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Breaking the seige: guidelines for struggle in science

Brian Martin
University of Wollongong, bmartin@uow.edu.au

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Abstract
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Breaking the siege: guidelines for struggle in science

Brian Martin

Faculty of Arts, University of Wollongong, NSW 2522
http://www.bmartin.cc/
bmartin@uow.edu.au

ABSTRACT

When scientists come under attack, it is predictable that the attackers will use methods to minimise public outrage over the attack, including covering up the action, devaluing the target, reinterpreting what is happening, using official processes to give an appearance of justice, and intimidating people involved. To be effective in countering attacks, it is valuable to challenge each of these methods, namely by exposing actions, validating targets, interpreting actions as unfair, mobilising support and not relying on official channels, and standing up to intimidation. On a wider scale, science is constantly under siege from vested interests, especially governments and corporations wanting to use scientists and their findings to serve their agendas at the expense of the public interest. To challenge this system of institutionalised bias, the same sorts of methods can be used.

Key words: science; dissent; methods of attack; methods of resistance; vested interests

Scientists and science under siege

In 1969, Clyde Manwell was appointed to the second chair of zoology at the University of Adelaide. By present-day terminology he was an environmentalist, but at the time this term was little known and taking an environmental stand was uncommon for a scientist. Many senior figures in government, business and universities saw such stands as highly threatening. In 1971, Manwell and his wife Ann Baker wrote a letter to the Adelaide *Advertiser* criticising aspects of the South Australian government's fruit-fly spraying programme. The senior professor and head of the Department of Zoology at the university, H. G. Andrewartha, complained to the Vice-Chancellor, leading to an attempt to dismiss Manwell. The saga lasted four years and involved everything from inquiries to student protests. The attack on Manwell can be interpreted as serving the interests of a pesticide-industry establishment threatened by criticism from a reputable scientist.

Scientists can feel under pressure, not just to do good research, but to conform to outside demands, sometimes unwelcome or even abhorrent. For example, they may be told to change their research directions, to keep quiet about findings, to alter wording in their papers or to say nothing while results are misrepresented. If they speak out, they may be threatened, reprimanded, publicly attacked or even lose their jobs.

Science can be said to be under siege when outside pressures influence or force scientists to serve goals other than truth and the public interest. There is plenty of evidence that science is and has been under siege. For example, in a survey of Australian scientists in the 1990s, more than half answered yes to the question "Do you believe that scientists may jeopardise their career prospects or research funding success by speaking out on environmental issues?" (Wilson and Barnes 1995) — and less than one in five said no. Numerous environmental scientists have come under attack because of their research or speaking out about it (Kuehn 2004). On some topics, such as nuclear power and fluoridation, it can be very risky for scientists to take a view contrary to the dominant one (Freeman 1981; Waldbott 1965). In some countries, any scientific dissent that challenges government positions can lead to discrimination or worse (Schoijet and Worthington 1993).

Overall, there is quite a lot of evidence of suppression of dissent (Martin 1999). It has gone on for decades, but most working scientists ignore it as long as it doesn't affect them personally. Sometimes, though, entire communities become aware and concerned because of the blatant and wide-ranging nature of the attacks on scientists, such as in the US under the George W. Bush administration (Mooney 2005), though there is plenty of evidence of similar problems in earlier times (Boffey 1975; Deyo *et al.* 1997; Primack and von Hippel 1974; Wilkinson 1998).

I will take for granted that there are ongoing pressures on scientists to serve vested interests. My focus here is on how to respond. There is surprisingly little attention to methods and strategies for defending dissent, by scientists or others. I present the backfire framework, a way of understanding methods used by perpetrators of perceived injustice. I apply this framework first to the Manwell case and then to the big picture of the relationship between powerful groups and science. In conclusion, I outline the normal assumptions made by apolitical scientists, contrasting them with a more engaged approach for breaking the siege.

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The backfire framework

When people think someone has done something wrong, they often become concerned, disgusted or outraged. What can the perpetrator do to minimise this adverse reaction? An ordinary perpetrator — a house thief, for example — usually can do this only by disguising the action or by hiding, namely not getting caught. Powerful perpetrators — such as governments — have more options. There are five main ways they can reduce outrage:

- cover up the action
- devalue the target
- reinterpret what happened by lying, minimising the consequences, blaming others or using a framework that puts things in a favourable light
- use official channels that give an appearance of justice
- intimidate or bribe people involved.

