

RANDOM HOUSE  BOOKS



Your Life In Your Hands

Jane Plant

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About the Book

Professor Jane Plant suffered from breast cancer five times before she learned of the relationship between diet and the disease. As one of Britain's most eminent scientists, her revolutionary analysis of the underlying causes of breast cancer and her simple and straightforward programme for adopting a healthier diet and lifestyle to defeat it - she has now been clear of the disease for fourteen years - caused shockwaves when it was first published.

In this new edition of *Your Life In Your Hands* she shares her account of all she has discovered and experienced in dealing with the illness, and updates it with several case studies of those people who have followed her programme. They explore the tribulations of the illness, as well as the positive effects Jane Plant's recommendations have had on their fight with the disease.

YOUR LIFE IN YOUR HANDS

Understand, Prevent and
Overcome Breast Cancer and
Ovarian Cancer

Professor Jane A. Plant

www.janeplant.com



For my children Mark, Emma and Thomas

Author's Note

The diagnosis and treatment of medical conditions is a responsibility shared between you and your medical advisors. All diets should begin with a medical check-up to make certain that no special health problems exist and to confirm that there are no medical reasons why you should not undertake a change of diet.

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Cancer Support

I recommend people requiring individual supervision or personal help to contact Cancer Support by telephone 020 8439 8818, or by e-mail: info@cancersupportinternational.com

For further information on this book, please e-mail or visit:

info@yourlifeinyourhands.co.uk
www.plantprogramme.com

www.janeplant.com

www.cancersupportinternational.com

Preface to the Fourth Edition

It is now 2007, and it is 14 years since my breast-cancer secondaries disappeared following a fundamental change in my diet and lifestyle. My cancer had spread to the lymph nodes in my neck, in spite of radical mastectomy, three further operations, 35 radiotherapy treatments, irradiation of my ovaries to induce the menopause and several chemotherapy treatments. Despite all this treatment, my doctors had given me only months to live. I then recalled that people in rural China, where I had worked as a scientist, had a very low incidence of breast cancer. At that point I changed my diet and lifestyle, and to everyone's amazement, including, I have to admit, my own, the large cancerous lump in my neck disappeared within weeks.

Since that time I have not even had a scare, and my annual check-ups at Charing Cross Hospital have tended to focus more on my diet and lifestyle than on my cancer.

I have talked to senior doctors who have said that they personally have not met anyone who has survived such serious illness and had been very sceptical about my books until they had talked to me.

My experience, and that of many other women who had followed my diet and lifestyle, led me to write *Your Life In Your Hands*, which was published in 2000. This was followed in 2001 by *The Plant Programme* and in 2005 by

Eating for Better Health, written with Gill Tidey, cookbooks which complement the dietary advice in *Your Life In Your Hands*.¹ From the many communications I have received from people all over the world I have become aware of the beneficial effects of my diet and lifestyle in treating other cancers such as ovarian cancer, endometrial cancer and oesophageal and colorectal cancer; information on ovarian cancer is included in this new edition of *Your Life In Your Hands*.

In my research for this book I became aware that the same factors implicated in breast cancer were also implicated in prostate cancer, and in 2004 I wrote *Prostate Cancer: understand, prevent and overcome*, now in its second edition.

Information on other cancers is now available on the website, www.cancersupportinternational.com. This website provides up-to-date science-based information and support to cancer sufferers, and includes a forum for people to discuss their experiences of their illness, treatments, diet and lifestyle. I receive many communications from men and women who have complemented their conventional medical treatment with the diet and lifestyle that I recommend, and I know from these communications that many of them are now healthy and cancer-free.

Since the first edition of this book was published, seven years ago, more and more scientific evidence has appeared to support its findings and recommendations. It is perhaps worth noting that, despite the press seizing on one or two of the most sensational recommendations of the book – eliminating dairy produce and reducing exposure to hormone-disrupting and hormone-mimicking chemicals – there were originally seven food factors and five lifestyle factors to be addressed – there are now ten for each.

