THE PRINCETON MATHEMATICS COMMUNITY IN THE 1930S: AN ORAL HISTORY PROJECT, THE ON-LINE VERSION

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This project[1] in its unpublished 1985 paper version was essentially inaccessible to the general public until September 2000, when an on-line version at Princeton University became available with supporting web documents, describing the incredible community of university and Institute for Advanced Study mathematicians which coexisted together in Princeton during that decade, welcoming Einstein to his new and final home there. This includes over 600 pages of typewritten transcripts of interviews with personalities of that decade who were still alive in 1984 when the project was carried out by Albert Tucker, William Aspray and Rik Nebeker (with the help of Charles Gillispie) and new on-line supporting documents describing the background surrounding this decade and its unique story added by myself.

Not having any background in the history of science, I felt I could make a valuable contribution in not only saving some fascinating documentation of a period that overlaps in part with the story of general relativity, but also in making it readily available to the outside world with additional materials which place it in context. The explosive growth of the internet and world wide web in the 1990s provided the perfect place to host these documents, which now reside at

http://www.princeton.edu/mudd/math

as part of the Seeley G. Mudd Manuscript Library of Princeton University.

It seems to me that too often scientists are charging ahead working on problems that interest them without ever investing a small amount of effort and time along the way in documenting the human faces and relationships behind the ever advancing frontiers of knowledge. Al Tucker, a young math instructor at Princeton in the 1930s who later became chair of the department in the 1950s, tried his best in retirement to interest others in saving memories of that exciting decade of the 1930s at Princeton that he had participated in. Finally noted Princetonian historian of science Charles Gillispie by chance convinced him to take charge himself and with William Aspray's history of science expertise and the help of then graduate student Rik Nebeker in 1984, half a century later, they interviewed most of the people who were still alive from that Princeton mathematics community of the 1930s. The transcripts of those interviews reveal interesting details of the personalities and interactions of an important group of mathematicians and some physicists, whose influence on successive generations has been profound.

As a Princeton undergraduate in physics (1974) with a serious interest in mathematics, I never learned of the history underlying the close connections between the physical buildings of the more modern Fine and Jadwin Halls joined by a joint math-physics library, whose roots trace back to the original Fine Hall (now Jones Hall) and Palmer Physical Laboratory (now the Frist Student Center) connected together themselves by a passageway and a common library. While lucky enough to have spoken in person about rotating cosmologies with Gödel in his office at

the Institute for Advanced Study for my undergraduate thesis work, I only had a vague idea about it being created as a home for its most famous member Einstein sometime between the two world wars. My Ph.D. thesis advisor at the University of California at Berkeley, Abe Taub "the physicist," had gotten his mathematics Ph.D. at Princeton in 1935 (having taken both the math and physics comprehensive exams, studying under H.P. Robertson, holder of a joint math-physics position) and stayed an additional year at the Institute for Advanced Study, working with Veblen and von Neumann, but I had never really been interested in finding out more about the period from him until it was too late. Abe retired in 1978 and died in 1999, and although I was able to see him repeatedly in the last decade of his life, my interest in the history he could have told me about only developed after he was no longer well enough to remember.

As described in more detail on-line, the 1930s saw the flowering of the Princeton University mathematics department as the culmination of several decades of efforts led by Henry Fine to improve its quality as a research institution. His untimely death in 1929 led to the construction of the original Fine Hall sparing no expense at the wish of the donors in the beginning of the 1930s, creating a unique environment intended to give mathematicians a place to do mathematics as a community. Through other coincidences, the strength of this mathematics department led to the choice of Princeton as the home for the new Institute for Advanced Study, which shared Fine hall with the mathematics department during 1933–1939 while its own building was under construction, a period in which many immigrant scientists were attracted to or passed through Princeton because of the rise of fascism in Europe, bringing the Institute's most famous members Einstein and Gödel to its Department of Mathematical Sciences.[2] The passageway between Fine and Palmer Halls was more than symbolic of the interactions between physics and mathematics that went on in those days, also exciting times for physics.

