Star wars

Sceptics abound one year on

Washington

PRESIDENT Reagan's request a year ago for the help of the scientific community in developing a system of defence against nuclear attack received a distinctly unfriendly answer last month. The Union of Concerned Scientists, (UCS), based in Cambridge, Massachusetts, marked the first anniversary of the President's "star wars" speech by publishing a detailed technical report saying the plan to create a comprehensive defence could not work.

Although UCS made plain a year ago its opposition to star wars, the new report is the most detailed critique yet published by opponents of the administration's strategic defence initiative. Compiled by a distinguished panel, including the physicist Hans Bethe, retired admiral Noel Gayler, defence analyst Richard Garwin and the physicist Victor Weisskopf, the report concludes that the prospects of a successful defence are minimal. Trying to develop one, however, would stimulate a new offensive round in the arms race, undermine the 1972 Anti-Ballistic Missile (ABM) Treaty and increase the risk of war.

The conclusions of the study reflect a growing consensus within the Department of Defense (DoD) itself that the president's ambitious objective in his so-called strategic defence initiative — to render nuclear weapons "impotent and obsolete" — is technically unattainable. DoD continues to support the initiative, but now says that although the new system would be useful to blunt a Soviet first-strike, it could not defend the civilian population.

According to the UCS study, the search for perfect protection is doomed from the start, because of the vulnerability of defensive facilities based in space and the absence of weapons that would be proof against Soviet countermeasures. The study predicts that the Soviet reaction to the development of a "star wars" system would include the development of a new generation of missiles, such as submarine-launched cruise missiles that could not be intercepted from space. Existing intercontinental ballistic missiles (ICBMs) would be fitted with more powerful engines, so their boosters would burn out quickly inside the atmosphere, where they would be less vulnerable to attack by X-ray lasers. Cheap decoy boosters without warheads would be deployed to overwhelm any space-based defence. And simple measures would be devised to knock out space-based defensive facilities in advance of a nuclear attack.

The study also dismisses as ineffective many of the technologies upon which a star wars system would have to rely. It says particle beam weapons are the least promising of the potential weapons, because charged particles could not penetrate the atmosphere. Chemical laser weapons would have to be kept in low Earth orbit to be accurate enough, and — thanks to Newton's laws of motion — more than a thousand laser battlestations would be needed to keep a big enough fraction above Soviet silo fields all the time. Nuclear pumped X-ray lasers cannot penetrate the atmosphere, the study says. They could in any case deliver only a light blow from which ICBMs could be easily protected. Excimer lasers are dismissed as a "laboratory curiosity".

Last year's administration report by James Fletcher, former director of the National Aeronautics and Space Administration, maintained that even an imperfect defensive system would help the United States by reducing the confidence with which the Soviet Union could launch a disarming first strike. The UCS panel disagrees. It says a defensive system that posed a serious threat to the "assured destruction" capability of either side would result in a higher proportion of missiles being targeted on cities.

Peter David

Yellow rain

Thai bees' faeces found

Boston

TWO US scientists have reported that there is now direct evidence that South-East Asian "yellow rain", which the US Government claims is a chemical warfare agent sprayed by the Soviet-supported regimes of Laos and Kampuchea, is actually a natural phenomenon — the defecation *en masse* by wild colonies of honeybees. Harvard biochemist and chemical warfare expert Matthew Meselson and entomologist Thomas Seeley of Yale University recently returned from an expedition to Thailand, during which they observed swarms of *Apis*, the true honeybees, making brief but abundant defecation sorties. The faeces come down as sticky yellowish spots up to a few millimetres in diameter which dry to a powder. They say that in composition and appearance they closely resemble samples of yellow rain from Laos that are the primary physical evidence for US allegations against the Soviet Union.

At the Khao Tai National Park in southern Thailand, the researchers say they found a defecation swathe extending as far as 160 metres from trees containing honeybee nests. Vegetation around the nests was covered with as many as 1,200 yellow spots of bee dung per square metre.

The significance of this discovery goes beyond biological observation. Since former Secretary of State Alexander Haig's Berlin speech of September 1981 in which he accused the Soviets of carrying out chemical warfare in South-East Asia, the US Government has maintained that samples of yellow rain collected in Laos provided by Laotian refugees are physical evidence of chemical attacks. These samples apparently contain tiny quantities of fungal toxins called trichothecenes produced by the *Fusarium* genus. This evidence has been a cornerstone of official allegations that the Soviet Union does not live up to the treaties it has signed. Use of chemical weapons would violate the 1925 Geneva Protocol which outlaws the use of chemical arms, and the 1972 Biological Weapons Convention. The US Government's case has been weakened, however, by a growing body of evidence that supports the bee faeces theory.

Meselson believes he has an answer to the question of how tricothecene toxins got into the environmental samples of yellow rain and biochemical samples taken from ill Laotian refugees said to be victims of chemical attack. He notes that the reports of both yellow rain and chemical attacks have almost all occurred during an eight-week period between February and April, at the end of the dry season in tropical Asia. Infestations of *Fusarium* mould in food stocks are a particular problem at the end of the dry season in India, and Meselson says that mouldy sorghum is a problem in Thailand too. He explains the illness among the Laotian refugees and the presence of *Fusarium* toxins as resulting simply from naturally contaminated food.

Meselson and Seeley brought back samples of both faeces and local food supplies to test for mycotoxins. Since there has been considerable dispute over the quantification of mycotoxins in the yellow rain samples tested so far, Meselson intends to improve the methodology by adapting high resolution mass spectrometry to the analysis of tricothecenes.

It is still a mystery why the honeybees carry out the defecation flights. Honeybees in temperate climates are known to make "cleansing runs" on the first warm days of spring to purge themselves of faeces built up during hibernation. The synchronized behaviour of these tropical bees may reflect the presence in the hive of distinct foragers and defenders. When squeezed, defenders turn out to be full of faeces. Foragers are comparatively empty. **Christopher Earl Stephen Budiansky adds:** Last week, the State Department dismissed Meselson's latest findings as irrelevant to the issue of chemical weapons use in South-East Asia. Colonel James Leonard of the State Department said that the bee theory does not explain why mycotoxins were found on three samples that do not contain pollen, and that the US case rests not just on scientific evidence, but on looking at that evidence in "the fullest context" of intelligence data and refugee reports. □