These same five sorts of methods are found in all sorts of arenas, including bullying, censorship, unfair dismissals, police beatings, massacres, torture and wars (Martin 2007).

If you oppose the unfair treatment, you can respond to every one of these methods:

- expose the action
- validate the target
- interpret what happened as unjust
- avoid official channels; instead, mobilise support
- resist intimidation and bribery.

This framework of methods provides a way of understanding struggles in science. First consider the attack on Clyde Manwell.

The Manwell case

Clyde Manwell's apparent offence, in the eyes of his attackers, was to question the orthodoxy about use of pesticides. Others had openly criticised the fruit-fly spraying programme, but Manwell was the first to do so who had strong scientific credentials — being a professor of zoology at the leading university in Adelaide. Other critics could be dismissed as ill-informed. Manwell could not be so easily ignored. (For information on the Manwell case, see Badger 1986; Baker 1986.)

The legitimate approach would have been an open discussion of the issues. Professor Andrewartha could have approached Manwell as a peer to discuss differences. Or he could have written his own letter to the Adelaide *Advertiser.* Instead, he wrote to the Vice-Chancellor to make a complaint. Furthermore, his letter was confidential. So far as the wider public and scientific community were concerned, this was a form of *cover-up*: Andrewartha's attack was behind the scenes.

Shortly after Manwell and Baker's letter to the newspaper was published, Manwell was criticised in state parliament. This was a method of *devaluation.* For example, one of Manwell's parliamentary critics, H. K. Kemp, speaking in the South Australian Legislative Council on 11 March 1971, said "To see this system [of fruit fly control], which has been built up over the years and proved capable of doing the job, being capriciously endangered by the actions of one man, who cannot be ignorant of the implications of his actions, is a sad thing indeed." Later during the saga, one of the members of the University Council — who was also a colleague in the Zoology Department — recommended to Manwell that he see a psychiatrist, and offered the names of three. Suggesting that Manwell was mentally ill was also a form of devaluation.

Andrewartha's initial letter to the Vice-Chancellor was entirely about Manwell's letter to the *Advertiser.* Andrewartha followed up with another letter to the Vice-Chancellor, raising several other matters including that there were errors in Manwell and Baker's recently published book and that Manwell had presented inappropriate material in four lectures. These other matters became the subject of considerable scrutiny. This could be considered to be an attempt at *reinterpretation.* Andrewartha's main concern was Manwell's public criticism of pesticides; by introducing complaints about other aspects of Manwell's performance, the attack on Manwell could proceed under a different guise, avoiding the key issue of free speech.

Andrewartha's attack was made through *official channels*, namely complaints to the Vice-Chancellor. The University Council set up a Commission of Inquiry to look into the allegations. The Commission and the Council found that even if the allegations were true, they did not warrant any penalties via university rules. Subsequently the Council appointed a committee of three academics to deal with residual problems in the Zoology Department — but this committee never examined the accuracy of Andrewartha's accusations.

Manwell also used an official channel: he sued Andrewartha for libel. This had the effect of reducing public discussion of the issues, which could be said to be *sub judice.* This was probably one of the factors that made the affair drag out: it was 1975 before it was resolved. The settlement of the case did not eliminate Manwell's problems: he remained the second professor of zoology, in a department run by Andrewartha. Manwell did not know at the time that his predecessor, the previous second professor of zoology, had also had a conflict with Andrewartha, but in that case the university administration had resolved the conflict by moving the second professor out of the department, away from Andrewartha's authority.

A primary form of *intimidation* in this case was the possibility that Manwell might be dismissed. He also suffered harassment, for example being denied honours students, having his third-year course on comparative biochemistry and pollution unilaterally cancelled by the head of department, and receiving anonymous threats of violence. He was also denied research funding (Manwell 1979).

Manwell survived. It's worth looking at the counter-methods he and his supporters used.

