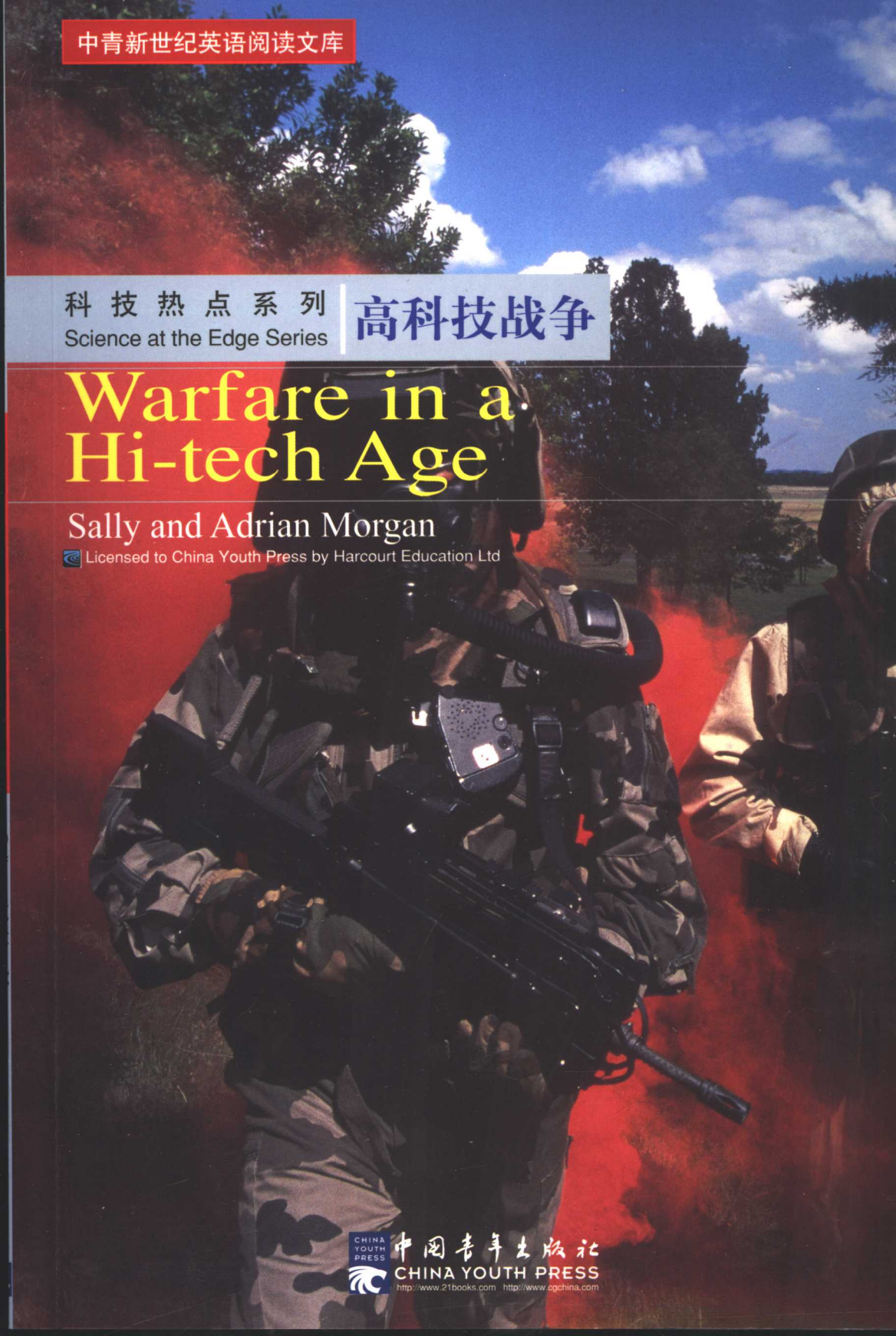
中青新世纪英语阅读文库



科技热点系列
Science at the Edge Series

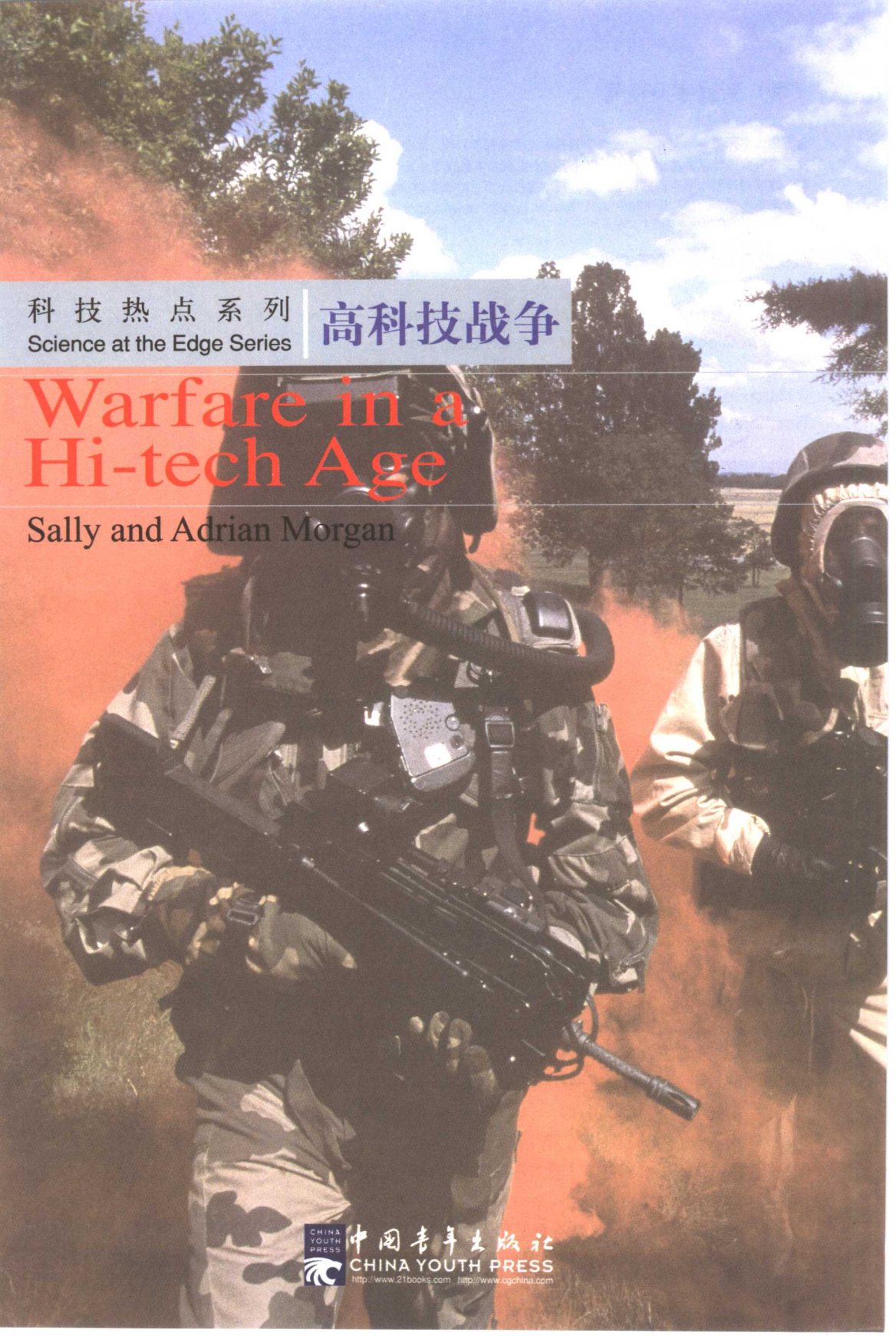
高科技战争

Warfare in a Hi-tech Age

Sally and Adrian Morgan

Licensed to China Youth Press by Harcourt Education Ltd

CHINA YOUTH PRESS 中国青年出版社
CHINA YOUTH PRESS
http://www.21books.com http://www.cgchina.com



科技热点系列
Science at the Edge Series

高科技战争

Warfare in a Hi-tech Age

Sally and Adrian Morgan

CHINA YOUTH PRESS
中国青年出版社
CHINA YOUTH PRESS
http://www.21books.com http://www.cgchina.com

（京）新登字083号

版权登记号：01-2005-0331

Warfare in a Hi-tech Age by Sally and Adrian Morgan
Harcourt Global Library, part of Harcourt Education Ltd.

