NRAO ONLINE 56

Partial transcript of ABC TV interview with Pawsey: George Baker of the Australian Broadcasting Company interviewed J.L. Pawsey and R.G. Giovanelli, 11 November 1960 [only Pawsey's remarks]

[At time 3m:18s] I had done very little astronomy, or no astronomy, until the end of the war. Then I had a background in physics research and in the technology of radio because I'd been working some years in England on the early development of television and then on radar in Australia and we were interested in finding really interesting things for research. Now there was a complete mystery evident to us in those days. A man from America in the early 1930s had discovered radio waves coming from the Milky Way and this seemed to be worth trying to find out something about. Then the thing was complemented by the parallel discovery of finding radio waves from the sun. Our first work was using equipment which we got from radar, radar aerials and receivers and so forth and we were able to observe the radio waves from the sun. …

5:12 There's so much evidence for new sciences or new branches of science being followed up by physicists in a lot of cases. In my own experience radio astronomy was something that was relating to astronomy and the astronomers should have been the people to follow up these observations of Jansky's that I mentioned before, radio waves from the Milky Way. They were not. They were physicists. Going back a little further, the development of television and the development of radar was dominated by physicists, not by electrical engineers. So this is the way it goes. Just why it goes is something you can discuss….

6:20 There was a basic change in thinking which is due to science. You go back 2000, 3000 years and there was no idea of looking at the world and relying on observation and experiments to find out about things. This is not a natural thing apparently. Most civilizations have developed on the idea that you get your ideas from introspection. This thought that's common in our society of getting our ideas by looking at the external world is the characteristic of science of course as we know it today and that's why the astronomers who are the people who look at the most distant parts of the universe today are the people who carry weight in trying to think of a world model, a model of the whole universe… It's a difference in perspectives.

7:26 How did radio astronomy happen to develop in Australia?

I'm the one who is the most intimately mixed up with this. It started first of all you can see exactly what happened at the end of the war: there was a group of physicists in the radiophysics laboratory who had been busily engaged in wartime work on radar development work, and at the end of the war the decision was made by CSIR, as the organization then was, to carry on in peacetime work, and we had the proposition to find worthwhile objects of research. We were not bound by anything and we experimented in quite a lot of different avenues. Two of those in the radiophysics division were the physics of rain and possible

rainmaking and radio astronomy. There were half a dozen others which were not very successful and we gradually built up into the two successful ones which were radio astronomy and rain physics and rain making. But you can take the story back even further than this. The time was ripe in Australia for good radio research to go ahead. It was ripe because about 10 or so years previously, about the end of the 1920s, the CSIR had set up a radio research board and had got people interested in radio research. It was then research on the ionosphere mainly. The key people in this of course were Sir David Rivett who is a man who is tremendously responsible very very much for the whole development of science in Australia and in this particular radio research board Sir John Madsen who is still with us in Sydney was one of the key people. Now that meant that there were students and research people in different universities in Sydney associated with the radio research board. I happened to be one of the very first students but there were many others. That means that a whole group of people in Australia at about these 12 years or so later who had been trained in radio research and therefore they were ready to embark on some new venture as it turned up. Well, radio astronomy happened to turn up as a very promising venture and the thing went ahead in that way.10:22

…The thing that is exceptional is to have a group of people who don't have research commitments. They usually have the equipment or something like this which having got they are morally bound to use. We were in the position where we didn't have anything to tie us down…..

11:53: In this scientific age a lot of the people ought to understand something of the nature of science. Now it's a double thing. We live in an age where we have an inheritance of the culture of the past, of art and history and literature and so forth and we have something that is relatively new, science. And I'm quite sure that it's desirable that the leaders of the people should be conversant with both. Now I don't know whether teaching this in the schools is going to insure this. It had bad effects on me when I was taught Shakespeare and it could be that it will have bad effects on some of the future Prime Ministers shall I say when they're taught physics badly. But at the moment I don't know any other way of making them conversant with it than putting it on the school curriculum and challenging the school masters to make a better job of it. 12:51

13:00 The thing I would like to see is a balanced curriculum in which the schools teach both science and the humanities and they force the humanities people to take a little bit of science and they force the science people to take a little bit of humanities. And if it rolls of their back then it's just too bad. 13:17

[Talks about the scope of radio astronomy in Australia]:

[Observations of sun, our own galaxy—a cooperative effort between north and south hemispheres.]

14:39 Radio observations are completely complementary to optical observations. There's only one astronomy and you observe in any way you can, and what's significant about radio astronomy is simply that it's coming over a short period of time and it's a time when you can rapidly go ahead because other people haven't done the ground work already…

17:59 Scientists have been building very elaborate equipment because they don't know how to get the information without building that very elaborate equipment. What happens always is that, I think, science begins on very simple things and then you require more elaborate equipment to find out more about this particular phenomena and so you go on to these very large devices in their very many forms. 18:23

18:53 … There's some very interesting psychology here in getting the right degree of complexity in your equipment. If you make the thing too simple then it doesn't give you enough information. If you make it too complex then you have to spend all your time thinking about the equipment and you never have a chance to think about the phenomena you want to observe. Well, this certainly happens in science and somewhere in between is the happy medium…

19:42 Our own work in Sydney in the Radiophysics division, we have always been able to move from small beginnings to the more complicated things. Of course the ideal way of starting a new research is to do it on another job number and then you don't have to tell anybody what you're doing and if it fails it doesn't worry anybody; but if it's successful then you can go to your immediate superior and say, "look how good this is" and he sort of scratches his head and says, "perhaps you shouldn't have been doing this," but if he's a good man he would never mention that and you won't tell him about it of course if it's unsuccessful and if it is successful it justifies you in making something a bit bigger and this I'm sure is the way in which science can develop most successfully step by step with the ideas there all along the line—it's just what you want to do….

21:00 …We're building a 210 ft diameter parabolic radio reflector at Parkes…like the Jodrell Bank in general principle though the engineering design is very different. This is right in the middle of the construction phase now at Parkes, the maze of pipes and structure out on the ground right now and it should be completed ... early next year. We hope that it will be mechanically better, more accurate. What we want is an instrument that's very large and which is very accurate at the same time. I can't say for sure how accurate it will be but we think that it will work at either 10 or 20 cm … we will be very disappointed if it is not excellent at those shorter wavelengths … the Jodrell Bank people so far have not been able to make observations

on such short wavelengths. Their instrument is 250 ft in diameter and somewhat larger on that account. We hope that we have a more accurate instrument, and can, if all comes well, produce more significant results. 29:29

27:07 The potential value of any science always comes under two headings. One is its scientific value … is its contribution to understanding the world or universe in which we live. And in addition to that there are technological aspects which you normally make a guess at and you frequently guess wrong as to where they'll turn up. And I'm going to take the technological ones first because they're a bit simple. It was fairly clear in the early days of radio astronomy that there was a good chance of improving long distance radio communication on the earth … from studies of the sun because the sun influences the ionosphere and as you there is frequently disturbances in the ionosphere—that's the reflecting layer above the earth that directs waves say from … Sydney to London and if one had the knowledge of the disturbances that were likely to take place one might improve the transmissions and any knowledge is apt to suggest a remedy for troubles. ….. That one [the technological one] hasn't come good yet and the one that is going to come good almost immediately is the long distance communication using satellites. The we will use big telescopes. Like the one at Parkes dish to receive right round the world. Now the non tech-ones are simply that radio astronomy is part of astronomy and we are going to learn more and more about the universe in which we live as we combine the two techniques—the optical techniques and the radio techniques.