The counter to cover-up is *exposure.* Andrewartha's letter and much else about the case were revealed in articles in the student newspaper *On Dit.*

The counter to devaluation is *validation.* Manwell's cause would have been assisted if prominent figures had come to his defence. Apparently this did not occur in parliament. However, a number of university colleagues privately complained about his treatment and 30 from outside Australia wrote letters in his defence.

The counter to reinterpretation is *interpreting the attack as unjust.* Manwell and Baker in their subsequent writings focused on their challenge to pesticide interests, relegating the other complaints by Andrewartha, for example about teaching, to secondary status.

The counter to official channels is to avoid them and instead to *mobilise support.* Powerful support for Manwell came from students; hundreds of them — and some staff members — attended a meeting and forced the closed Commission of Inquiry to be public. However, Manwell himself used official channels when he sued Andrewartha for libel. This limited the capacity for mobilising support because many people expected the courts to provide justice.

The counter to intimidation is *resistance.* Rather than giving up and leaving, or keeping quiet about his concerns about pesticides, Manwell refused to acquiesce. In the following decades he continued his criticisms of pesticides and agriculture more generally (Baker and Manwell 1988; Manwell and Baker 1988). Furthermore, he provided inspiration to many others by writing articles about suppression (e.g. Manwell 1978) and corresponding with other dissidents in science (Hawkeswood 2010). Manwell and Baker helped put suppression of dissent in science on the map in Australia (Martin *et al.* 1986).

The Manwell case is full of complexities — as indeed are most cases. I have not addressed many of the factors involved, for example the personalities of key individuals. In describing a case such as this, there is a risk of giving a picture that is one-dimensional, with one side — the dissident and supporters — portrayed as virtuous and flawless and the other side — the attackers — portrayed as nasty schemers. Actually, in struggles of this sort all participants commonly believe they are doing the right thing. Andrewartha should be remembered for more than his conflict with Manwell: he was a prominent scientist who made significant contributions to population ecology (Birch and Browning 1993). My aim in using the Manwell case is to illustrate methods used in struggles involving dissent.

Advice for dissidents

To be able to defend dissent, it's useful to see beyond the peculiarities of individual cases to the regular patterns and to develop an effective strategy.

Any scientist can come under attack. Public dissidents are simply at greater risk. Others are targeted because of their race, gender or personal style, are picked on by a bully or simply are in the wrong place at the wrong time. Scientists who think "It couldn't happen to me" are especially vulnerable when it does.

To begin, it is useful to understand that power struggles in science are like power struggles anywhere: the game is about power, not rationality. Be prepared for the other side to play unfairly. In Manwell's court case, the university accused Baker of working too many hours and produced a carbon copy of a typed contract showing a stipulated condition at the bottom. Luckily for Baker, she was able to produce the original — and the stipulated condition was not there. Someone had falsified the carbon copy. These days this sort of thing would be done electronically.

Be prepared for the other side to use the five methods of inhibiting outrage: cover-up, devaluation, reinterpretation, official channels, and intimidation — and be prepared to counter each of these methods. Quite a few dissidents acquiesce too easily and play their opponents' game.

The fewer people who know about the attack, the more easily perpetrators can get away with it. Many targets are reluctant to speak out, often because they are embarrassed or humiliated by what is being done to them. They hope things will improve without publicity — so they keep quiet. Alternatively, they might make a complaint to a superior, write a letter to a professional body or make a complaint to a grievance body — in other words, they hope for justice within the system using official channels. These are two common responses, and they are seldom effective. They are usually quite helpful to the attacker.

I've talked to numerous whistleblowers who think their own cases are different: they know truth is on their side and that anyone can see it, so they believe going to the ombudsman or some other agency will vindicate them. Nine times out of ten, they're wrong (De Maria 1999). Truth is not enough.

For most scientists responding to attack, the most common mistakes — from the point of view of the backfire model — are acquiescing in cover-up and relying on official channels. However, taking the issue to wider audiences doesn't have to mean media coverage. A typical sequence of actions in mobilising support is to approach colleagues, meet with a few friends, develop a plan of action, prepare a short factual summary of events, show it to a few people to check it and see how well it communicates, circulate it to a selected distribution list, gather information about what's happening at work, take stock of the state of play and plan for the next step — if needed. Such a small-scale mobilisation of support helps to expose information in a controlled fashion, provides validation by bringing supporters on board, challenges the attacker's interpretation, avoids official channels and resists intimidation.

