



NAVAL SURFACE WARFARE CENTER - DAHLGREN DIVISION (NSWCDD)
ORAL HISTORY TRANSCRIPT

Dr. Charles C. Bramble
Dahlgren's First Director of Research

INTRO MUSIC

Introduction: Welcome to the Dahlgren Centennial Celebration - A Century of Innovation. We hope that this and our many other products, events and offerings will showcase what Dahlgren has accomplished during its last 100 years.

Throughout our history, we've interviewed some of the most prominent minds, leaders and innovator that have been here, and we're opening up the vault to share them with you this year.

Today we are honored to listen to the story of Dr. Charles C. Bramble. Dr. Bramble first came to Dahlgren in 1924. Dr. Bramble served as the Head of Exterior Ballistics Section, Head of the Computation and Ballistic Department. Later, he was appointed as the Director of Research, a predecessor to the Technical Director position. Dr. Bramble was heavily involved in the early computing abilities of the base, particularly the Mark II Aiken Relay Calculator.

Let's listen to Dr. Bramble. . .

Interviewer: *You had contacts at Dahlgren beginning in the early 1920's. What was your connection there then?*

Bramble: My first contact with Dahlgren was in 1924. In those days, there was no bridge across the river. I used to call up, and they'd send a boat over to Morgantown for me, and I'd leave my car with the Captain's chauffeur. He kept the car on the Morgantown side because in those days, the Commanding Officer at Dahlgren was also Commanding Officer at Indian Head. So we'd go across by boat, and, in those days, there used to be a frequent trip by boat up the Potomac to Washington, and the wives of the people who lived there would go up on the boat to do shopping. There was also a railroad from Dahlgren to Fredericksburg, and that persisted until about the end of the war as I recall.

When I came down there, it was just for general interest of ordnance problems. You see, I was teaching ordnance courses at the Naval Postgraduate School then. I was on the Naval Postgraduate School faculty. I was teaching ordnance courses including ballistics and gun design and both exterior and interior ballistics.

Naturally I was interested in the current problems in those areas so that periodically I would get in touch with Dr. Thompson who was at that time the Senior Scientist there at Dahlgren. I'd go down and probably stay overnight or stay a day or two and then, of course, return. But it was a very informal contact, but that was my way of keeping a live interest in current ordnance problems and the investigation work and research that was going on. At that time I also





did the same sort of thing in connection with the Army Proving Ground at Aberdeen. That sort of thing, I think, gave them a natural interest in my field of interest. To put it immodestly, my so-called expertise in that field. So that when the national emergency came on and they decided to move the ballistic work out of Washington from the Bureau of Ordnance,-- they decided to put it at Dahlgren--they requested the Postgraduate School to have me transferred to Dahlgren, but the Head of the Postgraduate School wouldn't agree to that, so they compromised on my spending 4 days a week at Dahlgren. So at that time, my family stayed here, and I lived at the BOQ at Dahlgren. That was the beginning of the ballistic work and the beginning of the Computation Laboratory because, at that time, there were only two mathematicians employed at Dahlgren. They were people that were only about a GS-7 or GS-9 level. That was back in about 1942. This was before any of the reserve officers came. The only people there were Scott and Barker in the mathematical work in the computation work. There were a couple of women who were about a GS-5 level. That was a start. That work, organizationally, was under what they called the Ordnance Officer who was second in command. It seems to me that the Ordnance Officer was really the Deputy Commander.

Interviewer: *Did you have Admiral Withington as one of your students?*

Bramble: Yes, Admiral Withington, Admiral Parsons, Admiral Turner Joy, Admiral Hussey, Admiral Blandy, Admiral Schoeffel, Admiral Diehweg. The Ordnance Group at the Postgraduate School usually consisted of only about 8 or 10 officers, and they had more courses with me than any other single faculty member, and in fact, they stayed at the school longer than most of the groups. They stayed there 1 1/2 or 2 years so I got to know them very well. We had very pleasant relationships and a good many of these continued through the years. Among those I might mention Captain W. H. Vinson who had been a good friend of mine these many years. Also Captain Al Mome, Captain George King, and many others.

Interviewer: *Was this Admiral King?*

Bramble: No. By the way, I first came to the Naval Academy in 1917. I was in the Department of Mathematics for two years. That was during World War I. Then the Postgraduate School opened up under Captain King, later Admiral King, in 1919. I was appointed to the faculty there at that time. I remained on the faculty there officially until I went into uniform in 1942 and still continued then and it was back again after I was out of uniform in 1946 and remained at the Postgraduate School as a civilian on the faculty until 1947. Am I saying the things that you want to hear?

