public, and concludes that there is still work to be done before the adverse health effects of specific chemicals can be assessed.

Dr Hay could have gone further. Later works from the International Disaster Institute may indeed do this and take up the general nature of disaster, our reactions and the remedies proposed. Unfortunately it appears that analysis of natural disasters will be excluded although they kill tens and hundreds of thousands in floods, typhoons and earthquakes; man-made disasters are never on this scale unless they arise from the failure of dams or embankments installed to control all but the most exceptional floods.

IMAGE UNAVAILABLE FOR COPYRIGHT REASONS

Symbol of Seveso — August 10th, 1976, and workmen begin to cleanse the ICMESA plant.

The special disaster for Dr Hay was that at Seveso, in northern Italy, on July 10 1976, where the ICMESA factory of Hoffman-La Roche made trichlorophenol, used (but not in this case) to make 2,4,5-T, by hydrolysis of 1,2,4,5-tetrachlorobenzene with caustic soda. The reaction is carried out at atmospheric pressure in ethylene glycol solution which is then distilled under vacuum at a temperature not exceeding 185°C. The accident happened following an exothermic reaction, probably initiated from a hot-spot after the agitator and the steam were shut off, so that the temperature rose to 240°C and the reactor pressure to 3.55 bars, rupturing a disk in a vent-line discharging into the atmosphere. The temperature rise caused the formation of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin, one of the 75 possible isomers of dioxin, having a toxicity to guinea-pigs and mice represented by LD₅₀ values of 2 and 284 µg/kg. Hay gives an extended account of the chemistry of dioxins, their formation and destruction by incineration, photolysis, electrochemical oxidation and biodegradation, and estimates the amount of dioxin formed at Seveso to have been 250–500 g. This is considerably lower than the 2kg estimated for the Lombardy Regional Council.

The toxicology of dioxin is discussed mainly in relation to animal experiments. The effect on man was shown at Seveso in workers and their families by the rapid development of chloracne, and Hay devotes an entire chapter to this extremely disfiguring disease. The alarming feature of the Seveso discharge was its dispersion over a wide area from the two-phase jet issuing at sonic speed from the vent. Near the source, heavier droplets were caught in vegetation and some animals died after

eating it. Further downwind the smaller droplets contaminated houses and fields, the dioxin content causing 187 cases of chloracne in children but none in adults. These cases had all cleared up by 1980 (the gross lesions on the faces of two children given world-wide publicity were due to the sodium trichlorophenolate from the reactor).

Dr Hay records in detail the action taken after the accident by Hoffman-La Roche and Italian government, both local and national. The warnings and clear advice from the company were in contrast with the vacillation of the public authorities; the lack of emergency procedures and political confusion made the people of Seveso victims of a social disaster far greater than any physical damage they suffered from the chemical itself. The publicity given to possible teratogenic effects triggered demands for abortion to be freely available, opposed by the local clergy. Even worse, the agricultural and manufactured products of the area became unsaleable because no firm exculpation came from the authorities. Hay's account shows Dr Reggiani, the medical director of Hoffman-La Roche, acting with the highest integrity throughout the affair. His pursuit in the subsequent years of comparative health statistics for spontaneous abortions, birth defects and many other indicators has shown no detectable differences between the people in the contaminated area and those outside.

At the root of this book is a question — how do we remain alert to the detrimental effects of chemicals shown in some animal experiments without denying to the community products whose utility outweighs the risks? Hay shows how many uncertainties exist; for example, dioxin shows no mutagenicity in the Ames test. Yet the Seveso incident has given rise to the Seveso directive of the EEC, and to the campaign in the United Kingdom to ban 2,4,5-T even though there is already a stringent limit on dioxin content.

It is time for more agreement and less debate on how to compare benefits with costs, particularly on the reduction of risk in the use of medicines. In the Royal Society study group on risk, it was argued that action to reduce the risk of one death would justify spending between £100,000 and £1,000,000, any more being better spent on other medical benefits. In comparison with the estimated cost of smallpox eradication by the World Health Organization it is arguably too much. That campaign has saved 2,000,000 lives a year at a cost of £8 per life. Even more lives could be saved by providing safe drinking water, but the victims are a long way away from Europe and North America. Unlike Seveso and Love Canal, it is hard to make the publicity sensational. □

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States and soldiers

Richard Langhorne

The Pursuit of Power: Technology, Armed Force, and Society since AD 1000.