Dramatic, high-stakes attacks, such as the one against Manwell, are rare. Much more common are subtle forms of harassment and disadvantaging, such as difficulty in getting access to equipment, delays in obtaining approvals, heavier-than-usual teaching loads, derogatory rumours and unfair rejection of papers. Because these sorts of problems happen so often anyway, it's hard to prove any of these constitutes suppression of dissent. Manwell suffered a lot of this low-key harassment too.

Perhaps the most important step for anyone who feels under attack is to seek advice and support. Many targets start believing what others say about them. It's valuable to obtain opinions and help from others.

Many scientists are fortunate enough to go through their entire career and never experience a serious attack. This means it is hard to comprehend what's involved and sometimes hard to empathise with those who are attacked. Suffice it to say that it is far more traumatic than most people can imagine.

Many whistleblowers who suffer reprisals lose their jobs and sometimes their careers, but this is only part of the story: their health suffers, their relationships are put under severe stress and sometimes falter, and their very understanding of the world is thrown into turmoil. Prior to speaking out, many whistleblowers were conscientious, successful performers who believed the system worked. When suddenly they are attacked for doing a public service, their faith in the world is shattered, with no ready alternative (Alford 2001).

If one of your colleagues is under attack, you can provide a valuable service by trying to understand what it's like and, if they are willing to talk about it, by just listening. Doing more than this to help is valuable too, but you need to be careful: by supporting someone who has been targeted, you might become a target too.

Because only a few scientists come under direct attack, there's very little collective wisdom about how to respond. It would be like doing an experiment the very first time — you have to be lucky to get it to work, because usually trial and error are needed. But serious attacks are so rare that gaining experience is difficult. Therefore it is personally valuable to help a colleague or send a note of support to someone you've heard about through a media story.

One of the key elements of attacks is intimidation. Many targets are so frightened that they retreat, unwilling to stand up for themselves. However, the bigger impact of attacks is on third parties, namely everyone else who sees what happens and becomes afraid to step out of line. The way to challenge this is to resist. The same demonstration effect applies: each person who resists and develops an effective strategy becomes an inspiration to others. Manwell's resistance inspired many at the time and continues to be an example of how to oppose suppression of dissent.

When under attack, sometimes the wisest strategy is not to resist, instead acquiescing or leaving. Each individual has to weigh various factors, including the risk to their career, their psychological resources, likely allies and opponents, and consequences for colleagues and families. There is no single course of action best for everyone in every circumstance.

When a scientist does decide to fight, there are no guarantees. Even the best methods may not be enough against a powerful opponent. What can be said, though, is that studies of many struggles offer some general principles that make success more likely. The single guiding principle is to mobilise support. That means documenting the case carefully and accurately and making information known to others. It means behaving ethically, because that is more likely to win support in the long run. It means being clear about the issues at stake and concentrating on the ones of broad significance. It means not relying on official channels, because they put the matter in forums where wider support is less relevant. It means refusing to be intimidated, demonstrating to others that resistance is possible.

For a single scientist to resist attack is important, both personally and for inspiring others. But the challenges for science go beyond individual attacks. It is time to look at a broader picture using the same strategic framework.

Science under siege: the bigger picture

The common picture of science is that it is neutral. Scientists are searching for the truth, not to serve any particular agenda. As long as scientists verify their findings and publish them, their job is done. Cases such as Manwell's are unwelcome departures from the norm.

There's another picture: knowledge and power are inevitably intermixed. Powerful groups — governments and large corporations — fund research areas they are interested in. They pick the results that serve their interests and ignore others. This is what is meant by the saying that "science is political" (Arditti *et al.* 1980; Dickson 1984; Rose and Rose 1976a, b).

The status of scientific research depends heavily on its image as being neutral. People are more likely to trust science if it is seen as independent of vested interests. Therefore, powerful patrons of science have much to gain by hiding or legitimising their role. If people realised research agendas are being shaped by special interests, they might be upset. So it can be predicted that the powerful patrons of science will use the five methods of inhibiting outrage.