Interviewer: *You sure are. And that's the time you transferred to Dahlgren?*

Bramble: I transferred to Dahlgren. There was a question of whether I'd stay in the regular Navy or the Proving Ground was interested in my continuing in the work that I had started during the war. You see, we started the Computation Laboratory. I decided I'd come back as a civilian. As things turned out, I'm happy that was the decision because in 1947 my family and I moved to Dahlgren and we occupied quarters 508 for seven years.

Interviewer: *You mentioned Dr. Thompson. Could you tell me something about his work and the man himself?*





Bramble: He came there, as I recall it, and he was technically classified as a physicist. He was the Chief Scientist or the Senior Scientist, although there was no title of that sort at the time. There were two or three others that came later as civilians-- I think they came about 1934. But there were just a very small handful of civilian scientific personnel. The rest of the people were all essentially trained on the job at the batteries—Main Battery, Machine Gun Battery, and so forth--so that the actual highly-trained technical competence was rather scant in those days. But they had various ordnance problems. I remember back in those days that one of the serious problems was the unexpected dispersion in connection with the 14-inch batteries on the 14-inch gun battleships. That was studied for a long time at Dahlgren.

Interviewer: *What was Dr. Thompson like?*

Bramble: He had a very pleasant personality. He really got along very well with people in general. I think he was very diplomatic in dealing with the naval personnel in command, and, also, he developed quite a bit--you might say--clout in dealing with the Bureau of Ordnance through the years. He got to be well known and respected. Of course, one of the advantages that I had when I came into this work that the personnel who were in command positions in the Bureau of Ordnance were X-students of mine and practically all personal friends. For instance, Admiral Schoeffel, Admiral Hussey, later on Admiral Burke. That was always helpful in expediting our programs. One of the reasons they were interested in having me come there was that Dr. Thompson was leaving. He left to go with Norden Laboratories because Norden Laboratories had the mission of establishing the Indianapolis Ordnance Plant for the Bureau of Ordnance, and he went to Indianapolis and was there during the war and then later on as an outgrowth of that really and along with his ideas, the Bureau of Ordnance started China Lake. So that's the way that came about. Of course, out at China Lake- well, not exactly China Lake. I don't know whether it's in... I don't know exactly where it is, but there's a Thompson Laboratory.

Interviewer: *Oh there is. Named after Dr. Thompson?*

Bramble: Yes, named after Dr. Thompson. I think it's on the station. They have another facility that's in closer to Los Angeles, and I forget just where it is. I've been there. Tommy went as the Technical Director at the Ordnance Plant, and he took Carl Shaeffer with him. Carl Shaeffer was at Dahlgren. They both went to Indianapolis. Later, they closed out the Indianapolis Plant at the end of the war, and he went to White Plains, and so did Dr. Thompson. He went to White Plains because that was where the Norden Plan was, and that was the office I was in when I was at White Plains with Norden.

Interviewer: *Was that the home office or a branch?*

Bramble: That was the home office at that time. Dr. Thompson went from China Lake and then back to Norden.

Interviewer: *How long was he at China Lake?*

Bramble: I really don't know. I went to Norden in White Plains in 1954, and he was there and had been there for some years at that time. He and Carl Shaeffer were both there at Norden. Then, when Dr. Thompson retired from Norden, Carl Shaeffer took over the technical directorship in the latter part of my stay





there. When I went to Norden, I went there with the idea of having what you call a staff job because I wanted a job that I could walk out on for a month or two and travel if I wanted to without having a direct responsibility for a program, you see. I was not a project engineer. I was what they called a staff engineer which was somewhat of a general consultant for the plant with particular interest in ballistics and computation and associated instrumentation. At the time before the Ordnance Plant had opened up, one of the things they were interested in manufacturing was the Norden bombsight. Dahlgren was the test place for the Norden bombsight. They had a test facility there. All the Norden bombsight were sent there for tests.

Interviewer: *Was Dr. Thompson involved in this?*

Bramble: In a general way, yes. He was involved technically and also rather intimately in the details of the organization running the bombsight laboratory.

