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A Journal devoted to the study of the inter-relation of the  
Christian Revelation and modern research  
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## EDITORIAL

### *The Langhorne Orchard Prize for 1976*

In 1976 The Council of the Victoria Institute is offering a prize of £40 for an essay on any appropriate topic within the general areas of the relation of religion to either science or philosophy. The competition is open to all Fellows, Members and Associates of the Institute but, to encourage young authors to compete, age, if under 25 years, will be taken into account in judging the entries.

Essays should not bear the name of the competitor but should be marked with a motto, or arbitrary five-figure number. They should be accompanied by a sealed envelope marked on the outside with the same motto or number and the words "under 25" or "over 25" (i.e. on 1 May 1976) and containing the name and address of the competitor. Envelopes will not be opened until after a decision has been reached.

Essays to be sent to the Editor, should be typewritten, with double line spacing; the length, apart from documentation, should not exceed about 7000 words. References, either numbered or arranged alphabetically, should appear at the end. The closing date is 1 May 1976.

Generalities and declamation should be avoided. The judges are empowered not to award a prize, to divide a prize, and/or to award a second prize as they see fit. The copyright of winning essays is to belong to the Institute, which will normally permit an author to embody his essay in any more comprehensive work he may afterwards compose. It will be assumed that candidates have assented to the rules by entering for the competition.

*An Apology.* The Editor apologises to those who, after London meetings, have sent comments on what was said. Sometimes it has not been possible to obtain the papers from speakers and sometimes papers have been altered or corrected in such a way as to make the criticisms no longer relevant. However, such comments are always welcome and will be printed in the JOURNAL when this is at all possible.

## News & Views

### MYTH AND AMERICAN HISTORY

1976 marks the bicentary of the Declaration of Independence by the USA which is celebrated annually on 4th July.

In 1835 Strauss's *Leben Jesu* appeared and was translated by George Eliot as *The Life of Jesus*, published in 1837 in two volumes. Strauss did not go so far as to deny that someone called Jesus existed as a historical person but he caused widespread consternation by explaining away many of the NT stories about Him which, he claimed, were late myths invented by the Christian church in order to 'fulfil' OT prophetic passages which were supposed to refer to the Messiah.

In 1840 Theodore Parker, reviewing the third English edition (1839) of Strauss, showed how easy it would be, were a scholar so inclined, to apply the method of Strauss to American history. Because the passage is so little known, we reproduce it here from the *Christian Examiner* (published in Boston), 1840, 28 (July issue), 273-316, (p. 311f).

Mr. Strauss takes the idea, which forms the subject, as he thinks, of a Christian myth, out of the air, and then tells us how the myth itself grew out of that idea. But he does not always prove from history or the nature of things, that the idea existed before the story or the fact was invented. He finds certain opinions, prophecies, and expectations in the Old Testament, and affirms at once these were both the occasion and cause of the later stories, in which they reappear. This method of treatment requires very little ingenuity, on the part of the critic; we could resolve half of Luther's life into a series of myths, which are formed after the model of Paul's history; indeed, this has already been done. Nay, we could dissolve any given historical event in a mythical solution, and then precipitate the "seminal ideas" in their primitive form. We also can change an historical character into a symbol of "universal humanity." The whole history of settlement of New England, for example, we might call a tissue of mythical stories, borrowed in part from the Old Testament; in part from the Apocalypse, and in part from fancy. The British government oppressing the Puritans is the great red dragon of the Revelations, as it is shown, by the national arms, and by the British legend of Saint George and the Dragon. The splendid career of the new people is borrowed from the persecuted woman's poetical history, her dress — "clothed with the sun." The stars said to be in the national banner, are only the crown of twelve stars on the poetic being's head; the perils of the pilgrims in the Mayflower are only the woman's flight on the wings of a great eagle. The war between the two countries is only "the practical application" of the flood which the dragon cast out against the woman, &c. (We borrowed this hint from a sermon heard in childhood, "opening this Scripture," explaining this prophecy, as relating to America.) The story of the Declaration of Independence is liable to many objections, if we examine it *a la mode* Strauss. The congress was held at a mythical town, whose very name is suspicious, — Philadelphia, — Brotherly Love. The date is suspicious; it was the *fourth* day of the *fourth* month, (reckoning from *April*, as it is probable the Heraclidæ, and Scandinavians; possible that the aboriginal Americans, and certain that the Hebrews did.) Now *four* was a sacred number with the Americans; the president was chosen for *four* years; there were *four* departments of affairs; *four* divisions of the political powers, namely, the people, the congress, the executive, and the judiciary, &c. Besides, which is still more incredible, three of the presidents, two of whom, it is alleged signed the declaration, died on the *fourth* of July, and the two latter exactly *fifty* years after they had signed it, and about the *same hour* of the day. The *year* also is suspicious; 1776 is but an ingenious combination of the sacred number, *four*, which is repeated *three* times, and then multiplied by itself to produce the date; thus,

444 x 4 = 1776, Q.E.D. Now dividing the first (444) by the second, (4) we have *Unity* thrice repeated (111.) This is a manifest symbol of the national *oneness*, (likewise represented in the motto, *e pluribus unum*,) and of the national *religion*, of which the Triform Monad, or "Trinity in Unity" and "Unity in Trinity" is the well known sign!! Still farther, the declaration is metaphysical, and presupposes an acquaintance with the transcendental philosophy, on the part of the American people. Now the Kritik of Pure Reason was not published till after the declaration was made. Still farther, the Americans were never, to use the nebulous expressions of the Hegelites, an "idealo-transcendental-and-subjective," but an "objective-and-concretivo-practical" people, to the last degree; therefore a metaphysical document, and most of all a "legal-congressional-metaphysical" document is highly suspicious, if found among them. Besides, Hualteperah, the great historian of Mexico, a neighboring state, never mentions this document; and farther still, if this declaration had been made, and accepted by the whole nation, as it is pretended, then we cannot account for the fact, that the fundamental maxim of that paper, namely, the soul's equality to itself, — "all men are born," &c. &c. was perpetually lost sight of, and a large portion of the people kept in slavery; ... [though] if the history is not mythical, slavery never had a legal existence after 1776, &c. &c.

All of which is both ingenious and charming! One suspects that, were it not for the existence of authentic documents relating to events of the not too long ago, the sceptically minded would not hesitate to go along with the Parker mythological theory!

#### SECULAR PROPHECY

The *Centuries* of Nostradamus (Michel de Notredame, 1503-66) is a work often cited as affording a secular parallel to biblical prophecy (see J.S. Wright, this JOURNAL 1948, 80, 40). For several hundred years this book of quatrains has at no time been out of print, though many falsified versions exist and it has been difficult to assess the prophecies objectively. However a recent excellent edition (edited by Erika Cheetham, *The Prophecies of Nostradamus*, Speakman, 1973, repr. 1974) is now available. It reproduces the original 1568 edition, and provides a literal translation, notes on obscure words, and an admirable account of Nostradamus's life. Each quatrain is also followed by notes suggesting how the prophecy has been or might be interpreted.

Nostradamus, a converted Jew, is a strange character who both in his own life-time and ever since has greatly influenced the world of affairs. His prophecy that Germany would attack France through Switzerland led the French chief-of-Staff to order the making of the

infamous Maginot Line: "Near the great river (Rhine) a great trench, earth excavated..." (IV, 80) "Incredible but true", says Cheetham. In 1939 Frau Gbbels was reading Nostradamus in bed one night and thought that in the word Hisler she recognised Hitler. Much excited, she woke Dr. Gbbels who, shortly afterwards, hired the astrologer Krafft to aid in interpretation. Soon afterwards verses from Nostradamus, prophesying Hitler's victories, were scattered over the countryside in Europe, the last as late as 1943. Not to be outdone the British Secret Service spent £80,000 rewriting Nostradamus in ingenious ways to suggest the opposite conclusion and proceeded to drop the concocted verses over occupied Europe!

Most of the quatrains, as might be expected, read like unintelligible gibberish, but it is easy to pick out phrases which seem startlingly relevant to later history and to our own times, and it is difficult to think that all of these can be coincidences. For example:

- I,63 "Pestilence extinguished... for a long time the lands will be inhabited peacefully. People will travel safely through the sky (over) land and seas: then wars will start up again."
- II,6 "In two cities will be two scourges the like of which have never been seen" (Japanese cites in WW2?)
- III,13 "The fleet travels under water" (Submarines)
- VI, 5 Samarobrin 270 miles above the earth sends disease to the North (germ warfare from space?)
- IX,65 "He will come to take himself to the corner of Luna, where he will be taken and placed on foreign land" (Moon landings?)
- X,100 "A great empire will be for England, the all powerful for more than 300 years" (Surely remarkable! But the final end of the unfortunate Britain seems to be that it will become "the submerged island" of II,22, or perhaps the "tin island of St. George, half sunk", of IX,31)

There are also many possible (probable?) references to Napoleon, Hitler, and other historical personages, to battles, the French Revolution, and so on.