图书在版编目(CIP)数据

高科技战争 /（英）摩根，（英）摩根著. －北京：中国青年出版社，2005
（中青新世纪英语阅读文库 · 科技热点系列）
ISBN 7-5006-5711-0
I.高... II.①摩... ② 摩... III.英语 — 语言读物 IV. H319.4
中国版本图书馆CIP数据核字（2005）第000015号

丛 书 名：中青新世纪英语阅读文库
书　　名：科技热点系列 / 高科技战争
编　　著：（英）摩 根
出版发行：中国青年出版社
地址：北京市东四十二条21号　邮政编码：100708
电话：（010）84015588　传真：（010）64053266
印　　刷：北京朝阳新艺印刷有限公司
开　　本：787 × 1092　1/16　总 印 张：40
版　　次：2005年2月北京第1版
印　　次：2005年2月第1次印刷
书　　号：ISBN 7-5006-5711-0/H · 115
总 定 价：98.00元（共10分册）

Contents

Introduction

In the last 60 years or so, advances in weapons technology have led to huge changes in the nature of warfare. In July 1943, during World War II, UK and US air forces tried to damage the German war effort with huge bombing raids on the port of Hamburg. The air forces dropped thousands of tonnes of bombs, land mines and incendiaries (fire bombs). The city was all but destroyed, over 40,000 people were killed, and many more were wounded or made homeless. But these massive raids could not knock Germany out of the war, and German industry soon recovered.

By the time of the 1991 Gulf War, things were very different. In this war the USA and a **coalition** of other countries went to war against Iraq when it invaded Kuwait. The coalition forces used hi-tech weapons to reduce the Iraqis' ability to wage war, rather than killing thousands of soldiers and civilians. First, precision missiles were used to attack the command system of the Iraqi government and its armed forces. The missiles could destroy targets with great accuracy, even targets in cities. Each one was as effective as hundreds of World War II bombs. The Iraqi forces were weakened without coalition soldiers having to risk their lives, and with much less loss to civilian life. By the time coalition ground troops were sent in, much of the Iraqi army had already been defeated.

Warfare today

The 1991 Gulf War was a **conventional war**, in which two opposing armies fought each other using large numbers of soldiers, tanks, **armoured** vehicles and aircraft. But today, armed forces are increasingly involved in other kinds of conflict, such as **guerrilla** war and terrorism. Modern armies are not equipped to deal with an enemy that does not engage in any form of 'battle'. For these kinds of warfare a different kind of fighting force, using different tactics, is needed.

Guerrillas are small groups of irregular soldiers who fight against a much bigger occupying army. They often have the support of the local population. Terrorist groups usually have political aims. As their name suggests, they

The machinery of conventional warfare. Huge convoys of military vehicles moved into Iraq at the start of the Iraq war in 2003.

try to create terror and fear, for instance through **hijackings**, kidnappings and bomb attacks. Terrorist groups are usually small, but they are often well funded and have access to the latest equipment. Fighting terrorism is difficult – potentially anyone visiting an airport, a government building or even a crowded café could be planning to hijack a plane, kill a government minister or set off a bomb.

Threats and challenges

This book looks at how weapons systems and the style of warfare are changing to meet the challenges of terrorism and guerrilla warfare. It also **weighs up** the benefits of hi-tech weapons – are the billions that rich governments spend on them worthwhile, or could the money be better used? The term **weapons of mass destruction (WMD)** is hardly ever out of the news these days. This book discusses the threats from WMD and what is being done to counteract them. It also looks at how technological advances that are in the pipeline might shape the fighting forces of the future.

Changing warfare

Like most wars throughout history, the two World Wars were conventional wars. However, in 1945 World War II in the Pacific ended in a very unconventional way, when the US air force dropped nuclear bombs on the Japanese cities of Hiroshima and Nagasaki. Japan knew that it had no defence against these weapons of mass destruction, and surrendered.

After World War II came the period known as the 'Cold War'. Although there was no actual fighting between their armies, Western Europe and North America were opposed to the Soviet Union and its allies. Huge numbers of troops were massed in East and West Germany, **straddling** the most sensitive border between the two groups of allies.