Interviewer: *What were some of your major duties?*

When I was detailed on temporary duty to Dahlgren which was really a steady job, I was instructed to develop a facility for production of the Navy range and bombing tables. At the time I went there, there were only two desk-type computers in the place. That's all they had--two mathematicians to operate these. Along with the difficulties of getting things going, I can give you one minor incident. I immediately saw that we were going to need more desk-type calculators so I put in a request to have them get five more. I came back here on Thursday evening and when I went back on Monday, I found that the order had been changed to two for ballistic work and two for the so-called velocity measurement work. I was somewhat appalled by that, and I think it is difficult to impress command of the necessity for this kind of work, but it was just a matter of a very few months before we were up to about 50 desk-type calculators. They built the first wing there [Building 218], and to my amazement, when they took down the forms off the concrete work, instead of it being Ballistic Building, it has Velocity Building on the front of it. There was a financial reason for that. I don't need to go into that. I mean because of some of the bureaucracy goings on at the Bureau of Ordnance. There was really a reason for it, but you can correct me on this. Shortly after I was there, we put in requests for mathematical help in the Naval Reserves. We got Dr. Dresch who was from Stanford University, Dr. Kemper, and Dr. Cohen. Then we brought in some Wave officers, and the senior one was Eberjane [Hershey], and there were four others that had mathematical training and one or two others that went into other departments. One was a librarian and the other one served as an administrative assistant in the Commanding Officer's Office. By the way, there was also a Dr. Goochland and Walter Jennings and Hickman. Actually, the way the thing work, I immediately put them to work studying ballistics and giving them some lectures on ballistics and setting up the computational procedures. They taught the wave officers what to do to manage the enlisted Waves who pounded these desk-type computers--really the computational nitty gritty, you see--the real dirt-type computation. That's the way we spread there. . . There was Dr. Brad McMillan and also his wife, who was also a PhD, and she was in the mathematical work. McMillan, however, was attached to the velocity work, or was it over to the Projectile Laboratory with Ralph Sawyer? No, McMillan didn't stay there too long. After that, Audrey McMillan who was the first PhD woman on the station. I think they were both Harvard graduates.

Interviewer: *What was your involvement with the Aiken Relay Calculator?*





Bramble: Later on, we began to see the first development of what we might refer to as large-scale program calculators. We saw that Aiken had developed the MARK I which was electromechanical at the Harvard Computation Laboratory and also Bell Labs had developed a relay calculator for purposes associated with design work in connection with Bell Telephone. We saw the necessity for the importance of getting large-scale computers into the operation of ballistics work. I've got to make a digression here because also, at this same time, we developed a contract with MIT to have them operate for us the Bush Differential Analyzer. They ran a great many of our basic trajectories for the firing tables and bombing tables. They sent the output of this. This was the largest scale analog computer. . . . MIT had an analog computer, too, that may have been somewhat larger. That output came down, and we polished it up and developed the rest the rest of the subsidiary data that was essential to the firing tables -- all the so-called differential effects. Then we saw the necessity for the desirability in having a large-scale calculator of our own. I had some consultations with Bell Labs, with Harvard Computation Laboratory, MIT, and Dr. Fanorman at Princeton. As a result of that, through the Bureau of Ordnance, a contract was given to Harvard Computation Laboratory for the development of the MARK II calculator. That was the first one. [large scale computer] Incidentally, about the same time or I think prior to the MARK II, I had a consultation with a man from IBM who had charge later of the production and the Nautical Almanac for the Navy. He was at the Naval Observatory. He later went with IBM.

IBM developed a couple of small-relay computers. They were probably about 4 or 5 feet long and 4 feet high and a couple of feet wide that took up that much space. They built three of them, and they placed two of them at Aberdeen and one of them with us. They called it the 799 Relay Computer, and they placed with us and had us experiment with it and see what we could actually do with it in the way of practical computation. That was under Hisers jurisdiction. We put in a good deal of IBM equipment into it and did a lot of our computation work with IBM cards--that sort of thing before we got the MARK II. Then Aiken developed the MARK II for us, shipped it down. We got it going there. What a time we had getting the bugs worked out of that! The programming was rather difficult. There were lots of failures in accuracy and a great deal of difficulty in troubleshooting, but we did a lot with it nevertheless. Then as a consequence of that program, it was followed up by a research program through the Harvard Computation Laboratory to investigate the feasibility of a fully-electronic calculator. Aberdeen, at the time, under Ekers and Mockley, had developed an electronic computer called the Eniac at Aberdeen. Of course, I was also in consultation with them and the progress they were making. I made frequent trips to Harvard and kept in touch with Aiken and also to Dr. Dresch who was my first assistant.

Interviewer: *What was the name of that computer you were talking about?*

Bramble Eniac. As a result of this research contract with the Harvard Computation Laboratory, we were able to have the MARK III developed. The first one was a relay calculator. It was completely relay and tape- -punch tape. Now the MARK III was electronic with a magnetic drum memory and also used magnetic tape. There were two types of memory with that calculator. The high-speed memory was the magnetic drum which rotated at high speed and then a number of mechanisms -- I think there were four tape mechanisms on the MARK III that burned magnetic tape, and they were what we referred to as a memory with low-speed access. The next development was the development of the NORC. You may have the computer history of that already. Let's say the next development at Dahlgren was the fact that the Bureau decided





to locate the NORC at Dahlgren. That really put the Computation Laboratory in “big-time” calculations because it was so far and away beyond anything else at the time -- far and away in greater capacity. The speed is really what leads to capacity. That brings us up just about . . . I think the NORC was just about to be delivered . . . About that time I was approached by Norden Laboratories. . . . The decision to get the NORC was pending when Norden approached me to come with them, and I talked with Admiral Parsons and Admiral Schoeffel about it, and they proposed that I stay with Dahlgren until the NORC situation -- and I proposed that I stay there -- was fully firmed up, and the NORC was delivered very shortly after I left in 1954. That was really, I think, one of the turning points in the history of the Laboratory. Wasn't that about the time we got the . . . Just when did we get the new K Laboratory Building.