Did Nostradamus possess second sight? Perhaps he did. But it is important to remember that he did not work entirely on his own. He made extensive use of the book *De Mysteriis Egyptorum*, published in Lyons in 1547. (Have any readers information about this?). In addition Cheetham notes the influence of the books of Esdras on

his thinking — for he divides world history into periods of 7,000 years. But, and the point seems to have been largely overlooked by editors, biblical (and no doubt Jewish apocalyptic) writings and prophecies seem to have been incorporated into very many of his verses. Perhaps after his conversion Nostradamus was influenced by the NT too, especially the Book of Revelation. The fact is that though his phraseology is not biblical, the prophecies have much in common with those of the Bible. There are many references to antichrists of which there are to be three in all (Napoleon, Hitler, and one future):

- I,67 After many local famines world famine will follow.  
Also pestilence II,62 (Rev.6)
- III,97 A state of Israel will be established and will triumph over its non-Christian neighbours before the end of the 20th century (the century of the sun).
- II,93 St. Angelo and the Vatican Palace are destroyed by fire (Cf. Rev. 17:16)
- II,41 "The great pontiff changes his abode". The date given (astrologically) for this to happen is about 1986-93. (Some commentators interpret Zech. 5:5-11 to mean that the Papacy will be moved, by air, to Babylon. According to this school of prophecy, the Apocalypse describes the RC church as Babylon mystic but later as connected with Babylon the rebuilt city. This theme is exhaustively treated in R. Govett, pseud. Mattheetes, *The Apocalypse Expounded by Scripture*, Norwich, 4 vol., 1861-5). There are several references to the destruction of "the Great City". Editors, including Cheetham, take this to refer to New York. But why not "Babylon, the great city", Rev. 18:21?

Nostradamus puts the final Coming at about 2000 AD for which there is some (admittedly very slender!) biblical support. We know that this view was widely held by Christians in past centuries, e.g. by Newton in the following century.

Erika Cheetham thinks that Nostradamus had prophetic visions and that he often struggled to describe what he saw but did not understand. The evidence does seem to point in this direction, even if some of the prophecies were derived from the writings of others.

In connection with the book of Revelation, Dr. G.R. Beasley Murray's recently published commentary (*The Book of Revelation*, Oliphants, 1974) is helpful. It gives abundant references and quotations to parallels between John's imagery and that of the



extensive apocalyptic literature of his time. Directly or indirectly a good deal of this literature may have influenced Nostradamus, reaching him through Jewish sources. All in all it is difficult to regard Nostradamus's prophecies as secular, even if we cannot pin all of them down to their religious sources.

#### WOOD

Erosion and pollution figure increasingly in the news. We are learning that the world is running short of one commodity after another. The *World Watch Institute* of USA have now drawn attention to yet another shortage which has been largely overlooked hitherto, the shortage of wood. (*Science* 1975, 190, 36)

It appears that one third of the world depends upon wood for heating and/or cooking while one half of the wood harvested throughout the world is used for these purposes. But the rise in world population is out-pacing the growth of new trees. This leads to deforestation, with consequent erosion, and an ever-rising price of wood. Where money cannot be found in the third world dung is taking over as a substitute fuel, which is therefore lost as fertiliser. The 'firewood crisis' is at its most serious level in semi-arid areas especially Africa and India, but no part of the third world is exempt. The obvious remedy would be tree planting on a gigantic scale but there is little prospect of this being done.

The timber industry also makes serious inroads. In recent years the northern provinces of India, from Kashmir to Burma have been increasingly exploited.

Anil Agarwal, Science correspondent of the Indian Express, New Delhi, wrote a moving article on the subject for the *New Scientist* (14 Aug. 1975, p.386). The peoples who live in the Himalayan foothills have suffered greatly. Deprived of its lush forest covering the land erodes, and landslides are common. The annihilation of one entire village together with several bus loads of tourists led, in 1973, to the beginnings of a new movement, the Chipko Movement, started by a villager who argued "a mother saves her child from the tiger by hugging the child to her breast to take upon herself the wrath of the tiger." Whereupon the people of his village decided that the trees were their children and, after they had been felled, doggedly hugged them so that removal by the contractors was impossible. The contractors surfaced again 20 miles away, but the inhabitants of the first village marched to the spot, gaining more adherents as they went, and again prevented the contractors from removing their spoil. At last the state government of Uttar Pradesh took note.

The movement is spreading, but much harm has been done. Vast floods have been caused in the lowlands, bridges have been destroyed and irrigation interfered with by the silting up of waterways.

## SLAVERY

In a recent review (this VOLUME, p.108) attention was drawn to Stanley Milgram's experiments on conscience v. authority (*Obedience to Authority*, Tavistock, 1974, £2.50). Milgram made the horrifying discovery that most people, when ordered to do so by a legitimate authority, are prepared to behave in ways which they would at once condemn in others.

A rather similar situation is revealed in Roger Anstey's recent book on slavery (*The Atlantic Slave Trade and British Abolition 1760-1810* Macmillan £10.00). Until recently it was commonly assumed that slave traders, merely because they were slave traders, must have been unusually cruel men, who, because of the vast profits dangled before them, were prepared to steal, torture and sell their fellow human beings into life-long slavery.

Anstey has made a careful study of the trade covering the half century when it was at its height. In all, rather fewer than 4m slaves were transported (1.5m by Britain), about 10% dying in the passage and the price obtained averaged about £30 rising to £60 a head over the period. The profits obtained by the city men who invested in the slave ships averaged about 10%. Profitability in the Dutch and French trade was less. Vastly greater profits were made in many industries at the time and although slave labour in the New World was important to England, the slave trade as such provided negligible wealth for financing new investment.

Then what, if not profitability, kept the owners of slave ships and their crews in business? We are led, says Anstey, to "the frightening awareness that most of those involved in the slave trade saw their involvement as an 'honourable' and even 'genteel' pursuit" (p.403), and so continued their activities without concern. Men were told to carry on and expected to do so and that was enough.

*Inter alia* Anstey produces evidence against the Marxist thesis that slavery was only abolished when and because it had ceased to be profitable. The final abolition of the trade did not, in fact, coincide with a fall in profitability: it was the fruition of arduous work by Quakers and more effectively, of the evangelical Clapham Sect.

## TESTIMONY - THE MONSTER

The monster of Loch Ness never fails to interest. Two recent books, N. Witchell, *The Loch Ness Story*, 1974 and Peter Costello, *In Search of Lake Monsters* 1974 deal with the subject: a bibliography by J.M. Whyte has also appeared. Earlier sonar pictures together with recent photographs obtained by flash photography by a camera 40 feet below the surface of the murky water seem to provide fairly convincing evidence of the existence of an unknown species in the loch and the name *Messiteras rhombopteryx* is proposed for the beast, should its existence be finally established. (*Nature*, 258 466)

Nicholas Fairbairn thinks he has discovered that this Latin name is, in fact, an anagram of "Monster Hoax by Sir Peter S(cott)" (*Times*, 18 Dec. 1975) and suspects that Sir Peter is determined not to be fooled. However, in a later letter to the *Times* (30 Dec.) Sir Peter discards all the objections to the creature's existence, earlier outlined by Adrian Desmond (article, *Times*, 27 Dec.) He cites the case of "one Scottish landowner who had for long disbelieved and laughed at Nessie" but who had "watched one with his daughter for 45 minutes on a very calm December day through a stalking glass. He wrote afterwards "I have always laughed at those who were deluded enough to imagine they were looking at the monster. Now there is only one thing I can do: laugh at myself."

As Sir Peter points out, it is a case of whether to believe otherwise reliable eye-witnesses or whether to take too seriously the list of scientific difficulties which make Nessie seem improbable. In this respect the case is not unlike that of our Lord's resurrection. Scientifically it seems improbable (if this is a meaningful statement) but eye-witnesses testified to its truth.