Since the end of the Cold War in the 1980s, there has been less need for large armed forces. Armies have been downsized, and there has been a shift to more flexible, rapid-response units for use in smaller armed conflicts, and to peacekeeping forces trained to work within a civilian population. Today's wars are more likely to be fought in the streets against terrorists and guerrilla forces rather than on remote battlefields. The skills and equipment required to fight an 'urban war' are very different to those used in conventional wars. Soldiers need to be trained to cope with the demands of this role.

Guerrilla warfare

Over the last 60 years there have been a number of conflicts involving guerrilla forces. For instance, in the Vietnam War (1964–1973) between North and South Vietnam, the USA sent armed forces to support the South Vietnamese government. Despite having a larger force and superior technology, the USA was unable to overcome the North Vietnamese, who used guerrilla tactics.

The Soviet Union had similar problems during the late 1970s when Soviet troops invaded Afghanistan and were challenged by guerrilla forces. Soviet military tactics were to carry out initial bombing raids followed by a massive **artillery** bombardment. Then the tanks would roll in.

After the terrorist attack on the Twin Towers in New York on 11 September 2001, US President George Bush declared a worldwide War on Terror.

During these initial attacks the guerrillas retreated into the mountains, only to reappear and **ambush** columns of troops and vehicles in narrow valleys. The Soviet forces changed tactics and started to use helicopter gunships with some success, but the guerrillas used missiles to bring down the helicopters. The war was unpopular with the Soviet people, so in 1989 the troops were withdrawn.

*'We did not simply leave, we left with the war wrapped around the tracks of our tanks and the wheels of our vehicles, taking it home, and it **flared up** on our soil.'*

Russian Security Council Chief Alexander Lebed, on the Soviet withdrawal from Afghanistan in 1989

Terrorism

Terrorist groups have caused problems in many parts of the world over the last 60 years. From the 1960s onwards the Provisional IRA tried to overthrow British rule in Northern Ireland. In the early 1970s, the Black September group carried out many hijackings and kidnappings in support of an independent country for Palestinians. In the 1980s, al-Qaeda was set up to fight the Soviet Army when it occupied Afghanistan, and it has since become an international terrorist organization. On 11 September 2001, al-Qaeda launched a major attack on US soil when terrorists flew passenger airliners into the Twin Towers of the World Trade Center in New York, and the Pentagon in Washington. Thousands of people were killed.

New tactics

Terrorist tactics include hijacking, kidnapping and bombing targets such as airports and financial centres. Armed forces have had to develop new tactics to try and prevent terrorism. The British Army gained valuable experience in Northern Ireland while fighting the IRA. They learned how to patrol urban streets, assess difficult situations and detect and **defuse** bombs. This knowledge has been invaluable for peacekeeping duties in other countries.

Some conventional weapons have changed relatively little since World War II. Modern tanks (top) look much the same as those used in World War II (bottom), although they are more powerful, faster, better armed and better protected.

New technology

Some new weapons systems developed in the last 60 years have had a major impact on the nature of war. Probably the most important of these new types of weapon is the missile. Missiles are rockets, often with guidance systems, carrying an explosive **warhead**. They have changed the rules of warfare completely, because they allow attacks to be carried out from a great distance away. Once it took a battleship, firing from reasonably close range, to destroy another battleship. Now a missile fired from many kilometres away can achieve the same result.

Two other areas of technological change have opened up completely new ways of conducting warfare – satellite technology and computerization. Satellites allow commanders to talk almost instantaneously to troops anywhere around the world, to take **aerial** photographs without risking aircraft, and to **eavesdrop** on enemy communications. They can also provide accurate navigational information for missiles, bombs and soldiers (see pages 28–30). The development of small, powerful computers from the 1980s onwards has provided weapons with extremely accurate guidance systems. It has also made it possible to set up complex communications networks, which allow information from satellites, aircraft and other sources to be passed between military commanders and soldiers in the field.

Weapons of mass destruction

The latest missiles and bombs are precision weapons. As well as being more accurate and deadly in destroying their target, their use is intended to help minimize civilian damage and deaths. Weapons of mass destruction (WMD) are very different. These are weapons designed to kill large numbers of people indiscriminately. A WMD attack on a city, industrial centre or on agriculture would **demoralize** an enemy and could completely destroy its ability to fight a war.