Examples of new supporting evidence include the results of studies conducted by eminent researchers that

show the link between breast cancer and high dairy and calcium intake. There is also more and more evidence that the disease is associated with high circulating levels of a chemical messenger in the body called IGF-I and that this is linked to food factors identified in this book, especially high dietary intakes of dairy produce, trans fatty acids and refined carbohydrate and low dietary intakes of vegetables and fruit. There is also much evidence that a high-oestrogen diet is linked to breast cancer, and this book identifies the main dietary sources of dangerous animal oestrogens. It also debunks the propaganda against soya, which is high in protective phyto-oestrogens.

There is, in addition, further evidence of the importance of the correct balance of oils in the diet, as well as increasing evidence against consuming man-made vitamins and minerals, including megadoses of vitamin C or calcium to fight cancer. Evidence of the association of breast cancer and carcinogenic chemicals such as those in pesticides also continues to mount.

The reason all the recently published science has confirmed the findings and recommendations in my books and shown them to be so soundly based is not because I am clairvoyant or indeed particularly clever. It is simply because my books are based on research into the peer-reviewed scientific literature. Because of my scientific training, I am able to read information in publications written in the sort of scientific shorthand that all scientists tend to use to communicate with other specialists in their field, and translate it into simple straightforward English to make it accessible to a wider readership. I am also able to recognise biased studies funded by vested-interest groups such as the dairy or pharmaceutical industries. The extent to which medical practice is influenced by vested-interest groups is something that many others, including the *British Medical Journal* (*BMJ*), now take very seriously. The *BMJ* now requires that authors of any paper published by them

should declare the funding sources of their study or other potential conflicts of interest. For this reason, many of the references in this book are from the *BMJ*. There is also concern about bias and misinformation in relation to our food. In *Save yourself from breast cancer*,² Robert D. Kradjian, head of the breast-surgery division at the Seton Medical Centre, Daly City, California, states the problem as follows:

The issue is clear. Much of our highly varied, desired, and profitable food supply has been found to be dangerous. The people who furnish this food and who are enriched by its sale do not want you to know this. They have generously contributed to scientists who have supported, and are willing to continue to support, their products. If those scientists suddenly have a change of heart, and seriously challenge the safety of that food, you may be certain that the bulk of the food-industry financial support will promptly disappear.

Whom are you going to believe? Those with no financial gain from the sale of food and with the backing of the world's scientific literature? Or are you going to follow those who have at times devised flawed studies and reaped millions of dollars in support of the industries that they fail to seriously criticise? You must decide, and your health will be substantially determined by your decision.

Happily, many medical professionals and scientists have been supportive of my work, and in 2005 I was given Life Fellowship of the Royal Society of Medicine. I am aware that many doctors are now recommending my books to their breast-cancer and prostate-cancer patients and to sufferers of other types of cancer including colorectal

cancer. Increasingly, I am invited to address medical societies and cancer support groups, and I obtain very positive feedback from these occasions.

Perhaps it's worth mentioning that the diet will NOT cause osteoporosis. Quite the reverse. The book *Understanding, Preventing and Overcoming Osteoporosis*,³ which I wrote with Gill Tidey, provides the scientific evidence that this disease, like breast cancer and prostate cancer, is strongly linked to the Western diet and has an extremely low incidence in countries such as China. The osteoporosis book contains many more delicious, healthy recipes which complement those in *The Plant Programme* and *Eating for Better Health*, and it is particularly helpful to those concerned about cancer spreading to their bones or who are taking medication that can cause bone thinning.

This fourth edition of *Your Life In Your Hands* aims to bring you the most up-to-date scientific information on treatment. I look first at new developments in the conventional medical diagnosis and treatment of breast cancer and ovarian cancer. I then describe what cancer is, in simple, unscary language, and show that, instead of it involving some terrifying invasion of our bodies, it is simply our own cells behaving badly in conditions that encourage them to lose control.

I go on to describe some of the latest research findings into growth factors and hormone-disrupting and hormone-mimicking substances in our food, drink and environment, which I believe are responsible for the dramatic increase in breast cancer and ovarian cancer throughout the West. I take forward the debate on chemopreventive substances in our diet and I provide simple, practical advice on how to reduce your risk of suffering from breast or ovarian cancer – advice that will also help to treat the disease in those already affected. I look again at the politics of the problem, such as links between the pharmaceutical industry and medical clinicians, and the failure of the press to root out

bias and flawed science funded by vested interest groups such as the dairy industry.