## WAR

Nuclear war is never long out of the news. Bernard Feld has recently told of his experiences in assisting in the making of the first bombs (*New Scientist*, 24 July 1975 p.288) "There was a mesmeric quality about the bomb" he says. Neither he nor those he met in those days seemed able to stop and think what they were doing. "We were caught up in this activity, which was all consuming. Nobody worked less than 15, 16 and 17 hours a day... Hiroshima came up and everyone thought that was great. It's paid off". But the news of the second bomb, while Japan was already suing for peace "struck me like a cold shower".

Today some look back with nostalgia. The bomb, was justified, and showed the way science could be done. Others, Feld among them, feel "rather involved with the original sin" and think some atonement is called for. Feld now attends Pugwash meetings.

"The mesmeric quality about the bomb" extends to the political field. Nations continue to pile up nuclear weapons though well aware of the madness of so doing. SIPRI (Stockholm International Peace Research Institute) warns us that, on average, a new member is added to the nuclear club every five years but warnings fall on deaf ears (*New Scientist* 13 Nov. 1975 p.371). In informed quarters everywhere pessimism reigns. Politicians and military men cannot bring themselves to stop and think what they are doing.

Much has been written about the damage done to the people of Vietnam by the recent fighting. Now that the war is over there is an upsurge of liver cancer over the entire country. In efforts to deny vegetation coverage and food to guerrillas the USA dropped 100 million pounds of insecticides. It now transpires that one of these (245T) contained as impurity a trace of TCDD (2,3,7,8-tetra-chlorodibenzodioxin) a few parts of which per thousand million causes malformation in new-born rats and chromosomal malformation in mammals and plants. It is possibly the cause of the cancers. Its persistence is not known but it is not less than a few years. A quarter of the dense upland forests and a third of the coastal mangroves were sprayed. There is a possibility that the damage done by this chemical alone will be long lasting. (*Nature* 258, 2; cf. Rev.11:18)

Attention has been drawn once more to the appalling destructiveness of, even conventional, war. In South Vietnam alone the USA dropped 11 million bombs and fired 217 million shells, using in all some 7 million tonnes of high explosive. This is equivalent to one Hiroshima-sized bomb every five days throughout the 7-year period 1965-73. (*New Scientist* 1 Jan. 1976 p8)

## KORAN AND SCIENCE

A recent book by J.J.G. Jansen (*The Interpretation of the Koran in Modern Egypt*, Brill, Leiden, 1974) is of Christian interest. In Egypt, and elsewhere in the Moslem world, it appears, considerable numbers of commentaries on the sacred book, dictated by God to Mohammed, are to be found in bookshops. As with Christian commentaries on the Bible, three types of interpretation are offered.

(1) Many commentators seek to bring to life the times of the Prophet in the hope that this will help to explain obscure passages.  
 (2) Others apply the teaching of the Koran to our contemporary world, both political and moral.  
 (3) A third group, discussed in

detail by Jansen in Chapter 3, follows the method of scientific exegesis now well-established in the Moslem World.

The Bible claims authorship by (inspired) men (Matthew, Mark, Luke etc.) but the Koran is said to have had no human author. It is a replica, in part or whole, of the Book in heaven, communicated to the Prophet.

Two verses in the Koran set the stance for scientific exegesis: "We have not let anything slip in the Book", and, "We have sent down to thee the Book as an explanation of everything". Therefore, so it is argued, no facts of science have been missed and the Book contains all modern scientific theories and explanations. Some Muslim scholars say this is a "stupid heresy". One writes, "... Another disease has smitten them [Moslems]: they want to elucidate the Koran in accordance with scientific theories that may or may not prove to be true... this is a great danger... these theories are not fit to be drawn into the explanation of the Koran" (p.78). To the claim that what is said of the Book must be true because the Koran cannot err, some believers in scientific exegesis answer that the whole Book was not communicated. The parts that contain the science are still in heaven.

Despite the labours and ingenuity of the authors concerned, the working out of scientific exegesis proves quite difficult. The Koran states that *Ginn* are "invisible beings, either harmful or helpful, that interfere with the lives of mortals" — a clear statement, we are told, that the Koran shows knowledge of microbes. Strange philological inferences support the general thesis. "He is it who hath appointed for you the stars that you may guide yourselves" brings the comment that planets are not mentioned because their light is only reflected even though Arabic words do not clearly distinguish stars from planets. "He is it who has created the night and the day, the sun and the moon, each in an orbit hastening on (lit 'swimming')" brings the comment that since night and day cannot hasten, earth and stars are intended and this implies a modern cosmology (Hanaff Ahmad). The passage in fact merely says that sun and moon are seen to swim across the surface of the sky like swimmers on the surface of water.

Another exegete, in equally quaint ways, finds allusions in the Koran to aeroplanes, artificial satellites, interplanetary travel and the hydrogen bomb (p.50). But increasingly the Egyptians stress the compromise formula that the Koran is not a scientific text-book although its truthfulness is miraculous.

In many ways the Koran is treated by the Arabs in the same way as the Bible is treated by Christians. But in the scientific field, at least, the Christian exegete has an easier time of it than the Arab. However, seeing that Mohammed benefitted by both Jewish and

Christian influences, it is surprising that the Koran's does not fare better.

### NATIONALISM

"Look at the fig tree, and all the trees; as soon as they come out in leaf, you see for yourselves and know that the summer is already near. So also, when you see these things taking place, you know that the Kingdom of God is near" (Lk. 21:29f), or "... that he is near, at the very gates" (Mt.24:32; Mk.13:29) The fig tree here appears to be a symbol of the Jewish nation (Cf. Mt.21:19f) and in the OT trees in general are often used (e.g. in Ezekiel) as symbols of nations. A recent article by Bryan Magee ("Why Marxism is being left behind, *Times* 13 Oct. 75) analyses present tactics of Marxists throughout the world. The Marxists have learned the lesson that nowhere are the masses enthusiastic about communism. Magee asked two communists to explain how communism proves so successful in view of this fact and "both replied, in effect, that communism had been, and would continue to be, successful only when concealed under the cloak of nationalism ... All Marxist leaders who have been swept into power by their own people have proclaimed the chief aim of their struggle to be not the establishment of communism but the liberation of their country from foreign domination. That was the cause that inflamed the masses and roused them to fight." But among the rank and file communism is not understood and arouses no enthusiasm.

### PAIN

Some pain killing drugs are incredibly potent: the drug etorphine acts in doses smaller even than LSD. Unfortunately all are addicting: hence the stringent laws for the sale of morphine, our best known pain killer.

What happens to an opiate drug after it is taken? Radioactively "labelled" opiates are found to settle along the pain pathways in the brain where they can be completely displaced by opiate antagonists. It seems clear therefore that pain-killers get caught when they come near specific molecular receptors which are present at a pain centre, or pathway to such a centre, in the brain. But were these molecular mouse-traps intended to catch opiate molecules created (or evolved?) for the purpose of reacting with poppy seed? This scarcely seems probable. The wonderfully effective traps must surely be intended to trap molecules normally present in the brain. This is suggested, too, by the fact that a few individuals cannot feel pain at all.

Presumably their brains make unusually large amounts of a chemical which acts like morphine. Similarly, in moments of danger (e.g. Livingstone bitten by a lion) pain is killed. What chemical does the brain contain which might act in this way? A good many kinds of molecules are known to exist in the brain but trials show that none of them reacts like morphine. It follows that an unknown opiate or pain-killer, must be present, or be capable of being formed, in the brain.

So, at least, it was argued. And for some time teams of workers have been hunting the pain-killer which, since it must be present in the brain, has been named *enkephalin* (lit. in the brain). The race to identify it has now been won by Dr John Hughes and his co-workers at Aberdeen, with the help of others.

It turns out that there are two pain killers, both simple 5-unit polypeptides (H-tyrosine-glycine-glycine-phenylalanine and then either methionine-OH or leucine-OH). They were isolated from the brains of animals. This proved possible because if, for example, the intestine of a guinea-pig is given an electric shock it contracts, but morphine stops the contraction. This useful property of opiates made it possible to concentrate the morphine-like factor in brain fluids and finally to obtain enkephalins in the pure state. The two enkephalins have since been synthesised and the synthetic products, more active than morphine (especially the methionine one), behave as anticipated. It seems there is a real hope, at long last, of finding a powerful non-addicting pain-killer. But it may be a little while before enkephalins can be used clinically. For one thing there are many enzymes in the body which would break up simple polypeptides of this kind, so that a pill containing the material which entered the stomach would not affect the brain. Morphine is a much more stable material. (References:- S. H. Synder, *Nature* 257, 185; J. Hughes *et al*, 258, 567, 577-579. Articles in *New Scientist* etc.)