Nuclear weapons

Nuclear weapons are the most destructive WMD. They can kill large numbers of people and destroy buildings, roads and other structures over a wide area. They also leave an area contaminated by radioactive fallout. However, nuclear weapons are difficult to manufacture. They need complex guidance systems, triggers and nuclear fuel such as enriched **uranium** or **plutonium**.

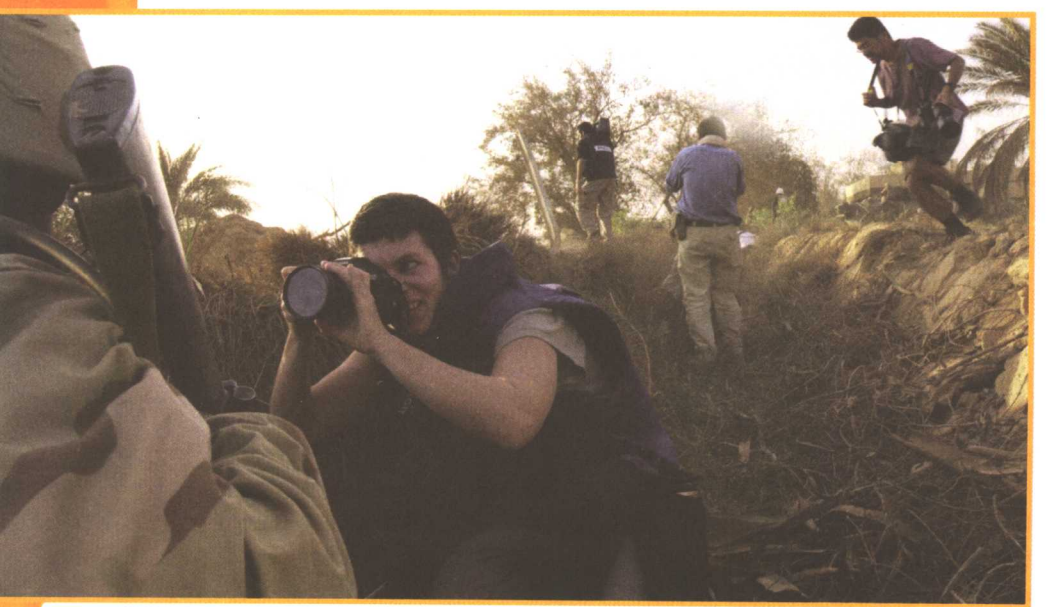
Biochemical weapons

Biological and chemical weapons do not have the immediate destructive power of a nuclear weapon. They are relatively crude weapons that leave buildings and other structures intact. Biological weapons are devices that carry disease-causing microorganisms (microbes), or **toxins** made by such microorganisms. Chemical weapons are dangerous chemicals that affect the skin, eyes, lungs, blood, nerves or other organs.

Real-time TV

During World War II there was no television or satellite technology to transmit pictures and reports almost instantly from the battlefront. People read about the war in newspapers or listened to reports on the radio, and the news they got could be several days old. Governments often censored war reports, minimizing any bad news and 'talking up' the successes.

By the time of the Falklands War in 1982, news reporting had radically changed. People saw TV **footage** of some of the action, including horrifying scenes such as the evacuation of severely injured soldiers after the bombing of the British landing craft, *Sir Galahad*. By the 1990s it was possible to provide live TV reporting direct from the front line, bringing the battlefield into people's living rooms.



During the 2003 Iraq War, many reporters travelled with a particular unit of soldiers throughout the war, giving them unprecedented access to the war zone.

The change in the reporting of wars has raised many issues. The speed of modern communications makes it difficult for governments to control what is seen by the public. It is not yet clear whether such images make us a more violent society or make people more aware of the dangers of warfare.

'For the first time ever in our history we not only have thousands – literally thousands – of journalists travelling with the troops but we have broadcast media behind what I would describe as enemy lines, reporting blow-by-blow what is happening.'

David Blunkett, UK Home Secretary, talking about media coverage of the 2003 Iraq War

Costly wars

The cost of modern warfare is immense. The 2003 Iraq War cost the USA at least US$20 billion, even though it lasted only a few weeks. The on-going cost of peacekeeping is estimated at US$4 billion, and the cost of returning troops and equipment will be a further US$5–7 billion. Advances in technology mean that although weapons are more powerful and more accurate, they are also more expensive. Tomahawk missiles can cost anything up to US$1 million each, and hundreds were fired within the first few days of the war.