Perhaps I should explain that I have left the main body of the first edition largely unaltered. This means that readers who are familiar with the first edition will not have to search the whole book for new material: the new text is all gathered together in the Updates to each chapter, in the second half of the book. This is the pattern that was adopted in the second edition. The third edition added the case histories that are now found at the end of the book. In this edition, the Updates have been revised to incorporate the latest developments.

In each Update I explain fully all the science and its implications, and at the end of the Updates to Chapters Two to Six I summarise the main points 'in a nutshell' to help to make the arguments easier to follow. The scientific references on which the book is based are also included, should you or your doctor wish to follow them up.

Finally, I should like to reassure readers that I wrote this book in my own time, with no funding or influence from any vested-interest group, and that I have tried to ensure that the science on which it is based is, to the best of my knowledge, objective, authoritative and as free as possible from commercial, political or other such influences.

Welcome

This book has come about as a result of many hundreds of conversations I have had with women who want answers.

Breast cancer is a puzzling, and frightening, subject. As someone who has suffered five times from progressively more advanced breast cancer, which eventually spread to my lymph system before it was finally defeated, I know from first-hand experience just how terrifying it can be. But although breast cancer is a subject that frightens many women, this is *not* a frightening book. Quite the opposite, in fact: it is empowering and optimistic. It is a story of hope.

Over the past century, Western women have achieved extraordinary progress in a great many areas. We now have the power to vote for our governance, the methods to plan our families and to ensure that a high proportion of our children survive, and we can be educated alongside men in any subject we choose. Despite all these impressive and valuable gains, today's 'epidemic' of breast cancer now jeopardises our well-being, assaults the very symbols of our femininity and motherhood and indeed menaces our lives as few other threats do.

The facts are stark and shocking. For adult women (aged between 25 and 75) the leading cause of death is cancer¹: and the type of cancer that kills most women is breast

cancer.² Out of about every ten women you know, one of them (I hope not you) is likely to contract breast cancer.³ These dry statistics actually understate the severity of the situation, because breast cancer affects the lives of far more people than that: when you include all the spouses, sons, daughters, mothers, fathers, friends, colleagues and loved ones whose lives are blighted by this disease, then you begin to realise just what a modern-day scourge we are dealing with. Almost no one in the Western world can consider themselves immune from its impact. Indeed, our increasing affluence appears to make matters worse. Most diseases affect the poorer rather than the wealthier, more-educated members of society, but breast and prostate cancer are different. They mainly affect the higher socio-economic groups.⁴ Indeed, the slang name for breast cancer in China translates as 'Rich Woman's Disease' as it mainly attacks women who follow a Western middle-class lifestyle.

For too long women have unquestioningly accepted that a proportion of us will be affected by breast cancer. We have been persuaded to be too passive about prevention and agreed that there is little or nothing we can do ourselves to prevent a disease that, quite literally, decimates the female population. And the overwhelming majority of our medical, scientific, political and financial efforts are directed towards detecting and treating, rather than preventing, this awful disease.

The message you'll read in these pages is very different.

I believe that all women have the right to the best available information so that they can make informed decisions for themselves. My aim in this book is to set before you, clearly and plainly, vital information that can help you to drastically cut your risk of contracting – and dying from – breast cancer. One of the frustrations for most women is not knowing how to help themselves. We know that if we smoke we increase our risk of lung cancer and if

we sunbathe too much, we increase our risk of skin cancer, so we can choose whether to take these risks. But in the case of breast cancer, we are too often made to feel helpless because we are rarely told about anything we can actually do to protect ourselves. Although we are told of many risk factors for breast cancer, they do not translate into anything we can actually do. This makes us feel powerless.

For the first time, this book makes available to all women a compelling body of new evidence which points to the underlying causes of breast cancer. It is my hope that women will use this information to prevent or treat this disease in themselves or those close to them. There is also much useful information gleaned from my own personal experience on the very practical aspects of dealing with the disease, including diagnosis and treatment. In addition, I have observed in my research that much of the data and information about prostate cancer leads to conclusions similar to those regarding the cause and treatment of breast cancer. Anticipating the care that the women who read this will extend to the men in their lives, I have included much about prostate cancer. You will also find suggestions on how, by changing values and behaviour patterns aimed at improving the environment, we can reduce our exposure as a society to some of the factors which may contribute to these diseases.

