

Chemical warfare: It's nothing new

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As millions flee Syria and the international community continues to consider its response to claims that chemical weapons may have been unleashed on civilians there; it is worth reflecting that in the science of modern warfare, truly, there is nothing new under the sun.



In her book *Greek Fire, Poison Arrows and Scorpion Bombs*, the distinguished classical scholar Adrienne Mayor recalls that the Persian army under Xerxes the Great used flaming arrows two-and-a-half-thousand years ago, and not long after that, the Roman army used spears tipped by a mixture of burning pitch and sulfur as a weapon, as you can see in the Ridley Scott film, *Gladiator*, which stars actor Russell Crowe.

By the 7th century AD, the inhabitants of Byzantium (Constantinople) had developed a fearsome substance that became known as Greek fire. Crude oil had been discovered in the Near East long before that, and it was widely used as a source of naphtha, an ingredient in flaming projectiles. The Byzantines added further refinements. Today, the ingredients are a lost secret, but it looks as if they used naphtha, pine resin and other chemicals including sulphur, projecting it long distances by forcing it through a nozzle under pressure; the original flamethrower. High-boiling chemicals like pine resin would enable the mixture to burn for longer and reach higher temperatures than one purely based on petrol-like molecules, and would also cause the burning mixture to adhere to any surface – or person – unlucky enough to be in its way. This was used twice successfully to fight off the Muslim navy besieging Constantinople. So chemical warfare is nothing new.

One of the best known quotes from a film comes from Francis Ford Coppola's *Apocalypse Now* about the Vietnam War: 'I love the smell of napalm in the morning'; spoken by actor Robert Duvall in the part of Lieutenant Colonel Bill Kilgore. Napalm has come to be associated with its use by the American and South Vietnamese forces during the Vietnam War, but its origins go further back.

Some people have called World War I 'the Chemists' War' for its use of substances like chlorine and mustard gas, and one of the less successful weapons was a flamethrower using gasoline. This was unsuccessful, as it burned too fast. During World War II, American scientists reinvestigated this weapon, in a team led by Professor Louis Fieser, who older generations of chemists will associate with an organic chemistry textbook. Just like the Byzantines, they found that adding a thickening agent to the fuel created something that burned longer and also tended to stick to surfaces; their thickening agent is reportedly a soap-like material based on aluminum naphthenate and aluminium palmitate. The name napalm was derived from the first parts of the words naphthalene and palmitate. When they mixed this with gasoline, they got a viscous sticky brown liquid which burned more slowly and produced higher temperatures, making it a very effective weapon for fire-bombing cities, for example. After that war, further developments took place.

It was found that if you mixed polystyrene (the stuff used to make plastic model kits, or in 'expanded' form as a packaging) with benzene and gasoline, the resulting product was less flammable and therefore safer to handle. Despite the fact it contained neither naphthalene nor palmitate, it became known as napalm B. Burning napalm would set peoples' clothing on fire and produce 4th or 5th degree burns, penetrating right through the skin. It came into combat use during the Korean War, and even though it has been used by many countries in different conflicts since then, it is imperishably associated with the Vietnam War. Many people will have seen the iconic Nick Ut photograph of a nine year-old Vietnamese victim of a misdirected napalm attack, running down a road; she is naked because she has ripped off her burning clothes. Thanks to surgery, she survived and Kim Phúc now lives in Canada.

Napalm has not been outlawed as a weapon of war, but a United Nations convention forbids its use against civilian populations.

W B Yeats, the Irish poet, used the phrase 'A terrible beauty is born', when writing about the Easter Rising of 1916. War is not beautiful, but people sometimes do brave things in the course of a war. Napalm, which Syrian opposition figures claim has been dropped on civilians, is definitely not beautiful; it is an obscene weapon, as the horrific footage of dead and dying Syrian civilians with dreadful burns would appear to show.

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