Cover-up The attention in scientific journals and media accounts is almost entirely on research that is actually done. There is far less attention to research that isn't done. If funding is available in an area, scientists can be found to work on it; if there's no funding, few scientists will take the initiative to pursue it. The result is that there are whole areas of what can be called "undone science" (Hess 2006). For example, there's lots of medical funding for diseases in rich countries and relatively little for far more lethal diseases affecting poor people. There is vastly more funding for new drugs than into uses of substances that can't be patented. There is far more funding for centralised energy sources like nuclear power and coal than for energy efficiency and decentralised renewable energy sources. There are lots of neglected research areas — areas of undone science — but this process and consequence are usually invisible.

Devaluation Critics of the way science operates, especially those who question the power structure of science, are portrayed as political, even as "anti-science." Dissidents of all sorts are dismissed as unscientific.

The scientists who are valued, in the normal conception, are those who keep quiet and do their jobs, even if that means taking grants from corporations whose products they are studying. Conflicts of interest are seldom a source of concern as long as they are in the service of powerful groups.

Going public is somehow seen to demean the credibility of a scientist as a scientist, in the eyes of other scientists. Those who popularise science are usually seen as less serious about their research.

Reinterpretation Scientists carry out their work through a set of conventions about how the world works, how research should be done and how to present the findings. Thomas Kuhn's idea of a scientific paradigm captured this idea. Subsequent scholars have qualified and modified Kuhn's conception, but the basic insight remains: scientists approach their task through a set of preconceptions or assumptions. These provide criteria for assessing what counts as good research and valid knowledge.

What Kuhn and most of his successors left out of the picture is the connection between prevailing sets of scientific ideas and powerful groups in society. An industry can provide funding and potential jobs for those who adopt a research programme that is industry-friendly, with potential dangers awaiting those who challenge the programme. Manwell learned this when he questioned what could be called the pesticide paradigm, a framework for research in the field in which questions about the effectiveness of pesticides were legitimate but alternative ways of dealing with pests were not.

Scientists adhering to the dominant way of thinking about issues are completely sincere. That is what makes paradigms so effective: they infiltrate the very criteria that scientists use to assess the significance of problems, the appropriateness of research methods and the characteristics of knowledge. It makes them acutely sensitive to the weaknesses of alternative approaches while often unaware of the shortcomings of their own viewpoints.

This process is most effective when paradigms and powerful interests are closely aligned, as with genetic engineering. However, sometimes there is a clash, as with climate change, in which the dominant scientific view is contrary to the interests of the fossil fuel industry. Scientists who question climate-change orthodoxy receive far more attention — and industry support — than those who question genetic engineering orthodoxy. (On the latter, see Delborne 2008.)

Official channels Scientific journals, scientific societies and research organisations serve to define the appropriate way to do science. An orthodox scientific career operates within a standard pattern of taking courses, apprenticeship as a research student and jobs as scientists. It is rare for anyone to succeed in science following a different path, for example being self-taught or researching outside the conventional career structure. Publishing outside the standard journals offers little credibility.

The standard system makes it easier for scientists to accept the role of dominant groups — governments, big corporations and scientific elites — in setting research agendas and criteria for acceptable knowledge. Within the official system, researchers with different agendas often have to struggle for credibility.

There are alternatives. In community research, done by activists and community members to pursue topics of local relevance, there is attention to environmental, health and social issues often neglected by mainstream science.

Suppression Those who challenge the system are at risk of being attacked. Dissent is welcomed as long as it is within the system parameters. The Manwell case is just one of thousands.

Responding

Given this picture of the power dynamics of science, what does it imply for working scientists? First consider the normal assumptions of scientists who are apolitical: they would prefer to ignore power dynamics and get on with their research. Here are some typical attitudes:

- My job is to do good science.
- If my research has social relevance, my task is to present the facts. I shouldn't be political.
- I should leave judgements and struggles to others.
- If, despite my caution, I come under attack, then I'll acquiesce, namely change my research or keep a lower profile.

These sorts of attitudes are typical of the loyal employee who believes those running the enterprise are capable and trustworthy. Scientists often see the "enterprise" as science itself and believe their loyalty is to its normal operation.