This wonderful discovery raises interesting questions. Why do opiates exist? It is difficult to conceive of any Darwinian natural selection advantage in providing a mechanism which may save a badly wounded animal or man from suffering. Why not let him suffer?, especially if his wound will kill him any way? Pain, we know, is essential to the higher forms of life. Without it we should not take sufficient care of our bodies to ensure survival. The man with a burnt hand would go on using it till it became infected. But severe pain is in a different category. Beyond a certain intensity pain serves no useful purpose. But alleviating such pain will not help to increase the number of children a man can have. So what is the point of providing a mechanism which, even if it does not always work, can produce an opiate? Here we seem to have an argument for Providence. The mechanism is there right enough: if the brain functions as it apparently ought to function, severe pain would be impossible.

Again, why does the mechanism so often fail? Does this raise a theological problem? Is it just possible that higher animals, unlike man, do not suffer extremes of pain?

### DISASTER SYNDROME

In an interesting book (*Disaster and the Millennium*, Yale UP, 1974) Michael Barkun draws attention to the "compulsive need to glue oneself to television and thus vicariously take part in the events" of the day. In the National Opinion Center study after the murder of John F. Kennedy people were asked to compare their feelings with those experienced after some past event. Of those who could think of such an occasion (47% of those interviewed), the majority referred to the death of a parent, close friend or other relative. After Kennedy's death feelings of extreme nervousness and tension were widespread and over the following few days until the funeral clinical symptoms were common: headaches, upset stomach, rapid heartbeat, some memory loss, etc. The symptoms were those of the typical "disaster syndrome", "yet they occurred in millions of people whose only contact with the events in question was prolonged exposure to the media... For television appears to have the potential of inducing a feeling of disaster impact in people remote from the source of disturbance and whose physical and social world remains otherwise intact" (p.204f).

The author goes on to discuss deliberate creations of the disaster syndrome as has happened in China, Russia and elsewhere.

Disaster creates the feeling that the past is done and gone: there is a chance now to build a new order. "The slate will be clean." But after a time those who wallow in disaster and revolution, of which the psychology is the same, wake up to the fact that the old has not been completely destroyed. Evil remains. People have been inefficient in destroying it and must try again. At this point it seems to them that ultimates are at stake. Ruthless methods are rationalised: they will be necessary for this once only to make sure that the revolution has not been for nothing. And then of course it all starts again. Once more the slate is not quite clean... once more the ruthless methods... persecution, purges, torture, prison camps....

In past history the syndrome was often linked with millenarianism. Today it is with us in communism, fascism and terrorism. The psychology is the same.



## HERESY HUNTING

The history of the Christian Church, looked at from the worst angle, is the story of one persecution following another. Men who were devout Christians had only to think for themselves and come, perhaps, to a view diverging slightly (in verbal form at any rate) from those of the established church, to be looked at askance, excommunicated, and often killed. Our Lord founded His church on the belief that He was the Messiah, the Son of God. No other foundation was ever laid. According to the NT the believer is under obligation to receive other Christians, *because* they are Christians, with open arms but "not to doubtful disputations". But Christians like those at Corinth in Paul's time have been adding other conditions to church membership ever since, and cold-shouldering or even persecuting those who differ on details.

To the Victorian sceptic science offered a way by which man could live at peace. Science was to be founded on truth, on ascertainable fact. So long as his attitude was empirical, one scientist would accept another. There was to be no heresy hunting.

Today we are seeing science failing in precisely the same way as the church failed. In the scientific press, recently, there has been much acrimonious discussion in connection with John Taylor's tentative acceptance of the power of Uri Geller and also many children to bend metal by thought. His critics turn on him for being too credulous. Though an able and well known physicist, there is no doubt that his reputation has suffered.

In another connection a writer in *The New Scientist* (4 Sept. 1975, p.568) asks: "Is there any other profession where personal reputations are as fragile as they are in science? Let a scientist utter an incautious statement or embrace too warmly an unfashionable idea and the hatchets emerge, newly honed. The ambitious young are haunted by fear all the way up the ladder and even at the top, though laden with honours, men must still be wary lest a whispering campaign implying senility — the raised eyebrow, the tight smile when the august name crops up in conversation — be mounted in the sacred name of truth.

The point is illustrated with reference to the late Dr James MacDonald, an American physicist, whose story has recently been told by Professor David Michael Jacobs in *The UFO Controversy in America* (Indiana University and London, £6.90). The book recounts the reactions of orthodox science to the alleged UFOs. After ten years of meticulous study, MacDonald started to talk about his conclusions, travelling around the States lecturing. In 1971 his opinion was sought in high circles on the possible dangers of supersonic flight. He argued that there might be some ozone reduction

but only if such flights became numerous. Then a congressman brought up the matter of his interest in UFOs as a red herring, attributing to him what he had not said. Despite his able reply and the support of friends, the damage had been done. A little more silly heresy-hunting of the newspaper variety and MacDonald found himself in a position where he could do no more scientific work. In despair he committed suicide in June 1971.

### SHORT NOTES

*Sir Alister Hardy*, in his latest book, *The Biology of God: a Scientist's Study of Man the Religious Animal* (1975, Cape, £4.50) seemingly accepts all the explanations of religion offered by materialists — evolution, for example, requires gestures of submission so that we feel happy in kneeling to say the Lord's Prayer. The Reviewer in *Nature* (258, 30) takes Hardy to be a pantheist, and much too gentle-natured at that. If Monod is wrong, he remarks, he should be criticised, "not combed for sympathetic quotation". A little asperity, at the very least, is needed in a fight between truth and falsehood.

*Morals and Mammon.* The recent controversy occasioned by Dr. Mervyn Stockwood's article in the *Morning Star* in which he criticised the appeal to the nation made by the Archbishop of Canterbury, elicited *inter alia* one very interesting letter in the *Times* (6 Nov. 1975). It is written by W. H. Gore of Hull who has lived and worked with people at all social and economic levels in many parts of the world. "I have never found anywhere", he says "that high moral values are the prerequisite of any particular social or economic level. I have found many men, women and children, in every level possessing high moral values and living on, what could only be termed, a high moral plane, as well as some, in each level, who did not even understand morality. The proportion of one with the other does not appear to vary with the varying social and economic levels".

*Red Shift* The quasars, discovered in 1963, are star-like objects which emit both in the visible and radio wave-lengths, but the spectral lines of the elements they contain are shifted towards the red end of the spectrum. It has usually been assumed that this is due to the Doppler effect, that is to the recession of the objects away from the observer. But the red shifts of astronomy are some-

times so large that attempts are often made to explain them in a different way. Can they be caused by gravitational fields? 3 C 48 is one of the earliest known quasars: it has a red shift of 0.368 (a good deal smaller than that of many quasars discovered more recently.) Around this quasar there is a diffuse nebula and it has now proved possible to examine its spectrum in detail. Its red shift turns out to have much the same value (0.369) as the central quasar. If red shifts are caused by gravitational effects the nebula should show the higher value, as the gravitational field must be much smaller out in space far away from the quasar. This strongly supports the view that red shifts are cosmological and cannot be otherwise explained, which fits in with the "big bang" theory of the origin of the universe, but not with the steady state view which has now, also, been discredited in other ways. (*Astrophysical Jour.*, 1975, 198, L49)

*Archaeology* The newspapers (e.g. *Sunday Times* 2 Nov. 75) report that, according to an Anglo-American Archaeological team, a ruined palace on a rock outcrop near a village called Shimal on the peninsular which juts out into the Strait of Hormaz (Joining the Gulf of Oman to the Persian Gulf) may, in fact, be the palace of the biblical Queen of Sheba. Excavations are to start soon both at the palace and the surrounding area. Perhaps some of Solomon's gifts to the Queen will be unearthed!

*Homing of Birds.* The homing of birds has often appealed to Jews and Christians as an instance of a phenomenon illustrating faith in the religious life (Cf. Jer. 8:7):

How do the birds do it? The subject is as baffling as ever. It is known that birds can establish four kinds of maps in their brains. (1) A map of the local area; (2) a map, picture or conception of where the sun ought to be and of how it ought to move across the sky; (3) a picture of the pattern of stars in the night sky and (4) some notion of the direction and/or tilt of the earth's magnetic field (though no one as yet has any idea how birds can detect so weak a field). The last mentioned methods are only used when the orthodox way, that of recognising the local landscape, fails. Now P. Pupi, working at Pisa, has shown that his pigeons can remember smells coming towards the home loft from different directions and can use this information to help them find their way. At Cornell, however, the work could not be repeated. It seems unlikely that this method could be of any use over great distances. (*Nature*, 257, 368).