By William H. McNeill.

Basil Blackwell: 1983. Pp.406. £15.

FEW AGES have been as preoccupied as our own with the preparations for and likely consequences of going to war. Thus *The Pursuit of Power*, a study of technology, armaments and society as they have developed over a millennium or more, must arouse considerable interest.

The author is William McNeill, an historian who is no stranger to the temptation to seek out and describe patterns of development over very long periods. He has notably succumbed once already in *Plagues and Peoples*, his treatment of the incidence of disease published by Blackwell six years ago. Global histories have not been fashionable in recent times, though there are signs — of which this is an example on a comparatively small scale — that we may not be deprived forever of modern successors to Gibbon and Macaulay. Although *The Pursuit of Power* is not an especially substantial tome, the treatment it offers is far from lightweight. The discussion is tightly packed and marked by great breadth of learning. The conclusions that emerge are often complex, but a finely balanced prose style renders them easily accessible to the general reader.

The pattern perceived by McNeill results from the operation of two factors. First, the diffusion from China during the Sung dynasty (AD 960–1279) of a new kind of economic organization based upon market forces rather than the "command" principle which had characterized the economies of the ancient empires. Secondly, McNeill continues, there was a steady development of ever more efficient weapons, used by increasingly sophisticated armed forces. It was this factor that propelled new economic development. The two effects together came to affect profoundly the creation, structure and behaviour of states. Certainly, it is true that since the evolution of the Italian city states in the fourteenth century, the division of human society into nation states has become a global fact. The more difficult question is whether McNeill's attractively organized explanation for this phenomenon is wholly satisfying.

The ability of economies to generate technological innovation has been a particularly important ingredient of power since the last quarter of the nineteenth century. Economic success, however, and effective military organization have been but two of the ingredients, and it is not certain that a military stimulus has been required on a regular basis to produce successful

technological advance. There have been times when the stimulus was the other way round — particularly, for example, in the application of the steam engine to naval warfare.

McNeill sees military strength as being the principal reason for the internal security of rulers, at least until the middle of the twentieth century. However power may rest with a state for other reasons entirely; internal stability, for example, may follow because a regime has enjoyed an accepted legitimacy. Thus, states have held respected positions more because their systems of government were secure enough to develop effective military forces for external use, rather than because they could dominate their own populations militarily. The eighteenth century provides a classic example of this kind of effect, in which all states improved or wished to improve their internal administration. McNeill thinks that this was just because rulers had come to enjoy a complete internal security through their possession of more efficient armies. It is also true, however, that at that time states were facing an unprecedented problem of international relations in that, because of a shift in the distribution of power among them, they no longer faced a single threat but a multiple one in which each nation was equally feared and fearful. Then, as before and as now, internal efficiency and stability was one of the components of power and it was not surprising that anxious rulers should have attended to domestic reform more because of foreign threats than because they felt militarily predominant within their own borders.

A similar problem for McNeill's thesis occurs in late nineteenth-century Europe. He offers three causes for the First World War: first, a threat to the balance of power (which he regards as the least significant); secondly, changes in the structure of industry and state administrations induced by the demands of military developments, leading to a dysfunction between the striking success of industrial organizations in the advanced states and the increasing inability of those states to apply this advance to their relations with each other. Thirdly, a demographic crisis developed which could only be relieved by war or disease, both of which had occurred by 1918. Here again, while accepting the importance of a demographic factor, we need to be reminded that the chief consequence of technological advances in the nineteenth century, particularly in communications, was a shift in the distribution of power in the world; it was this, rather than anything else that made states feel insecure. The defensive reaction of Germany to the rise of Russia in the early twentieth century exemplifies this effect. In such circumstances all states felt under pressure to make the most of their industrial capacity, their armed strength and their internal stability.