This book chronicles, in part, my journey through five progressively worse episodes of breast cancer and describes how I used my training as a scientist to cope with both the disease and the treatments I was given for it. That scientific training had taught me to observe and record everything, to root out every fragment of information and to sift the relevant from the irrelevant, the rational from the irrational, and to keep asking those two key questions that are at the very heart of science: why and how? This

book contains what I believe to be the answers to those two questions regarding breast cancer.

If this book had been around even two years before my first diagnosis of breast cancer, I am sure that I would never have had the disease. I hope very much that you can put the information it contains to the best possible use in your own life.

Sincerely,

Jane A. Plant, CBE, D Univ, DSc, FRSM, FRSE,
FRSA, FRGS, FIMM, FGS, C Eng, C Geol
London

1 The Hat, The Boa Constrictor and The Scientist

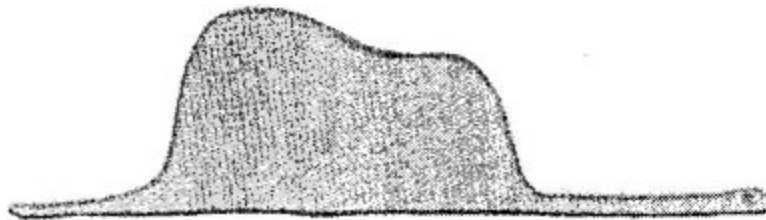
In this chapter I explain to you why, as a natural scientist, my approach to the problem of breast cancer is so different from that of doctors and orthodox medical researchers. I then go on to explain how I used my training and experience to cope with all of the orthodox types of treatment a breast cancer patient is likely to undergo, including surgery, radiotherapy and chemotherapy. I explain the treatments clearly and simply and give lots of practical tips to help you cope, for example, to avoid or minimise hair loss during chemotherapy. In this chapter I have tried to make you feel as if you have a good and caring friend guiding you towards the light at the end of the tunnel.

Scientists can often seem to be rather strange people.

The truth is, scientists are different – we're trained to be. Let me explain what I mean by using the story I tell when I first lecture to new students at one of the universities I visit. It comes from a wonderful children's story you may already be familiar with: *The Little Prince* by Antoine de Saint-Exupéry. In this magical book the little prince draws a picture of a boa constrictor digesting an elephant. But when he shows his masterpiece to grown-ups and asks them whether they are frightened by the picture, they ask why they should be frightened by a picture of a

hat. It is the ability to see that the hat is a boa constrictor digesting an elephant that distinguishes the best scientists.

I pondered deeply, then, over the adventures of the jungle. And after some work with a coloured pencil I succeeded in making my first drawing. My drawing Number One. It looked like this:



Let me give you a well-known example to show you what I mean. What sort of person sees an apple fall from a tree, wonders what force is drawing it down towards the earth – and then goes on to develop the whole concept of gravity?

Here's another example. What sort of person leaves a plate of glass coated with photographic emulsion next to a piece of granite in a drawer and, when he notices that the emulsion appears to have been damaged by 'emanations' coming from the granite, does not simply curse and throw it away? Instead, he deduces that previously unknown particles and rays have been emitted from the rock – and discovers radioactivity.

And one more. What sort of person attempts to culture bacteria in a petri dish, finds the experiment has gone 'mouldy', yet does not simply throw it away? Instead he looks carefully and observes that something in the fungus has killed the bacteria and discovers penicillin – thereby establishing the basis for the development of modern antibiotics.

All three people – Sir Isaac Newton, Henri Bequerel and Sir Alexander Fleming – saw things a little bit differently. It is this ability to see a familiar situation from a different viewpoint or angle which probably makes scientists seem rather odd to other people. But sometimes it results in a major leap forward in our understanding of the natural world.

Thinking like a creative scientist is more a state of mind than anything to do with training or education (although increasingly, we need to know and understand more and more facts before we can contribute new ideas).