As a physics undergraduate during the renaissance of general relativity at Princeton in the early 1970s, chance circumstances involving then assistant professor Remo Ruffini led me into mathematical cosmology, begun by Taub's most famous contribution to the field in introducing the "Bianchi cosmology" of spatially homogeneous universe models in 1951,[3] shortly after some interesting special cases were brought to the world's attention by Gödel following World War II, which had brought the story of Princeton mathematics in the 1930s to a close. Their work relied on the 1898 classification of symmetry types of 3-dimensional Riemannian manifolds by the Italian mathematician Luigi Bianchi,[4] whose work in turn was probably transmitted to the 1930s mathematics community at Princeton by department chair and then dean Luther Eisenhart, a differential geometer whose texts on Riemannian geometry and continuous groups were important references for many generations of relativists and which contained numerous citations to Bianchi.

My 1973 typewritten student translation of Bianchi's long paper into English turned out to be of interest to the Golden Oldies section of the journal *General Relativity and Gravitation*. Editor Andrzej Krasinski contacted me in 1998 for a translation because of my association with Bianchi and Italy, leading to a year-long project to scan, LaTeX, and improve my earlier unknown translation. Meanwhile I needed to provide some context for its applications in general relativity, leading me

to nose around the new Fine Hall library at nearby Princeton, where I discovered the Oral History Project by chance through Taub's participation in it. In turn a chance suggestion led to my meeting then professor emeritus Charles Gillispie and my idea to transfer the Project to the web as a natural place for it to be freely available and be accompanied by supporting documents. This was a long process of scanning, editing, and conversion to html form, during which I got to read every page of the oral transcripts, enjoying many stories and amusing anecdotes about this collection of famous academicians, detailing how they thought, taught, worked, played, studied and interacted together, both professionally and socially.

I retell the story of my own involvement in this project, partly motivated as an indirect tribute to Abe Taub, in order to call attention to the many stories which are transmitted orally in the classroom, in public lectures, at meetings or in private conversation about the people behind the science we are all pursuing, stories which often fail to be kept alive by not being recorded permanently. Most of us, including myself, are guilty of not thinking in time to keep records of the history of science as it is being made or even after the fact. But science is a very social activity based on interaction, so it is important to remember the human side of the equation together with the results. In my case I stumbled into an opportunity to preserve other people's stories, learning in the process of the apparent lack of interest in maintaining some kind of historical record that seems to prevail.

The decade of the 1930s also marked the arrival at Princeton of John Wheeler, who fortunately took the time during his eighties to write his own memoirs,[5] which have some overlap with the Oral History Project, filling in some additional context about the physics side of the story. It was a privilege for me to have had him as a teacher during my undergraduate years, and to occasionally meet him later in life. It was ultimately his influence through his collaborator Remo Ruffini in the 1970s that led me into relativity and changed my life, again by chance circumstances, and he has had a powerful influence on many people who have come in contact with him in the physics and relativity community.

References

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2. Ed Regis, *Who Got Einstein's Office?* (Addison-Wesley, New York, 1987).
3. Abraham H. Taub, *Ann. Math.* **53**, 472 (1951); reprinted in *Gen. Rel. Grav.*, **33** (2001).
4. Luigi Bianchi, "Sugli spazi a tre dimensioni che ammettono un gruppo continuo di movimenti" [On three-dimensional spaces which admit a continuous group of motions], *Memorie di Matematica e di Fisica della Societa Italiana delle Scienze, Serie Terza*, Vol. **11**, 267–352 (1898); English translation by R.T. Jantzen in *Gen. Rel. Grav.* **33** (2001).
5. John Archibald Wheeler, *Geons, Black Holes, and Quantum Foam*, (W.W. Norton and Co., New York, 1998).