For McNeill, it is the consequence of fighting the two world wars rather than their causes which are profoundly signi-

ficant, because those consequences amounted to an apotheosis of the pattern he has identified. Compelled by military necessities, states had to make fundamental changes in their administrations. This time the heady mixture of danger, patriotism and a formidable level of industrial and technological organization pushed them out of the old path of social and political development, carried on the back of intertwined economic and military change, into a new kind of mixed or semi-command economic and social structure. McNeill argues that since 1945 this situation has been maintained by military and technological pressures. The constant fear induced by nuclear weapons, and the enormous expenditure lavished on armaments generally, have led many to agree that this new structure, and other characteristics of contemporary political life, are militarily determined. Military force, however, is clearly not the only determinant of power and may have more significance as a reflection of its distribution. Some would say that the present baroque, even rococo, state of modern military competition is not just a consequence of the global power structure, but that its complexity reflects the fact that the power structure is less volatile than for many centuries past.

McNeill rightly stresses contemporary international tensions, and he has a prescription for their amelioration: world government, which, as he says, is certainly technically feasible. But the will is so lacking that the very prescription has a quackish air. More sensibly, he observes that it would be wise to expect the future to yield as many surprises as the past, some of them unpleasant. To any historian accustomed to working on any part of the last five centuries or so, the most surprising thing that could happen is that upheavals in human society should slow down and gradually stop. McNeill, however, does foresee this as the likely desirable consequence of the establishment of a world government, and allows that greater demographic control and the immobilizing nature of nuclear weapons have produced greater stability since 1945.

Nuclear weapons may be about to be eclipsed by new weapons but foreseeable technological developments are unlikely to disturb the current balance of power. If this is so, it will be likely to demonstrate that it is not any particular weapon that has been immobilizing, so much as the absence of any serious threat to the dominance of the super powers. They have now achieved an apparently impregnable position against which all the threats of the post-War world have proved ineffective. Perhaps McNeill might be most surprised by the prospect that this fact may eventually permit the natural development of the tranquillity which, for him, can only flow from an attractive but impractical dream. □

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Jewish nationalism and the liberal ideal

M.F. Perutz

The Essential Chaim Weizmann: The Man, The Statesman, The Scientist.

Compiled and edited by Barnett Litvinoff. Weidenfeld & Nicolson: 1983. Pp. 290. £16.50.

The Essential Chaim Weizmann conjures up a vivid image of the great Jewish leader, mostly by letting him speak in his own words. It quotes extracts from his speeches, letters and memoirs; it adds summaries of his career, of his political battles with successive Zionist Congresses, and of his brilliant negotiations leading first to the Balfour Declaration and later to recognition of Israel as an independent state. It contains an appreciation, in no more than three pages, of Weizmann's scientific work, and it reproduces a variety of people's sketches of Weizmann's personality. Appendices give the texts of several official documents, from the Faisal-Weizmann agreement in 1919 to Israel's Proclamation of Independence of 1948.

Weizmann had a fervent belief that the Jews were a nation entitled to the rights of a nation; at the same time he was inspired by liberal ideals and averse to any form of violence. His high moral standards can be gauged from his courageous address to the Zionist Congress of 1946, at a time when the British Labour Government was blocking Jewish immigration into Palestine and bitterness was at its height:

It is difficult in such circumstances to retain a belief in the victory of peaceful ideals, in the supremacy of moral values. And yet I affirm . . . that we must retain it. Zionism is a modern expression of the liberal ideal. Divorced from that ideal it loses all purpose, all hope. . . . Assassination, ambush, kidnapping, the murder of innocent men, are alien to the spirit of our movement . . . it mocks the ideals for which a Jewish society must stand.

Already in 1929 Weizmann had written to Einstein: "I have always preached most unpopular realities to the Zionists, have always been attacked most bitterly . . ." For example he told the Congress in 1923:

Palestine is not an empty country . . . there are 500,000 Moslems, 100,000 Christians and a 100,000 Jews . . . there has been a striving on the part of the Arab people for a revival . . . being anxious for a revival of the scattered Jewish people, we treat with respect and reverence any attempt at revival amongst other people.

In his autobiography, *Trial and Error* (Hamish Hamilton, 1949), Weizmann wrote:

We must stand by the ancient principle enunciated in our Torah: "One law and one manner shall be for you and for the stranger that sojourneth with you . . ." I am certain that the world will judge the Jewish State by what it does to the Arabs.