New Scientist, August 14, 1969

Escalation of chemical warfare

It is not generally appreciated how far the use of non-lethal chemical agents in war has spread—particularly in Vietnam. A very real danger, namely that habituation may lead to a weakening of the constraints presently operating against the deployment of intensely lethal chemical weapons, urges the need to give priority to this matter at the continuing Geneva disarmament talks

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Following the recent comment in *New Scientist* (17 July, p.107) concerning Mr Fred Mulley's speech at the continuing Geneva disarmament talks, and Mr Mulley's reply thereto in the correspondence columns (31 July, p.247), we feel it highly pertinent to set forth in detail the essential facts about so-called harassing and riot-control agents, and their relevance to the prohibition of chemical warfare.

It is certainly true, as Mr Mulley maintains, that the Geneva Gas Protocol is not as explicit as it might have been on the subject of irritant chemicals; and it has certainly been argued that its prohibition does not cover these agents. Yet on the only occasion when the matter has been put to international debate, admittedly nearly 40 years ago, more than two-thirds of the representatives of governments that were parties to the Protocol interpreted it as extending to irritants, while the remaining representatives did not oppose this view.

When so respected a figure as Mr Mulley says that he fears it may be difficult to secure unanimous agreement on such an "extensive" interpretation, he is both being perhaps unduly pessimistic, and prejudicing attainment of the consensus before it has even been sought. His assessment of the priorities in the present CBW disarmament talks is that BW negotiations should come first, and that nothing must divert attention from them. This is a noble objective; whether or not it prevails at Geneva, we urge that extreme care be taken lest its pursuit accelerates the decline of the constraints against CW. The harassing agent question is at present probably the crucial issue in CW arms control—as the following discussion will perhaps make plain.

Chemical irritants in war

The police in various countries use certain chemical irritants for domestic purposes. When used in this manner, they have been called "riot-control agents". Military forces have also employed these same chemicals, and others related to them, widely as agents of chemical warfare (CW). When used in this fashion, they are called "harassing agents".

Although usually not lethal by themselves, harassing agents have been used to reduce an enemy's fighting efficiency by forcing him to mask, by upsetting his fire, or by driving him from cover to face capture or hostile fire. They are thus sometimes employed to increase the lethality of other weapons.

Chemical irritants were the first CW agents to be used in the First World War. Artillery units conducted bombardments involving tens of thousands of harassing-agent projectiles during the months immediately preceding the deployment of chlorine cylinders at Ypres. Altogether, the participants used some 13 000 tons of irritants during the war, a quantity slightly greater than that of the mustard gas disseminated then.

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a feeling of severe chest constriction. This may last for several minutes: subjects so affected often become extremely fearful, so much so that they appear to lose the ability to inhale or exhale. In addition to these effects, gastro-intestinal symptoms sometimes appear, generally in the form of nausea, and more rarely diarrhoea. Vomiting is unusual. Subjects may also experience irritation of the skin, particularly moist skin, which may persist for several hours. Heavy exposures may cause blistering.

Incapacitating symptoms caused by CS aerosols in the open generally pass within 15 minutes or so after exposure ends. In confined spaces, where higher dosages may be received, the severer symptoms may be more long-lasting. Instances of actual lung-damage in Man have not been reliably reported in the literature, but they can certainly be expected at very high dosages.

Experimental respiratory LCt_{50} values—the exposures required to kill half the exposed organisms—have been obtained from a variety of laboratory animals: these range from 8300 mg.minutes/cu.m for guinea-pigs up to 43000 mg.minutes/cu.m for mice, in the case of CS aerosols made up of particles of 1.5 micrometres mass median diameter. The published estimates of the human lethality vary from 25 000 up to 150 000 mg.minutes/cu.m.

No studies appear to have been made on the long-term effects of exposure to CS. It is known to be an alkylating agent and, as it is generally dispersed in a form that can penetrate deep into the lungs, the possibility of its carcinogenesis ought to have been investigated.

Three forms of CS have been developed for war use: the commercial product itself, for dissemination by distillation from pyrotechnic compositions; CS1, a micronized powder formulation containing five per cent silica gel, for dissemination by explosive burst or dusting apparatus; and CS2, to be used in the same way as CS1, and consisting of the latter microencapsulated with silicone to improve its flow properties and weather resistance. Spread on open terrain under normal weather conditions, CS1 is effective for about a fortnight; CS2 is considerably more persistent.

The following weapons have been developed to dissipate CS, CS1 and CS2: hand grenades; rifle grenades; projectiles for automatic grenade launchers and multiple rocket launchers, for ground and aircraft use; 4.2-inch mortar bombs; 105-mm and 155-mm gun and howitzer projectiles; high-capacity dusting apparatus, both portable and for mounting in trucks or helicopters; aircraft bombs, cluster bombs and bomblet dispensers, of ratings from 50-lb up to 1000-lb.

tity of harassing agents, mostly chloroacetophenone (CN) and adamsite (DM), during the Second World War. The munitions into which they loaded these agents included grenades and candles, artillery shells, mortar bombs, aircraft bombs and bulk disseminating devices.