Alfred M. Worden, command module pilot of the Apollo 15 lunar mission has now left NASA and joined High Flight Foundation (the Christian Evangelical Organization in Colorado Springs), James Irwin, commander of the same mission, heads HFF, (*Science* 1975, 190 37).

## CREATION

"In the beginning", long before all worlds  
 Or flaming stars or whirling galaxies,  
 Before that first "big bang", if such it was,  
 Or earlier contraction; back and back  
 Beyond all time or co-related space  
 And all that is and all that ever was  
 And all that yet will be; Source of the whole,  
 "In the beginning was the Word" of God.

The Word of God; Reason, Design and Form,  
 Intelligence, Whose workshop spans the stars  
 Expressed within the Cosmos and alike  
 In what seems chaos; He Who works as much  
 In randomness as order, Who to make  
 Man in His image scorns not to create  
 By patient evolution on a scale  
 Of craft divine which dwarfs a million years.

Who is this God, that bows Himself to see  
 The puny wonders of this little speck  
 Of cosmic dust that we have named our Earth,  
 The toy volcanoes and the restless sea  
 That splashes from His bucket like a drop  
 And still a captive to the circling Moon  
 Flows and recedes, purging polluted shores  
 Or sending tidal torrents up the Severn?

Who is this God, that circles either pole  
 With fluorescent light - an arctic dawn,  
 Whose rain makes little sparks and tiny cracks  
 That we call thunder storms, this God Whose plan  
 So shapes the atoms that they must combine  
 To give dust life and then to feed that dust  
 With inorganic substance to create  
 By DNA a pattern like its own?

Who is this God and can this God be known  
 Within the confines of a human skull,  
 A litre and a half of mortal brain  
 Whose interlinking neurones must depend  
 On chemistry and physics in the end  
 For all that Man can know or comprehend?  
 Can Man know God eternally enthroned  
 Throughout all space and in the great beyond?

The mystery of being, still unsolved  
By all our science and philosophy,  
Fills me with breathless wonder, and the God  
From Whom it all continually proceeds  
Calls forth my worship and shall worship have.  
But love in incarnation draws my soul  
To humble adoration of a Babe;  
"In this was manifest the love of God".

Still Jesus comes to those who seek for God  
And still He answers as He did of old,  
"I've been with you so long, how can you say  
'I don't know God, oh show me God today?'  
When you've met Me you've seen the eternal God  
Met Him as Father too, as He Who cares  
And loves and longs for men as I myself.  
I am the Christian message. God has come."

ROBERT L.F. BOYD

E. DAVID COOK

## Theological Aspects of Ecology

In this paper, based on that recently given at the VI Symposium on Ecology, Dr. Cook, assuming the validity of the Christian position, attempts to outline and clarify some of the ecological implications of Christianity.

"Eco-crisis", "Eco-catastrophe", "Eco-politics" and a host of freshly coined words suggest that the obvious title for this paper ought to be "Theo-ecology" or "Eco-theology". Such a lurid title would be entirely in keeping with the tone of much of the current ecological debate, especially at the fringes. Some commentators write of a new form of Armageddon — a battle for the salvation of life itself. They prophesy a Doomsday, catalogue cosmic catastrophes, and portray a purely secular apocalyptic based on a vivid account of a future ruined by technology.

In the past the *eschaton*, the culmination of history, has usually been presented from the theological angle. But today, perhaps, we are beginning to see a link, though still a tenuous one, between the modern study of ecology and the older study of theology. Both historically and in order of importance, however, theology takes priority, as the organisers of this Symposium have realised since they arranged for this paper to be presented first.

The more one listens to the ecological debate, the more confusing it becomes. Scientists, economists and politicians disagree among and between themselves. While there are many important differences among those who are professionally interested in ecology, this must not obscure a wide measure of agreement concerning the existence of the problem now facing mankind. Differences, though important, often arise from different ways of looking at the same things. In particular there are often fundamental differences in the assumptions made about man, nature, values and society.

Technologists are often basically optimistic. They believe that given time, effort and finance, technology can solve its own problems and set its house in order. Many scientists on the other hand are avowedly pessimistic. Things have gone too far, the disease is too far advanced, the treatment too palliative, they say.

The area of debate is conducted at the level of how a solution is to be found, if indeed it *can* be found. For the Christian, the need is not so much to find out how problems can be solved, as to understand why they matter at all. What we do is always deeply influenced by why we are doing it. Our task, then, is to clarify the presuppositions and assumptions which underlie the environmental debate and to seek to expound Christian categories as a basis for action. Definitions and descriptions of ecology and the environmental crisis must be left to those more competent. The theologian may not be able to say everything, but this must not deter him from saying *something*.

In this paper I propose, (1) to comment on the nature and content of the ecological crisis; (2) to discuss the current widespread view which blames Christianity for our present ecological predicament; (3) to outline the Christian position with reference to creation and the doctrine of man and, finally (4) taking one ecological argument by way of illustration, to compare Christian with non-Christian approaches to ecology.

### 1. *The Ecological Crisis*

Environmental problems are not new as a glance at the parliamentary legislation of the nineteenth century will readily prove. But the unique factors facing us today are (1) The concatenation of the problems facing us and their severity. There are too many people occupying too much space, consuming too much of the earth's resources and that too rapidly. It may be fairly said that we are running out of world: our planet is all too finite. (2) Environmental problems are now universal. We are all involved, whether we realise it or not, a fact which has led to the appropriation by ecologists of Eldridge Cleaver's aphorism. "If you are not part of the solution, then it must be that you are part of the problem." (3) The almost incredible level of disagreement, even among experts, is also a unique feature of today. Scientists disagree over the long and short-term effects of what man does, the adequacy of technical achievements and the possibility of future discoveries. All too often Voltaire seems to have captured the situation: "We put drugs of which we know little into bodies of which we know less, to cure diseases of which we know nothing at all."

A feeling that mankind has been, or will shortly be, overtaken by catastrophe is now astonishingly widespread. It has gained a focus in the model of a space-ship Earth surrounded by a hostile environment and thrown back on its own resources to secure the continuance of the well-being, indeed the life, of its voyagers. If six people are trying to live in a spaceship designed for only three, then all six are in danger. The environmental issue is not

simply one of quality of life: it reduces to a question of survival.

A cautionary note will not be out of place here. The danger of concentrating on the symptoms rather than the causes of the disease is that we soon find ourselves treating the symptoms rather than the disease itself. Has the ecological crisis been correctly diagnosed at the level of causes rather than symptoms? we may ask. We need to answer this question before we can formulate a call for action.

Action based on a knowledge of ecology may be based on selfishness or on principle. It can be argued that technology is harmful because it encourages man to use up non-renewable resources. This is quite different from arguing that because a certain ecological attitude is right in principle, we ought to act in a particular way. Selfishness may hide behind an apparent moral concern for ecology, while necessity, rather than principle, may be the true motive for action.

Returning to our model, the space ship Earth is divided into first and third class compartments. First-class passengers have the best of food and material comforts, while third class travellers lack even the basics of life. We need to ask whether the concern about ecology shown by first-class passengers hides a subtle conspiracy to prevent the third-class passengers from attaining the standard of living of their more fortunate brother astronauts. Environmentalists, in their enthusiasm for their just cause, have no right to be blind to the social problems of poverty and malnutrition.

Words acquire an evaluative flavour. 'Ecology' is essentially concerned with the balance achieved by living things and systems, but the fact is that it has now become an emotive concept which tends to endear it to all.

In much of our thinking on moral issues the descriptive and the evaluative become tangled together. Man looks at nature through coloured spectacles: his presuppositions influence both what he expects nature to be like and his subsequent reactions. What people do about their ecology, depends upon what they think about themselves, their society, economics, technology and religion.

## 2. *Is Christianity to Blame?*

A recurrent theme in the discussion of the background of the ecological crisis is that of the role and influence of Christianity. In particular, the relation between Christianity and technology has been the subject of much debate. The case against Christianity is simple. In Genesis, man was commanded to be fruitful and multiply.



