot of people that couldn't see the speakers. Veblen on that occasion gave a very nice oration in which he reviewed the career of [Henry B.] Fine.

What did you think of the building itself?

Whitney: I guess I lived in it very much. I didn't pay too much attention to it as a building, except it was interesting.

Tucker: And it was luxurious.

Whitney: Yes, it was absolutely magnificent.

Tucker: Did you like the social atmosphere, particularly at tea time?

Whitney: I remember—what is it?—Kriegspiel was going on so much of the time.

Tucker: Yes.

Whitney: I think Gerrit Bol was there. He started piling up a chess set on one mantle, and I joined in on that for a while. I certainly saw what it was like to have a group of people working together, talking math solidly back and forth for days on end.

Tucker: To me, looking back, it contrasted very much with the situation a year later when I spent six months at Harvard. I didn't find anything like the same community.

Whitney: There was no such location. Not until much, much later was there a chance for anything quite like that.

Tucker: At Chicago there already was Eckhart Hall. But Eckhart Hall did not have tea everyday; they only had it on the days of the colloquium. So while there was some of the same atmosphere at Eckart Hall, I felt a lack of community. Towards the end of my year at Harvard I was offered a Benjamin Peirce Instructorship for the following year. Then Princeton offered me something similar—it didn't have any name to it. I chose the Princeton one, although many people thought I

was very silly. Marston certainly told me I was, but I missed the social atmosphere of Fine Hall. I couldn't find anything like it at Harvard, where it seemed people had their own special friends, and where there wasn't any general mathematical community.

Whitney: And the professors were spread around.

Tucker: Oh yes. I had to go to Eliot House to talk to Marston; Birkhoff had an office in the library, I think, and Coolidge at Lowell House.

Aspray: Do you remember getting to know a number of the other National Research Fellows while you were there?

Whitney: I saw a lot of Leo Zippin. He is the person perhaps I saw most. Of course he started working with [Deane] Montgomery, I suppose after that time. And then Chuck Morrey. Was he a National Fellow at that time?

Tucker: Yes.

Whitney: I saw less of him. But an incident with him caused me, in a funny way, to write a paper there, one of my nice papers. He started talking to me one time about path spaces. I could not understand what these things were—something on a manifold, what kind of manifold I was not sure. He kept talking about it, on and on. I finally wondered, "What can I do about this?" I was sort of lost, and I really had things I wanted to do, so I thought, "Quick, ask him some questions." I said, "Chuck, suppose you have some kind of a curve, maybe very wiggly, in a space, let's say a metric space. How could you pick out a mid-point of that? How could you pick out a mid-point of each half? And so forth. Let's get a parametrization of it." So he started thinking about it. That enabled me to slip out. Then I started thinking about the problem myself. It tied me up for two days. I finally got an answer to it, and it turned a into a nice paper of mine. Montgomery and Zippin quoted that paper in the book they wrote later.

Tucker: And you were also working a bit on graph theory at that time, weren't you?

Whitney: Yes, I certainly was, though I was then beginning to move out of that field.

Tucker: Was it really in some sense the four-color problem that challenged you initially in graph theory?

Whitney: That was the initial challenge, yes. It caused me to write in that direction in my Ph.D. thesis.

Tucker: Yes, that's what I thought.

Whitney: But I did not feel that that was the subject I wanted to stay in, so I was moving more into topology at that time.

Tucker: And it had just started to be called topology.

Whitney: Yes, it was Lefschetz's influence. Of course Lefschetz was the key figure there and was certainly an unforgettable figure. He always had much influence, and talking with him you always found so many ideas. There were clashes at times between him and Alexander, but mostly they were avoiding each other at that time to avoid this trouble.

Tucker: Yes, they had tremendous respect for one another, and yet they had to express their own opinions. Well, I was writing my thesis that year, which was unduly long.

Whitney: It had influence. I used it some years later writing my paper about products in a complex.

Tucker: But, I think I now realize that, especially for a young mathematician, it's not a good idea to put too many ideas in one paper. I kept making the paper longer and longer. In fact, still afterwards I added things to it before it was published. The result was, I think that many of these things got buried because other ideas stood out.

Whitney: A number of my papers have had that problem.

Aspray: You said you were just turning to topology at this time in your own work. Princeton was, of course, the American center for this kind of research. Did you come away from Princeton with a new way of looking at things or a new approach.?

Whitney: Certainly lots of ideas were going around, but I didn't hear too many of them. I must have gone to a few seminars, but not very many I think. It was really little things that would start me out in different fields, like my question to Chuck Morrey at that time. I remember one summer in the Yale library I noticed in the *Bulletin* of the Math Society a paper by M.W. Whyburn asking a question whether, given a closed set in a space, it is possible to have a function with derivatives, with every point of that set a critical point and with the function not constant on that set. I played with that idea for quite a while, and it turned into quite a big field of work for me. So things often came by something catching my fancy. At Princeton there were interesting programs to look into. I tended not to be in a center of a field. When I found myself in the center of some field, I simply would not know enough of the background material. It was very hard to keep up with the other people, who would go ahead and learn more things much faster than I could. So I tended to keep my eyes open for some simple elementary thing, which was elusive, to dig into.

Tucker: Did you have anything to do with Wedderburn?

Whitney: No. I felt I didn't have the knowledge of algebra required for a lovely field like that.

Aspray: Do you remember why it was that you decided that Princeton was the place to take your fellowship?

Whitney: I can only guess at present why I thought that. Certainly I knew it was a place where there was much going on, also in topology. It was a very natural place to go. Undoubtedly that was the reason. But I was interested in Alexander's work especially. It was a chance to get to know him too. I imagine I had heard of him as a climber.

Tucker: Did you know that before Fine Hall was built, Alexander had his office on the top floor of Palmer Lab? He always left his window open slightly so that if he wanted to get in when the building was locked he could just climb up the wall. You remember he always wore tennis shoes so that he was prepared.

Whitney: I was told about when he had his office here in this building [Fuld Hall]. The secretary, I think Miss Blake was her name, would say to some visitor, "Oh yes, do come in. I am quite sure Professor Alexander is here. He would love to meet you." Alexander, overhearing this, would quickly climb out the window.

Tucker: Well, thank you.