This book sees things a little bit differently. For many decades, women have lived in the shadow of a devastating disease that continues to kill a high proportion of sufferers and which is associated in many women's minds with treatments that involve mutilating surgery and being subjected to irradiation or chemicals with frightening side effects. The disease is, of course, breast cancer. The only hope we are given is that with enough expenditure on research, we might one day find a truly effective treatment. Sadly, that day has been a very long time coming.

In these pages, I want to take you on a journey. Partly, it is the story of my own learning experiences with breast cancer, which I have suffered from five times and eventually conquered. But mainly, it is the story of a new and rather different way of seeing, understanding and treating this disease.

It is my hope that this book will serve two purposes. First, I want it to be directly useful to you, the reader. The straightforward advice and simple lifestyle suggestions it contains will be of practical benefit to *every woman* in significantly reducing the risk of developing breast cancer. If you happen to be that one woman in ten who has developed breast cancer, then you will also find much additional information here which will give you a better

chance of survival overall and help you to cope with rigorous treatment methods.

Secondly, it is vitally important that this book ignites a debate within the scientific and medical communities. Science is, at heart, an adversarial process. Progress is made by vigorous cross-questioning of your own and others' work. This book puts forward a new perspective on breast and prostate cancer and backs it up with compelling evidence from the scientific literature. The inescapable conclusion is that relatively small augmentations to the orthodox medical therapies currently being used in clinics and hospitals would result in major improvements in patient survival. For example, providing breast cancer patients with sound dietary advice as is common in the case of heart disease or diabetes, could greatly increase survival rates. So much suffering could be prevented, and so many lives could be saved, that the evidence must be heard – and acted upon – with the very greatest urgency.

HOW MY STORY BEGAN

I didn't choose to study breast cancer – it chose me. This is how it happened.

I first stumbled into science because I was an instinctive feminist. The boys at my local grammar school could choose between Latin, art and physics as GCE options, whilst at the Girls' School we could choose from only Latin, art or cookery. Although Latin was my best subject, I did not like it and resented the time spent on something that, as a teenager, I could see little point in. So I led a campaign for the girls to be offered the same choices as the boys and, for my efforts, became hoist with my own petard when I was obliged to study physics just as the boys did. Without quite realising it, I had started on the road to becoming 'a Scientist'.

At school I occasionally regretted what I had done, but at university I literally fell in love with the scientific subject I had chosen to do – geochemistry. I was the only woman to pursue the subject in Honours year; however, I was so dedicated and such a perfectionist that I had some problems. For example, after my final year examinations I ran away because I believed I had failed my exams. In fact, when my professor finally tracked me down it was to tell me that I had gained a first class honours degree.

After leaving university I married a young doctor who subsequently trained as an army psychiatrist, and had a son, named Mark. Our marriage failed and, in a protracted and painful custody battle, I lost my son to my ex-husband and his new wife, a psychologist. This has been a source of intense and chronic stress for the last thirty years of my life. Four years after I separated, I married my present husband Peter who, like me, is an earth scientist. We have two children, Emma, now twenty-six and Tom, now nineteen. You will read about them later.

I was lucky to be employed by the British Geological Survey as only the second woman scientist in its history. (Women had previously been employed only in a technical capacity.) I am now the Chief Scientist of the organisation and hopefully I am helping to encourage other women to progress in what in the past has been a very male-dominated subject.

Geochemistry is about the chemistry of the earth. My speciality is in understanding the chemistry of the surface of the earth, especially concentrations of chemicals where these occur either as natural concentrations in ore deposits or as a result of man's activity, for example, where there are landfill sites or contaminated land. I have frequently worked with biochemists, veterinarians, epidemiologists and medical geographers looking at the impact of chemicals in the environment on the health of humans, animals and crops. Early in my career, between 1975 and