This has led to a population crisis which threatens to destroy not only our quality of life, but life itself. Man was further commanded by God to subdue the earth and to have dominion over nature, which is interpreted to mean that nature exists only to serve man, its master, and has no value apart from man. Man being above nature has an unqualified right of dominion over it. This doctrine, we are told, is none other than a charter for man to exploit nature without limit: its impact being seen most clearly in modern technology. In this area man forces nature to meet his ever-growing demands. So the current pollution and resources crisis is the result of Christian based, technological exploitation and abuse. The Bible gave to man the perfect excuse to behave as he wished in technological pursuits: the blame rests fairly and squarely on Christianity.

A further aspect of the alleged insidious influence of Christianity is the impact of the Protestant Work Ethic which teaches that it is morally right to strive and to succeed. Success is a sign of God's blessing and approval. Material blessing reveals spiritual achievement. As a result, economic systems have been geared to growth and development along the lines of capitalistic philosophy. More equals better. Now there is no more. There is not even enough. Accordingly Christianity must take the blame for the over-use of precious and limited resources, which mortgages not only the future, but also the present.<sup>1</sup>

This attack on Christianity can be examined at two levels. Firstly, it is desirable to examine the validity of the argument in a wider context than simply the Bible - or rather, a few isolated texts in the Bible. Secondly, we need to examine again the biblical picture of man and his relation to nature.

Firstly, then, it needs to be said that the above argument indicting Christianity is deceptively simple and in danger of being simplistic. The relationship between religion and the applications of science is more complex than suggested. The historical and cultural development of technology may be ascribed to many factors rather than to one simple cause. We must exercise care when we use terms such as 'science', 'technology' and 'religion', for these general headings cover a multitude of different approaches and connotations. The nature of cause and effect in history is difficult to define. The same is true of the relation between culture and religion. The critic implies that the influence of Christianity on scientific culture has been one-way traffic. It is as likely that culture perverts religion as the reverse.

There is something faintly amusing about the recent criticism of Christianity when we contrast it with a different, though equally stringent attack. T.S. Derr expresses this aptly.

Once Christian Theology was blamed by the humanists for robbing man of his autonomous rationality and creative powers by subjecting him to the rule of an omnipotent God. But now we are told Christianity has all along been too anthropocentric and has fostered man's pride where he should have humbled himself before the awesome power of the universe. Once Christian theology was called the enemy of science, a backward-looking, static world-view that fought the theories of Galileo and Darwin and resisted free enquiry and social and technical innovation. But now we are told Christianity has all along been promoting the scientific and technological mentality, heedless of the eternal holiness and ageless rhythms of the natural world.<sup>2</sup>

If we accept the validity of the new attack on Christianity, we may well come round full circle, in position, opting for the very obscurantism and blind rejection of modern science and technology, which humanists once held as the major charge against the Church.

Even if it be granted that the anti-Christian argument outlined above is more correct than the old picture of Christianity as the enemy of science, it may be questioned whether the new attack can be sustained. Ecological mismanagement is not a feature of Christian countries only. Many examples cited in ecological writings illustrate the universal and historical aspects of the crisis in terms of grazing, de-forestation, and the like. Japan, though deeply imbued with the nature worship of Shintoism, has an industrial pollution problem the envy of none. It is not only the case that there are ecological problems where Christian influence is of little significance, but also that technology has developed in cultures other than Christian. The history of China, Greece, Rome and the Islamic nations reveals a solid body of technological expertise independent of Christianity. Christianity itself in any relationship with technology has been far from monochrome in its impact. The Eastern Orthodox stress on mysticism encouraged few major scientific or technological developments. Accordingly Christianity does not always lead to technological abuse. Technology is not entirely based on Christianity as is suggested.

It is worth noting that in this modern criticism of Christianity there is, at least implicitly, a criticism of science and technology. It is science and technology which first drew our attention to ecological problems and it is doubtful if we can hope to solve these problems without their aid. Their assistance is certainly necessary, even if it is not sufficient. Without scientific expertise, we would not even know about dangerous levels of mercury in fish, or how to measure the lack of protein in a diet.

A puzzling feature of this attack on Christianity is that it is so hard to identify the butt of the criticism. Blame usually leads

to reformation, correction, punishment and change. It is difficult to see how we can undo what has been done — if it has been done. How are we to judge whether what was done was accidental or the result of negligence or ignorance? And if we can do so, what follows? Emphasis on some kind of witch-hunt obscures the more serious issues and the need for action. The subject is too serious for recriminations; nevertheless the critique does have the positive value of driving us back to consider the basics.

A second and different level of response is to consider whether the criticism is fair to Christianity. The Bible tells man to exercise control over nature but that is not the same as domination. Christianity makes no claim that man has an unqualified right of dominion over nature, only that he has the right of dominion and even this is severely qualified. We may admit that all too often Christians themselves have misinterpreted what they believe, with the result that the environment has been abused. This is not, however, to level the charge of error against the Christian faith, which, as we shall shortly see, engenders a most wholesome ecological approach. There is all too often a gap between Christian theory and practice.

Returning to the Protestant Work Ethic, one point needs to be stressed. Though it is true that worldly success has sometimes been interpreted as a sign of divine election, it is also the case that one entire book of the Bible, the book of Job, is written to show the inadequacy of such a view. And even if the view were true, there is a marked hiatus between an admonition extolling the virtues of sobriety and hard work and an identification of this way of life with greed, selfishness, irresponsible capitalism and the spoilage of the environment. Informed discussion and good evidence would be required to bridge this gap, but neither seem to be forthcoming.

### 3. *Ecology is a Category of Creation*

The interest shown by Christians in ecology and environmental issues arises in part, of course, from their shared concern with the tremendous problems now confronting mankind, but still more from their belief in God as Creator. For it is primarily this belief which, for the Christian, makes ecology an issue.

"In the beginning, God..." sets the context for the creation. God is there before its beginning and both the priority of God over creation and the dependence of creation on God is expressed in the very first verse of the Bible. The biblical view is that the natural realm is a created entirety; has value in itself because it is created, is part of history, and is of concern to the Christian.

*The natural realm is created.* God created the heavens, the earth, animal life, and man. God made them all. The natural realm is therefore dependent as to its origin and source on the Person of God. This is why it matters whether or not creation is *ex nihilo*. God's creation of everything out of nothing means that matter has no existence independent of God and that it is dependent on Him. It also has purpose and meaning. To ask why there is a world, is to invite the reply, "Because God made it". To ask why God made it is to fall into the nonsense of extrapolating from human to divine purpose. This creation is not the work of a watchmaker who simply sets the watch in motion and then leaves it. Rather God's creative activity is involved not only in the initial act of creation, but also in the ongoing action of sustaining the world. The Bible suggests that God is so involved in natural processes that without His sustaining power nothing would continue to be as it is. God is in ultimate control of the natural realm. This is what gives sense to the doctrine of Providence. Furthermore, He has Himself become part of the natural process. The impact of the Incarnation is to make God one with His created order in a surprising way. "The Word became flesh", means that God is now even more intimately involved with His creation.

*The natural realm has value.* At this point Christians will part company with those ecologists who appear to desire a return to primitivism, mysticism and animism, or to imply not only that nature has value in itself, but that it is in some sense divine. The Christian affirms that God alone, and most certainly not nature, is worthy of worship. The value which the natural realm possesses is derived from God. The cosmological arguments, for all their shortcomings, were clear on this point. It is not the details of design in the world which matter so much as the Designer. Nature exists not for its own sake or for man's sake, but for God's sake. Nevertheless, though its value is derived, it has value in itself. In pronouncing that what He had created was good, God testified to the value of created things. The value was present before man was created and its value does not depend on man. For the Christian this is important, for at the level of creation all things are equal. It is not possible to be more or less created. Man and the natural realm are equal in origin though not in purpose. The rider is crucial. If they were equal in purpose, there would be little difference between them. The Women's Liberation debate may clarify the point. Men and women are certainly equal in origin, but they are very different in purpose. We wouldn't have it any other way. This does not entail that man owns woman. She has worth in herself. Equally in the case of the natural realm, man does not own the natural realm, which has its own endowed value, independent of man.

*The Natural Realm is Part of History.* The Bible views history, not as a cyclic process as non-Christian religions do, but as a linear development. History has a beginning, a middle and an end.