Interviewer: *That was about 1964.*

Bramble: I think what happened was the MARK II and MARK II were dismantled and the NORC was put in the same building. Then I left the Naval Proving Ground at the end of January 1954. In fact, today is the 31st of January, and it's the anniversary of my being transferred from the Postgraduate School to Dahlgren. That was in 1947. Then I left Dahlgren on the 31st of January 1954, and I left Norden on the 31st of January 1958.

Interviewer: *In 1951 you were appointed as Dahlgren's first Director of Research.*

DiDonato: I think I was actually functioning before that. I was functioning, in a sense, as a Technical Director, but I was not so designated, I think, until 1951.

Interviewer: *Let me ask you this next question. We were talking about your being officially appointed Director of Research in 1951. This was a period of heavy proof and testing during the Korean War. What did you see as your mission at that time?*

Bramble: The mission of the station was to do research on weapons systems and also to carry out test work on systems under development and also proof work for production. That is, down there in the early days, you'd hear guns all day long because they used to have so much ammunition testing.

Interviewer: *Did you see any trends developing at the Proving Ground?*

Bramble: Of course, in the early days, it was just a test station. Dr. Thompson was always interested in research and he, in his early days, worked with Goddard on rocket work at Clark University. So he was always interested in getting more and more research work because that's where one's intellectual interests naturally lied--not just in the routine test work. Test work had some interesting statistical problems but not the sort of challenge that you have when you do research work. So the trend through the years has been to do more and more things that might be classified as research and development like it is right now. You know more about it than I do. I've been in touch with it quite recently. I haven't been enough in touch with it to know just what the relationship is now between say one facility down there that has been developed has been this satellite surveillance work that has been developed since. That has developed in recent years. A thing that reflects that is the change in the name of the station.





Interviewer: *Can you tell us something of the work of Mr. Riffolt who succeeded you as Director at Dahlgren?*

Bramble: Mr. Riffolt came to this country from Sweden. He came to Clark University, and he was originally an instrument maker and a very skillful laboratory technician. He was more of a technician than an engineer. I'm not saying that in a derogatory sense at all, but that is the situation. But he was very skillful in that field--very precise. He worked with Dr. Thompson at Clark University, and he was brought to Dahlgren by Dr. Thompson under his influence in much the same sense that I brought in people like Cohen, Kemper, Niemann, Hiser, Goochland, Ritter, and Hershey. They had the predecessor of what became the A&P Laboratory. Nils Riffolt was really the predecessor of that laboratory.

Interviewer: *Were you optimistic about Dahlgren's future when you retired in January 1954?*

DiDonato: Yes, I really was.. I was optimistic because they were getting the NORC. I felt that was really going to give them a very solid foundation for a growing computation laboratory, and I felt the Computation Laboratory was very essential to the Bureau of Ordnance, and I thought that we developed an excellent staff there at that time. We had a lot of really very competent people. We had Dr. Hershey, Dr. Cohen, Dr. Kemper, Mr. Niemann, Bob Ryland and Dave Brown. I felt very optimistic about it. I left, not that I wasn't interested at all, but it was just the force of the economic circumstances because I had offers from two commercial outfits, and at my age and with the expenses I had with a son in college, I felt that I same time draw my retired annuity. So that's why I left--not that I wanted to leave. We enjoyed it and liked it at Dahlgren very much and enjoyed the association, and, in fact, enjoyed the professional life. It was financially advantageous to leave, and I just felt that for the sake of my family I couldn't afford not to do that. I regretted it. It was an interesting experience however. In general, I have only minor regrets about the situation because I did have a lot of interesting experiences in connection to Norden.

Conclusion: Thank you for listening to this week's Dahlgren Centennial Podcast, and hopefully you have learned another interesting aspect of what our people accomplish for the Navy and our nation.

We will continue sharing how Dahlgren is a one-of-a-kind location where innovation is heralded as the hallmark of each individual.

Tune in next week to hear from Woodrow Saft, a naval gun expert who started working at Dahlgren in the early 1940s.

Thank you for celebrating this century of innovation with us at Dahlgren.

CLOSING MUSIC