1977, I served on a Royal Society committee concerned with geochemistry and health.¹ Since that time, my team of scientists at the British Geological Survey has been concerned with a wide range of human health problems related to the environment. Some of the methods we have developed allow us to make highly reproducible, high resolution maps showing the distribution of chemicals over the surface of the earth. We are able to look on our computer screens at the distribution of, say, arsenic and uranium (as potentially toxic elements) or zinc or iron (trace elements essential to animal and human health) in the same way people can look at the Earth's physiography – using remotely sensed photographs from space.² Almost from the beginning, these images, although intended for geologists, created a lot of interest from veterinarians, who found them helpful in diagnosing environmental and nutritional animal diseases in Britain. It was by working with them that I first began to learn of some of the amazing connections between geochemistry and biochemistry. I also learned when I was ill, that veterinary rather than medical literature provided the most fundamental answers based on biochemistry. Eventually, I established a team that is regarded as the best in the world in tackling health problems related to the levels of trace elements in the environment – some such as arsenic and fluoride can occur at levels so high that they cause disease; others such as selenium, iodine, zinc and cobalt can occur at such low levels they cause ill health in both man and animals. This is a particular problem in many developing countries.

Very recent work that the BGS team has conducted, which has received wide publicity, dealt with the problem of arsenic contamination in water from wells in Bangladesh. There the levels of arsenic in water can be so high that many people develop skin lesions where their skin becomes black and thickened and which, in a significant proportion of sufferers, becomes cancerous.

What I had learned as a result of this type of environmental detective work time and time again was that until you identified the *fundamental cause* of such problems, there was little or nothing that could be done to help the affected individuals. And until you've found the cause (whether it's of breast cancer or any other disease) and effectively neutralised it, then you can never, ever claim to have 'cured' the problem.

Until 1987, I had no interest in cancer because, like most people, I never imagined that it could happen to me. I had never smoked or sunbathed, rarely drank alcohol and ate what most experts would consider to be a healthy diet. I even wore and used cosmetics that I had checked contained no harmful chemicals. My lifestyle was hectic, certainly (it still is!), but no more stressful than many other women's.

Then, one Friday evening in September of that year, my life changed for ever.

I was in northern Canada examining gold deposits ahead of a major scientific conference in Toronto. I was working on a project aimed at understanding how gold, which is the rarest element on earth, could become concentrated by factors of up to about 10,000-times by natural geological processes to form economic ore deposits. I was feeling pleased because I had begun to see clues that would lead to new theories and models, which subsequently I published in peer-reviewed papers ([see here](#)) and in a textbook I wrote over the next few years. It had been a gruelling day working down the gold mine. It was hot, sweaty and dirty work, not to mention noisy and dusty and I couldn't wait to get back to my hotel and the luxury of soap, hot water and fresh towels.

Finally back in my room, I dried myself and returned to my bedroom to search for a bra. As I was walking around topless hunting for my underwear, I suddenly saw in the low angle, late afternoon sunlight, a lump about the size of

a large pea just under the skin of my left breast. I felt it and was immediately overwhelmed with fear and panic; my mouth went dry and I felt sick. I knew without a doubt that I had breast cancer. Over the next week or so, I was to become very familiar with the feel of the cancer. I was surprised by how hard it felt – like a compressed rubber ball surrounding one of the ducts in my left breast. I was angry with myself for not having examined my breasts before but, somehow, I had never thought the advice applied to me. I was only 42 – surely too young to get cancer? My family and loved ones, my developing career, the many happy and productive years I had always imagined to be ahead of me . . . In one heart-stopping moment, everything came crashing to a very full stop.

After the initial shock had subsided somewhat, I tried to think what to do. My husband was working in Jamaica and I had no contact telephone number (this is common among geologists), and my children were both staying with their grandmother. In any case, I saw no point in upsetting them. The first thing I did was to telephone one of my oldest and dearest friends. Dr John Camac had been my doctor throughout my childhood and was still my mother's doctor. Despite the fact that it must have been about midnight in Britain, he was wonderful to me. He guided me through a careful self-examination. He knew me well enough not to give me false reassurances and we agreed that the lump that I had found probably was cancer but that it appeared to be very localised and could probably be treated by lumpectomy on my return to Britain. With his advice and the help of a friend in Canada, I decided to stay for the conference until I had honoured my commitments, but also to go to the famous Princess Margaret hospital in Toronto for an examination and diagnosis.