Nature has a part to play in relation to all three. In the beginning, history begins with the creation of a perfect natural order. The created realm is good. In the Garden of Eden, the relationship between animals, plants and man is one of harmony and unity before God. There was no ecological crisis then. This perfect paradise was shattered by the Fall. It is depicted as cosmic in its results. Far more than man's relationship with his Creator is broken. The earth is cursed because of man's sin. The relation of man and the natural realm is now clear in relation to history. Man's action and inaction affect the natural realm in the historical process. A paraphrase makes the point. "For all creation is waiting patiently and hopefully for that future day when God will resurrect his children. For on that day thorns and thistles, sin, death and decay — the things that overcame the world against its will at God's command — will all disappear, and the world around us will share in the glorious freedom from sin which God's children enjoy. For we know that even the things of nature, like animals and plants, suffer in sickness and death as they await this great event." (Rom. 8: 19-23, *The Living Bible*)

In one sense the Fall is a kind of *uncreation*<sup>3</sup>. The harmonious order between man and nature begins to disintegrate. It is as if part of God's judgment on man's sin results in an undoing of the created order. The account of Genesis Ch. 3 does not stand alone. The Flood narrative again stresses that when man does evil, nature is affected, and it is righteous man in the form of Noah who has to ensure the survival of the animal world. One further passage illustrates this idea of uncreation. In the early chapters of Jeremiah in the midst of God's warning of punishment on account of His people's disobedience, there is a picture of the cataclysmic effects of God's judgment.

I saw the earth — lo, chaos primeval!  
 The heavens — their light was gone!  
 I saw the mountains — and lo, they were quaking,  
 And all the hills rocked to and fro.  
 I looked — and behold, no human was there,  
 And the birds of the skies had all flown.  
 I looked — and behold, the tilled land was desert,  
 Its cities all lying in ruins —  
 Before Yahweh,  
 Before his fierce anger.  
 Ah, this is what Yahweh has said:  
 A waste shall the whole land be  
 (Though I'll make no full end)  
 For this let the earth lament,  
 And the heavens above don mourning;  
 For I've spoken and not relented,  
 I've purposed and will not turn back.<sup>4</sup>

Man's sin affects the natural order and it is possible to interpret our present crisis as the fruit of man's broken relationships not only with the natural realm, but also with his Creator. At the present time in history, the relationship between man and his environment has never come under closer scrutiny. This scrutiny reinforces the biblical point that man and the natural realm are bound together in history.

The togetherness in history has final fruition in the picture of the end of the ages. Catastrophes, earthquakes, and cosmic disturbances are all hallmarks of the "Parousia" of Christ. The end of history culminates in a return to a perfect harmony. (*Is.* 11; *Rev.* 21). Man will be in harmony with the animal and natural kingdom. Nature will fulfil the Creator's intention, the redemption of mankind involving the redemption of the world. This redemption involves renewal of heaven and earth. There will be no ecological crisis at the end. The natural realm plays its part in history — in the beginning, the middle and the end.

*Concern for the Natural Realm is part of Christianity.* Man's dominion does not imply a licence to exploit but a duty to respect, protect and nurture the natural realm. As it was in the beginning, so it will be in the end. We who live, as it were in the middle of history, must strive to conform to that perfect harmony depicted in Genesis, Isaiah and Revelation.

Concern for the natural realm is part and parcel of the OT laws concerning land. In Leviticus 25 there is the clear understanding that the land belongs ultimately to God. The seventh year is to be kept as "a sabbath of solemn rest for the land, a sabbath for the Lord" (*Lev.* 25:4). Man's responsibility to, and concern for the natural realm rest on his relationship to God who commands him to be concerned. Such thoughts are often to be found in the OT (eg. *Ps.* chs. 8, 19, 50; *Is.* chs. 24, 25) but it is to the NT we now turn. Jesus often uses pictures derived from nature to express God's concern for man who is worth more than birds and flowers. His words imply worth, if lesser worth, in sparrows and "lillies of the field". If Jesus was concerned with these, Christians ought to be concerned with them too.

In particular Christians need to give more thought to a proper expression of their concern and stewardship for the natural realm in their attitudes and life-style. Indeed, some have gone so far as to suggest that the Christian community ought to be a pilot-plant, revealing by the working of the proto-type, the purpose of God for the created order.<sup>1</sup> Christianity is certainly concerned with the natural realm.

*Christian Anthropology — Man's Unity with Nature.* Since man is himself part of the subject he studies under the heading of ecology

he needs to learn all he can about his own nature. For the Christian this means learning what the Bible teaches about man. There are two main ideas involved in the biblical view: man is united with nature, yet he is different from it.

Links between man and nature are obvious in the common biological and chemical make-up which man shares with the animal world. He is dust and to dust he must return. He is part of the world, being dependent on photosynthesis by plants for the energy requirements of his body, both as regards the food he eats and the air he breathes. With nature too he is affected by the Fall and awaits the final redemption.

But man's unity with nature does not imply an identity. Some ecologists adopt a Buddhist-type of approach which sees man and nature as basically one.<sup>1</sup> This view tends to glorify, romanticise and even to deify nature. Unacceptable conclusions follow: if nature is beyond detraction it must be accepted warts and all. But it is not always benevolent and a view which encourages its uncritical acceptance must quickly degenerate into a fatalism which accepts what ever happens as good and right. Furthermore it reduces man to the level of grass, though there does appear to be a difference between man thinking he is the same as grass, and grass thinking that man is the same as grass.

*Man differs from Nature.* Though man is part of his own environment, he is distinguishable from it. In thought he can disengage from his surroundings, can ask and answer ecological questions and act accordingly. He is the conscious guardian of the natural environment. Between man and his environment there is a basic, qualitative distinction. To say this is not to be arrogant, but rather to state the obvious.

In the creation story man is distinguished from nature in several ways. He is the climax of God's work: only when he is included in the now completed creative process, is creation pronounced to be very good. Man is made in the image of God. In this lies the most important difference between man and the rest of creation. It makes him a person, for God is personal. He is not made in the image of God because of how he behaves, but because of the decision of God to make him God-like. Therefore his function in nature is unique. Accordingly God gives him an injunction: he is told to multiply, to subdue the earth and to have dominion over the animal realm.

In fulfilling this commission man has been guilty of abuse. He has too often become parasitical on nature and deified himself. But in exercising dominion, is it necessary for man to be aggressive? Part of the problem is that the words 'dominion' and 'subdue' can be suggestive of aggressiveness. Yet they have other connotations too, eg. the allusion may be to the rule of a king over a people or a

master over a servant. Dominion need not imply domination; certainly it does not imply extermination. A balance is possible between creatureliness and dominion. The biblical picture is of the shepherd-king who cares for and protects his flock. This is the model for man. One expression of this role is seen in the naming of the animals. Control over the name implies control over the named object, but man is to give the name which, though it implies power, is a loving, gentle act almost paralleled by our use of private nicknames for those we love.

The pre-lapsarian situation ought not to be the main focus of attention in understanding man's difference from the rest of creation. It is rather to the Flood narrative attention must be drawn. It is in the renewal of a covenant with man that God describes the situation of our fallen world. In Genesis we find the beginnings of fear and dread on the part of animals towards man. Animal flesh is now, for the first time, at man's disposal as a food supply. After the Flood, there is a clear and violent separation of man from the animal world.

The Bible now pictures man as a rebel. He is selfish, self-centred, and sinful. Through the Fall he becomes a tyrant over nature. The ecological crisis is one fruit of that sin. It is to be doubted whether man can ever totally overcome the results of his sin and disobedience in relation to the natural realm, until he is totally redeemed. If so, it is only proximate cures we can hope for rather than absolute ones. For the Christian this may result in questions as to how best to use his energy and time. Should he first seek to change men recognising that it is the changed man who has the potential for God-like relationships with creation? Or, should he seek to alleviate the situation by other means which would involve a realistic assessment of man's nature and hence the recognition that man's attitude to his environment will only be changed by appeal to selfish motives?

When the difference between man and nature has been overstressed, Christians have tended to emphasise too strongly the distinction between the spiritual and the material, the soul and the body. Gnostic dualism based on a Platonic dichotomy leads to a semi-Christian schizizophrenia, with which it is impossible to live and which is a travesty of the purpose of God. It is important to note that the final difference between man and nature is not so much in status as in function. Man is called to be a manager, trustee, steward, or vice-regent. On God's mandate, he is delegated responsibility for the created order. As a steward, he is entitled to live from the estate, but that does not mean he owns it. It is held in trust for his Lord, to Whom he is answerable; he will be called to give an account of his stewardship. Yet this is no mere business relationship, but one of love in which man is seen as a co-worker with God. This work is not to be characterized by a



"laissez-faire" attitude. A good manager is involved in research and development for his master, remembering that the shepherd-king is his model and that the sheep matter. In the parable of the talents in Matthew, it is the developer who is rewarded and not the conservationist. This is no charter for exploitation, for the gain was in no way selfish, but all part of fulfillment of stewardship. The conservationist made no attempt to put his resources to their proper use and so reaped the unpleasant consequences.