Because the latest weapons are so complex and expensive, only the richest and most technically advanced countries can benefit from them. The richest country in the world, the USA, has by far the largest and most sophisticated armed forces. The armed forces of the UK, France, Germany, Australia and Japan are also technologically advanced, but much smaller than those of the USA. Countries such as Iraq have some powerful individual weapon systems and large numbers of troops, but they have little access to satellite technology and their communications networks are poor.

Some people question whether the costs of hi-tech weapons are justified. The money has to come from the government budget, which may mean that public services such as housing, education and health care have to be cut back to pay for weapons. Governments have to make difficult decisions as to whether it would be better to spend money on improving conditions for everybody at home rather than going to war.

'Every gun that is made, every warship launched, every rocket fired, signifies in the final sense a theft from those who hunger and are not fed, those who are cold and are not clothed.'

US President Dwight D Eisenhower, 1953

Biochemical weapons

Biological weapons (bioweapons) involve the release of disease-carrying microorganisms or the toxins that they produce. Chemical weapons use chemicals that harm the body. The use of bioweapons is not new. An early example of biological attack occurred in 1346, when **bubonic** plague infected Mongol troops retreating from Kaffa in the Crimea (now Southern Russia). The Mongols **catapulted** the **corpses** of plague victims into the city, where the disease claimed many victims. Survivors from Kaffa may have carried the disease back to Italy, and started the Black Death epidemic that killed almost a third of Europe's population.

Mustard gas, an early chemical weapon, was used in World War I. The Geneva Protocol of 1925 (see page 18) banned the use of chemical and biological weapons, but chemical agents were nonetheless used in the war between Iran and Iraq in the 1980s. Terrorists have also used chemical weapons. In 1995 a Japanese terrorist group released the nerve agent Sarin in the Tokyo subway (see page 18).

Bioweapons

The microorganisms used as biological weapons are bacteria or viruses that cause disease or serious poisoning from the toxins that they produce. A biological agent can either be released into the air, from where it gets into the body by being inhaled, or it can be used to contaminate food or drinking water. Some agents can be spread by contact, after touching contaminated surfaces.

The smallpox virus, shown here, was eradicated in 1976. However a few laboratories around the world hold stocks of the virus and there are fears that terrorists could obtain these.

When bacteria or viruses enter the body, there is an **incubation period**, before symptoms appear. This may be days or weeks. During this time, the organisms continue to spread and infect more people before anyone is aware that a biological agent has been released. Toxins tend to cause illness or death within a few hours, or sometimes even minutes.

What makes a biological agent?

A biological agent needs to be highly infectious (easy to catch), and **lethal**. It should be able to survive in the environment for a long period of time, and it must be possible to produce it on a large scale. It is more effective if there is no treatment or **vaccine** for the disease.

The two most feared biological agents are **anthrax** and **smallpox**. Both are highly lethal – four out of every five people die from anthrax if it is untreated before the onset of serious symptoms, while one in three people infected with smallpox could die. Although there are vaccines for both diseases, only a limited number of them are available.

The following table shows the effects of six biological agents classified as being the highest risk to US national security (from the US Center for Disease Control).

Agent	Symptoms	Treatment
Anthrax	Early symptoms include fever, general weakness, coughing, difficulty breathing. Death can occur within 36 hours. Not contagious.	A vaccine is available but it is reserved for military use. If given early, antibiotics can prevent illness.
Botulinum toxin (toxin produced by bacteria *Clostridium botulinum*)	Blurred vision and difficulty in swallowing or speaking, followed by muscle paralysis. The victim suffocates and dies.	The toxin can be treated with an anti-toxin.
Pneumonic and bubonic plague	Symptoms occur within 1 to 6 days and include fever, coughing and difficulty breathing. Death is rare.	Treated with antibiotics.
Smallpox	Fever, headache and nausea for about 2 to 4 days. A spotty rash spreads over the body and blisters form. It is highly contagious.	A vaccination can prevent infection, but there is no effective treatment and 1 in 3 victims die.
Tularemia (rabbit fever)	One of the most infectious bacteria known. After 3 to 5 days, victims develop fever, headaches, chills. Inflammation and bleeding of the airways causes 1 in 3 to die.	Treated with antibiotics.
Viral haemorrhagic fevers e.g. Lassa fever and Ebola	Symptoms (fever, aches and diarrhoea) can appear from 3 days to 2 weeks. Haemorrhaging occurs from body tissues, mouth and nose.	Some strains respond to anti-viral drugs. If left untreated, between 30 and 90 per cent of victims die.

