

Preface

In August 1931, Karl Jansky, a radio engineer working for Bell Telephone Laboratories in Holmdel, New Jersey, serendipitously made a major scientific discovery. Jansky had been assigned the task of investigating annoying radio static that interfered with transatlantic telephony. To check it, he built a simple antenna from metal struts, mounted on four car tyres so it could rotate, and proceeded to monitor radio noise from different directions. The output of the ramshackle instrument was a pen and ink recorder. Jansky was soon detecting thunderstorms, even far away, but he was puzzled by a background hiss that seemed to display a 24-hour cycle. Intrigued, he looked more closely and found the period to be 23 hours and 56 minutes, the duration known to astronomers as the sidereal day - the time it takes for Earth to rotate once relative to the distant stars (as opposed to the solar day, the time it takes to rotate relative to the sun). The sidereal periodicity implied that the radio source lay far out in space. Jansky eventually concluded that the radio static emanated from the Milky Way. Before he could follow up on it, however, he was assigned other duties by the company.

In this curiously low-key manner, an entire scientific discipline - radio astronomy - was born. No fanfare, no medals. Further progress came, as so often in science, with war. The development of radar during the Second World War greatly boosted the power and fidelity of radio receivers, and in the immediate post-war years, physicists and astronomers spotted an opportunity. Using cheap left-over wartime equipment, they began to build the first proper radio telescopes, enormous dishes that enabled them to tune into the universe. About this time, in the 1950s, it dawned on some scientists that radio telescopes were powerful enough to communicate across interstellar distances, so that if there were any intelligent beings on other planets it would be possible for humans to receive their radio messages. On 19 September 1959 the respected scientific journal *Nature* published an article by two Cornell University physicists, Giuseppe Cocconi and Philip Morrison, entitled 'Searching for interstellar communications', in which the authors invited radio astronomers to look for radio messages coming from alien civilizations. Cocconi and Morrison conceded that their ideas were highly speculative, but concluded with the pertinent remark, 'The probability of success is difficult to estimate; but if we never search, the probability of success is zero. The following year, the challenge was taken up by a young astronomer, Frank Drake, to whom this book is dedicated. Drake used a radio telescope in West Virginia to begin searching for alien radio signals, and from his pioneering project the international research programme known as SETI was born. SETI stands for Search for Extraterrestrial Intelligence, and since the 1960s a heroic band of radio astronomers have been scouring the skies for any sign that we are not alone in the universe. In 2010, SETI will be officially fifty years old, which seems a good time to take stock. This book is a tribute to the dedication, professionalism and infectious optimism of SETI researchers in general, and to Frank Drake's courage and vision in particular.

The subject of SETI is speculative to a degree far beyond that of conventional science. It is wise to take any discussion of alien civilizations with a very large dose of salt. But retaining a robust scepticism need not prevent us from approaching SETI in a methodical and penetrating way, informed by the very best science we have. That is the spirit in which I have written this book. I have taken care to separate facts and

theories in which we have some confidence, from reasonable but untested extrapolation, and from wilder speculation driven largely by ideas from science fiction.

I was still a high school student when SETI began, and although I was vaguely aware of it, my understanding of life beyond Earth was gleaned almost entirely from science fiction. Like many people, I learned more about SETI from the many television appearances of the charismatic scientist Carl Sagan, whose novel *Contact*, and the subsequent Hollywood movie based on it, convinced many people that SETI is a human adventure without parallel. In my later years, I came to know the key players quite well, many of whom now work at the SETI Institute in California. Much of what I have written about in this book stems from my long and fruitful association with them, especially Frank Drake, Jill Tarter, Seth Shostak and Doug Vakoch.

I didn't just want to write a bland congratulatory book. Instead, I decided to take a penetrating look at the aims and assumptions of the entire enterprise. As I wrote it, I kept asking whether we might not be missing something important. Old habits of thought die hard, and a project that has been running for fifty years can benefit from a shake-up. In February 2008 I held a workshop at Arizona State University called 'The Sound of Silence' to encourage radically new ways of addressing the evocative question 'Are we alone?' The contents of this book reflect much of our discussion at the workshop, and my thanks are due to all the participants.

There are some special acknowledgements I should like to make. First and foremost is my wife Pauline Davies, a science journalist and broadcaster with a deeply sceptical mind, and an uncompromising stickler for factual accuracy and properly reasoned argument. She not only pounced on many a slip, but helped me clarify a lot of the arguments, and contributed several ideas of her own which appear without specific attribution in the text. My views on the subject have been greatly shaped by the many in-depth discussions she and I have had over several years. Carol Oliver, former journalist, SETI scientist and now astrobiologist, has been a valued colleague and supporter during my 'SETI career'. Gregory Benford, James Benford, David Brin, Gil Levin and Charles Lineweaver gave good critical feedback on some sections of the book. My literary agent John Brockman has been a decades-long source of encouragement and support for my writing career. My editors Amanda Cook and Will Goodlad have shepherded the project with skill and sympathy; the text is greatly improved as a result of Amanda's detailed critique. And finally, a huge thank you to Frank Drake himself, whose inspirational lectures and articles got me into this field in the first place.

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