I thus spent the next week alternately being a professional scientist chairing sessions or giving lectures in front of an audience of about 800 people; attending a

specialist breast clinic for examinations and biopsies finally to be given the diagnosis of cancer; and sitting alone or with friends feeling like a terrified five-year-old worrying what the future held. Most people have some attractive feature – for example long legs, beautiful hair or eyes, and so on. In my case, it had been my boobs. I had a small waist and shapely breasts. Before I was married, my surname was Lunn and this led to two of my teenage nicknames – busty Lunn or lusty bun! The thought of losing one of my breasts terrified me. Would it mean that people would treat me as an object of pity? Would my colleagues joke about me?

By the time I returned to London my local doctor had already managed to get me an appointment with the breast cancer clinic in a leading London teaching hospital, the Charing Cross Hospital. I shall never forget the scene that greeted me on my first visit. The waiting room was full to bursting with strained-looking women and their supporters; the atmosphere was thick with fear and anxiety; there was no conversation and, mostly, we avoided even making eye contact with each other. Even then, I noted that most of the women appeared well groomed but they were of different ages, different shapes and builds and with different breast sizes. There were two black women, one woman of Indian appearance, one woman of Middle Eastern appearance, but no Oriental women. Looking back I realise that I was already searching for clues about the cause of breast cancer by looking for common factors among the women affected. Of course, if it were that easy someone would have identified the factors long ago but it was impossible for me to suppress my instincts as a scientist. Seeing those scared faces – and knowing how scared I felt too – was the first time I fully understood what a common disease breast cancer is, and how dreadful and widespread is the damage it causes to women, their families and friends.

Over the months and years that followed my first visit to that clinic, I made it my business to learn as much as I could about this devastating disease. In times of great personal crisis, people usually fall back on the fundamental things they know best and trust most. For some, it may be their religious faith. For others, it could be close friends and loved ones. In my case, when disaster struck, I fell back on what I trusted most: my scientific training.

And that's what saved my life.

HOW SCIENCE SERVES US - AND WHY IT SOMETIMES DOESN'T

A good scientist will see things a little bit differently. As a science 'insider', I'd like to tell you something about the way that science works, which will help you to make sense of the differing approaches that scientists have adopted towards breast cancer.

When I lecture to my students, I like to ask them to visualise science as a mighty oak tree - a tree of knowledge, if you like. Start deep down under the earth, at the very tips of the ever-probing roots. This is where lots of discoveries are constantly being made and new facts found. Then some of these are brought together to form larger roots, and finally, the whole knowledge can be assembled to give a total or holistic trunk to the tree. This last function - the assembling of disparate bits of information to give a new insight or theory or sometimes a major breakthrough - has often been achieved by one individual with a grasp of many or all of the different aspects of a problem, who has the good fortune to be in the right place at the right time to make all the necessary connections. Finally, this newly acquired knowledge flows to the branches and leaves, as the information is communicated to the world at large - who may use it for good or ill.

This is, of course, a simplification of a complex and dynamic subject, but it is a useful way of understanding the way in which science has always functioned to deliver the fruits of its labours to society. In recent years, however, things have changed significantly, and not for the better. Today, the overwhelming trend is to devote maximum attention and resources (money, people, equipment and facilities) to scientists working at the root tips; often using very expensive, high-technology methods. Sometimes, this approach is called 'bottom-up' science (as opposed to 'top-down'). The great natural scientist James E. Lovelock lucidly explains the problem in his book *Gaia: the practical science of planetary medicine*: "To understand the physiology of the earth requires a "top-down" view of the earth as a whole system. We need science, but it must grow from the top down as well as the bottom up!"

Science that exclusively and narrowly focuses on the extreme root tips at the expense of everything else can be bad science. My friend, Professor John Dewey FRS, of Oxford University, made this point recently in a thoughtful and thought-provoking article in the science journal *Geoscientist* (John is a modern scientific hero, being one of the pioneers of plate tectonic theory which explains how the Earth's surface has evolved over time). He wrote:

In our ambitious scramble for funds and recognition, we have forgotten the traditional values of scholarship, the seamless integration of research and teaching to generate knowledge and science. Scholarship includes intense library research and reading literature more than five years old.³

There is a word to describe what has happened to many branches of science in recent decades, which is increasingly used pejoratively: reductionism.