Chemical weapons

Chemical weapons are weapons that release toxic chemicals that attack the body through the lungs, skin or gut. Many chemical weapons are industrial chemicals that are safe in small amounts but lethal in large quantities. So chemical agents are abundant, easy to acquire, and relatively cheap.

Many modern chemical agents are designed to penetrate the skin. The thinner and the moister the skin, the greater the chances of penetration, so the eyes are particularly **vulnerable** to chemical agents. The lungs are also vulnerable and many chemical agents are designed to be inhaled.

Farmers use **organophosphate** pesticides to dip their sheep and protect them against parasites such as ticks. These sheep dips belong to the same group of chemicals as the nerve agents Sarin and VX gas.

There are five categories of chemical agent. They are nerve, blister, choking, blood and irritating agents.

Nerve agents

Nerve agents work by interfering with the transmission of nerve impulses. Nerves are vital to the body – they carry information from the senses to the brain, and transmit messages from the brain to the muscles. Exposure to a nerve gas leads to convulsions (violent and uncontrollable muscular contractions) followed by death when the muscles used to breathe are paralysed. Examples of nerve agents include Sarin, a chemical that acts by direct contact with the skin, and VX gas, which is inhaled. There are **antidotes** that counteract the effects of nerve agents, but they have to be injected immediately.

Blister agents

Blister agents cause burning and blistering of the skin and irritation of the eyes and lungs. If the lungs are badly affected they may fill with liquid and cause death. Symptoms can take between two and 24 hours to develop. Mustard gas is a blister agent that was widely used during World War I.

The dose of a blister agent needed to kill a person is about 50 times more than for a nerve agent, so blister agents are more likely to disable than to kill. The best treatment is to remove as much of the chemical as possible by washing, but there is no antidote.

Choking agents

Choking agents cause coughing, choking and headaches. Liquid can collect in the lungs and cause death. Examples of choking agents include the gases **phosgene** and **chlorine**. There are no treatments or antidotes for these agents.

Blood agents

Blood agents such as **hydrogen cyanide** starve the body of oxygen by stopping the transfer of oxygen from red blood cells to other cells in the body. A large dose causes **vomiting**, **convulsions**, breathing difficulties and death. There is no antidote as such, but injecting a sufferer with the chemical **sodium thiosulphate** turns the cyanide into a harmless substance that passes out in the **urine**.

Irritating agents

Irritating agents, such as tear gas, cause pain in the eyes, a flow of tears and difficulty in keeping the eyes open. They can irritate the mouth and nose which leads to vomiting, but they are not usually lethal.

> *'Biological or chemical agents are **amenable** to [can be used for] the waging of psychological warfare because of the horror and dread they can inspire. Even if the agents are not actually used, the fear of them can cause disruption, even panic.'*
>
> World Health Organization report on Health Aspects of Biological and Chemical Weapons

Manufacturing chemical and biological weapons

The manufacture of chemical weapons employs virtually the same systems and processes as completely legal industrial products, such as pesticides. This means that industrial plants and equipment used to manufacture industrial chemicals can be switched easily to the manufacture of weapons of mass destruction.

Biological weapons are more difficult to produce than chemical weapons. Bacteria are usually cultured (grown) on a jelly-like substance in a covered glass dish. However, producing anthrax bacteria, for instance, is more complicated than simply growing a bacterial culture. The most effective bioweapon is an airborne spore (a resting form of the bacteria) that can be inhaled into the lungs. The spores have to be grown to the right size, and kept from **clumping** together when they are released.

Viruses need to grow on other living organisms – the flu virus, for instance, is grown in chicken eggs. Smallpox is difficult to grow and it is so deadly that it poses a very serious risk to laboratory workers that try to culture it.

A laboratory technician has to wear protective clothing and a face mask when handling **pathogenic** bacteria. The bacteria are cultured inside a sealed cabinet so that they cannot escape into the atmosphere.