The principal harassing agent to be prepared and used in massive quantities since the Second World War is *o*-chlorobenzalmalononitrile (CS), for which a variety of formulations has been developed suited to different tactical objectives. We summarize its properties above (see boxed section).

Status under the Geneva Protocol

The Geneva Gas Protocol of 1925 prohibits the use in war of "asphyxiating, poisonous or other gases, and of all analogous liquids, materials or devices . . .". Many governments have expressed the view that the use of tear gas and other chemical irritants in war is prohibited by the Protocol. This position was declared by the United Kingdom, France, Romania, Yugoslavia, Czechoslovakia, Japan, Spain, the USSR, China, Italy, Canada and Turkey at Geneva on 15 January, 1931.

Subsequent discussion of harassing agents at Geneva led to an expression by the USA that while the use of tear gas for local police purposes should be allowed, its use in war should be prohibited. This was the agreed view of the nations participating in the Disarmament Conference, expressed in a resolution adopted on 23 July, 1932.

Future status

Over the past 40 years, many nations have employed chemical irritants for police purposes while regarding their use in war as illegal. Their use for police purposes is a matter for national legislators, and is not at issue here.

The situation in which these agents have remained outlawed for military use at least for the past four decades is not one that should be altered unheedingly. Nevertheless, there is a danger that this might happen, not so much by direct renegotiation of the Protocol, but by indirect sanction of infractions of the Protocol and of the customary international law on which it is based.

In itself, the military use of harassing agents is relatively unimportant compared with other dangers arising from military technology. The hazard lies in that a progression to more lethal agents will become appreciably more probable, and that CW will become an increasingly acceptable method of fighting. These probabilities will increase whenever chemical irritants are used in war, particularly as the scale on which they are used increases. The following mechanisms could contribute to this:

(*a*) As a belligerent comes to place more and more reliance on harassing agents, he will develop more weapons to disseminate them until he finally has the capability of spreading them with his entire range of tactical weapons delivery systems. This point now seems to have been reached in the

Vietnam war. Thus confronted, his enemy will protect himself with gas-masks if he possibly can. These are capable of completely nullifying the harassing effects of tear gases and respiratory irritants, and chemical weapons can defeat them only if the agents used attack the skin. The tissues of the eyes and respiratory tract are much more delicate than those of the skin, so that an effective skin irritant must of necessity be a more violent material than a normal harassing agent. Probably the only practical skin irritants are the arsenical and mustard vesicants, materials that are indisputably CW agents. The fact that the attacker has already deployed a wide range of chemical disseminating equipment, backed up by supply channels attuned to handling chemical weapons, would make his decision to move over to skin irritants that much easier, particularly if his troops have become accustomed to relying on chemical weapons.

(*b*) A belligerent attacked with chemical weapons will be under pressure to retaliate in kind. The doctrine of proportionate response may easily be traversed by the exigencies and passions of war.

(*c*) The military establishments of countries not involved in the war will be observing its progress very closely, and the increasing use of chemical weapons will not fail to attract their attention. At first, they will see the use of police-type riot-control equipment, and they will note how it can be employed to increase the area of effectiveness of explosive and fragmentation weapons, to contaminate terrain and deter its occupation by the enemy, and for other purposes far removed from those for which it was originally designed. They will then note the deployment of irritant-agent weapons that could never be used by police forces—mortar, gun and howitzer projectiles, rockets for multiple-tube launchers, and aircraft cluster bombs. Irrespective of their views on the way the irritants were used initially, they will see the significance of this second development. They may begin to question the doubts that they could normally be assumed to have about the propriety of using chemical weapons in war. By the time the third stage, of vesicant-usage, is reached or appears imminent, they may have begun seriously to assess the military advantages and disadvantages of CW.

(*d*) This last process will have been one of a gradual erosion of preconceptions about gas, and of a proliferation throughout many of the world's armies of appraisals or reappraisals of the value of chemical weapons, uncluttered by at least some of the often irrational psychological constraints that previously existed. They will undertake these in the expectation that when the war is over, a surplus of up-to-date chemical weapons will become available, and that experienced users of them will be willing to give instruction in their battlefield employment. The war will thus have left a permanent residue of lowered psychological barriers against CW, and an accumulation of new know-how and interest in its battlefield possibilities.

It may be that our assessment of the dangers of the military use of chemical irritants, whether in Vietnam or some future war, is too fearful. But even if we are only fractionally correct, the situation is one that must engage the closest attention of people concerned with arms control. If there is any danger at all of the constraints against use of chemical weapons being or having been weakened, swift reinforcing action must be taken. The military option of using irritants in tactical operations is surely not so valuable as to have attracted immutable pressure to keep it open. Apathy may be as serious a block to remedial action as opposition from military establishments.

Above all else, nothing must be done that might weaken the constraints still further. It is on this score that Mr Fred Mulley's speech at Geneva on 10 July is open to criticism.