This would be fine if science, as a social institution, was indeed a dispassionate search for the truth. But if, instead, powerful groups are shaping and benefiting from the way science is organised — and benefiting from the perception that science is neutral — then the typical attitudes serve these powerful groups.

Consider then an alternative approach, based on challenging each of the five methods of inhibiting outrage.

- Expose what science is and isn't done. For example, reveal the role of military or corporate sponsors and point out areas of public interest where little research is being done.
- Validate scientists who do research and speak out in the public interest. For example, point out that they are free of conflicts of interest affecting other scientists.
- Question assumptions underpinning conventional research. Explain how paradigms can be aligned with the interests of powerful groups.
- Mobilise for change and don't rely on scientific elites to do it.
- Resist attacks and help others to resist.

When large numbers of scientists mount a challenge along these lines, it often means supporting a social movement. Very occasionally, scientist-activists become a social movement themselves.

- Scientists in several countries in the 1940s and 1950s mobilised for science in the public interest. However, these movements were crushed by governments in the emerging cold war.
- Scientists have supported environmental campaigns for decades. Indeed, some environmental research preceded and helped stimulate the rise of the environmental movement in the 1960s.

- Scientists and engineers critical of nuclear power were crucial players in anti-nuclear campaigns from the 1960s onwards.
- Scientist critics of the US "star wars" anti-missile system proposed in the 1980s campaigned in parallel with the anti-nuclear-war movement of the time.
- Scientists have played key roles in challenging dangers from tobacco, lead and other substances, taking on powerful industries.
- Climate change scientists have confronted a vociferous denial campaign underwritten by fossil fuel interests.
- Outspoken scientists have challenged the Bush administration's pressures to manipulate science for corporate goals.

Many of these campaigns seem to be mainly about the applications of science. But the struggles sometimes got down to the level of hypotheses and data analysis. For example, the debate over nuclear power included disagreements about the effect of low-level ionising radiation, including the shape of the dose-response curve (Diesendorf 1982).

The historical pattern seems to be that science is always under siege, in the sense that powerful groups want science to serve their special interests at the expense of wider social goals. However, few scientists recognise this as much of a problem, because of the methods of inhibiting outrage: the influences on science are hidden, dissidents are devalued, the job of scientists is perceived to be doing good science, scientific elites are available to take care of the politics, and challengers are intimidated. In a few periods, though, there is a wider perception of threat, when the pressures become too blatant or when scientists become aware and empowered by mobilisations in other parts of society. In other words, when citizens become concerned about an issue, their concern can rub off on scientists.

Conclusions

Individual scientists occasionally come under direct attack because of their research or public statements. This is often a tremendous shock, and it is not obvious what to do because it doesn't happen often — and who would want to gain experience by repeatedly coming under attack? Therefore, it is wise to learn from what happens to others.

In a wide range of injustices, powerful perpetrators regularly use the same sorts of methods: they hide their actions, devalue the target, reinterpret what happened in ways that minimise consequences and blame others, use official channels to give an appearance of justice, and intimidate or bribe people involved. By recognising these methods and countering each one of them, it is possible to be more effective in resistance. This doesn't make the struggle easy, nor is it a guarantee of success, but it can increase the odds of being effective. It's also important to know when to acquiesce and when to resist.

However, pressures on science are not just on individuals — they are systemic. Science has always been shaped by social forces, especially by powerful patrons. Today that means mostly governments and corporations that fund research. Usually this state of affairs seems normal. By using a variety of techniques, dominant groups — including most scientific elites — minimise awareness and concern about the way scientific agendas are shaped.

The idea that science can be pure and separate from society is an illusion. Research is always embedded in society: it is funded from social resources, it is carried out by social beings (scientists are human), its agendas are influenced by prevailing ideas and it has social consequences. The goal should not be a pure, independent science but rather a science that is shaped by and serves a desirable conception of society.

Science is inherently contentious, just as the way society operates is inherently contentious. That means scientists need to make choices. The default option is to accept the way things are, without questioning or resistance. The more active option is to take a stand. And if you're going to take a stand, you should try to be as effective as possible.

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