#### 4. *Non-Christian Approaches to Ecology*

Finally let us examine one of the commonest of all arguments for ecological concern - the argument that if we use up Earth's natural resources now, future generations will be aggrieved. Various reactions to this argument will help to illuminate the Christian approach, if only by way of contrast.

It is commonly assumed that we are under obligation to future inhabitants of our planet. What is the basis of this obligation?

In many ways the problem is hopelessly complex. We have little sure knowledge of the demands that life will make on future generations. We cannot simply extrapolate from our own situation without suspecting that we may be as far from the mark as a man of 1800 describing 1984. Yet it is obvious that men of the future have rights of some kind, for there are trusts left for children's children, who are as yet still twinkles in their fathers' eyes. We are not absolved from responsibility for the future simply because we shall not be there to face those who will suffer as a result of what we do now. The bomb left in a Belfast pub may kill no one I know, but, if I placed it there, I am responsible. Is there however, any basis for this sense of obligation towards far distant descendants?

Probably most Christians would argue along the following lines.<sup>1b</sup> If we are servants of Christ, we are answerable to Him. Responsibility for actions extends as far as the foreseeable consequences. Believing in the family of God and in the communion of saints, we assume that we are intimately bound not only with all those saints and martyrs who have gone before, but with those yet to come. Our love and concern must be extended to them also.

However, priorities cannot be ignored: legitimate claims of a future generation must be balanced against the claims of those alive today. Christians will remember that the harm we do today is tangible, whereas that which may be done to a distant progeny is highly problematical. Where interests conflict the present generation must be given the benefit of the doubt. Long-term ecological concerns must be balanced against social, political and economic justice.

Three non-Christian approaches spring to mind: those of the materialist, the Buddhist and the humanist. A true materialist must have difficulty in even framing the problem. If there is only matter, there can be no value judgment other than the utilitarian. No account needs to be taken of future generations, for these are non-existent. If anything matters, it is reality here and now, not mere possibilities.

The Buddhist may appear to be in a stronger position since for him nature is a unity and everything is on the way to perfection. However, the Buddhist idea of perfection is only very loosely linked with the intrinsic value of generations to come. Buddhists seek salvation by freedom from earthly bondage. Nirvana seems a far cry from the paradise of wilderness sought by many who enlist Buddhism in their cause.<sup>5</sup>

The humanist is the most anthropocentric of all men. The only basis for his action must be selfishness in the sense of for-man-alone. Nothing else can be of equal worth. If there is no life after death, then it is hard to understand how concern for posterity can be a motivating force here and now. There is certainly no biological reason for the husbanding of assets in the long term, though there may be emotional ones.

The Christian recognises the importance of the present but takes account of the future also. He refuses to withdraw from reality into the make-believe world of mysticism and primitivism: he feels responsibility for nature at large, realising to the full that man is not the only creature that God created or that matters. In thinking of future generations he is mindful of the Creator of all, past, present and future, to whom every knee will bow and every tongue confess.

- 1 Lynn White, *The Historical Roots of our Ecological Crisis*, AAAS Lecture, Dec. 1966.
- 2 Der, T.S., "Ecology and Human Liberation", *World Student Christian Federation* 1973,3 (1). Ref. (b), Chap.5.
- 3 A tape by C. Napier on the theme of ecology introduced me to this idea. See also D. Clines, this JOURNAL 1973, 100 (2), 128 (p.137).
- 4 Bright, J., *Jeremiah*, N.Y. 1965, pp.30-31.
- 5 Dorling, "Wilderness and Plenty", *Reith Lectures*, BBC, 1969.

DAVID D. BRODEUR

Auschwitz Gas: Medical and  
Chemical Origins

This is the last of a series of four studies by David Brodeur on the Jewish *Diaspora*. Previous articles have dealt with prophecy (1971) and Zionism (1973 and 1974). The present article, inspired by the Holocaust, traces the history of the gas that killed an estimated one million Jews at Auschwitz back to the Kaiser's Chemical War Service established by the Prussian War Ministry early in World War I.

In the summer of 1943 a photo interpretation team at the British Air Ministry were baffled by a curious anomaly. Their perplexity stemmed from the simple fact that a certain twice damaged house situated in an outlying sector of Hamburg had been completely restored within a week or two after the raids. Some months later the speedy repair of the dwelling was recorded on reconnaissance photography for yet a third time. The interpreters concluded that the house belonged to an important personage in the Nazi war machine, possibly even a high party official.<sup>1</sup>

The thrice restored dwelling later proved to be the residence of Dr. Brune Tesch, owner and manager of the local *Tesch und Stabenow Internationale Gesellschaft fuer Schaedlingsbekaempfung M.B.H.* and a highly respected specialist in fumigation techniques.<sup>2</sup> In the Third Reich this firm (which operates today as TESTA GmbH) enjoyed exclusive rights to all industrial and military fumigation work east of the Elbe River. Nonetheless, in 1945 a British military tribunal, sitting in Hamburg, charged Tesch and two other officers of the firm with supplying the substance Zyklon B to the Auschwitz death factory in full knowledge that it was employed to exterminate the inmates. The short trial of Tesch and his associates took place on March 1 to 8, 1946. Documents were produced which revealed that Tesch's deputy, Karl Weinbacher, had tendered for two gas chambers the month that Hitler had unleashed his attack upon Russia.<sup>3</sup>

Tesch and Weinbacher were sentenced to death and executed, just two small cogs in a giant chemical extermination apparatus. The chemical that they distributed was one of three prussic acid fumigants developed and marketed by the German Limited Liability Pest Control Company DEGESCH (*Deutsche Gesellschaft fuer Schadlingsbekaempfung M.B.H.*) of Frankfurt. The major constituent of the product was prussic or hydrocyanic acid (HCN) which was first described in the 1770's by the Pomeranian born Swedish chemist Karl Wilhelm Scheele who dutifully recorded that it exhibited a taste and smell akin to that of bitter almonds. Scheele remained blissfully ignorant of the fact that he had discovered one of nature's most lethal and rapidly acting poisons. In 1886 a Californian horticulturist pioneered the use of HCN as a plant fumigant in the control of citrus scale insects. By 1900 a worldwide market opened up to hydrocyanic acid for the protection of fruit shipments and decontamination of ships, grain elevators and the like. However, used in this manner as a vapour the acid had a severe drawback. It was very dangerous to its handlers, a single inhalation able to cause edema of the lungs. To make the gas safer to handle some German chemists during World War I (WWI) developed the first of several products based on HCN, combined or mixed with stabilising and warning additives. The new material was called *Zyklon* and it was developed in a research project sponsored by the Prussian War Ministry's Chemical Warfare Service. Oddly enough, no history of the *Holocaust* or, for that matter, any other chronicle, has given a full account of the development of the *Zyklons* one of which (*Zyklon B*) took the life of one out of every three Jews killed by the Nazis during World War II.

The development of the *Zyklons* for commercial peacetime use was the work of the aforementioned DEGESCH. During WW2 DEGESCH's director was Dr. Carl Frederick Peters, an accomplished chemist who had risen through the ranks after being initially hired to test *Zyklon B*. After several trials in connection with the *I.G. Farben Case* Dr. Peters was acquitted of complicity in the murder of six million Jews. His firm which remains today one of West Germany's leading pest control developers owed its origins to a certain WWI technical committee, a committee involved in the business of coordinating weapons of human destruction. To see how this came about it is necessary to go back to 1914.

One bright and cold Sunday morning in December 1914, Dr. Fritz Haber the director of the three year old *Kaiser Wilhelm Institute fuer physikalische und Elektrochemie*, situated in Dahlem, Berlin, anxiously received a twenty five year old scientific recruit, Curt Wachtal. Haber wanted the young man to set up a much needed pharmacological unit to support the Institute's chemical warfare development program. Some measure of Wachtel's competence may be gleaned from the fact that after only the barest of formalities Professor Haber entrusted to him the solution of a most critical problem.

He was to try to find out why animals exposed to high concentrations of certain gases died while those exposed to lower concentrations of the same gases, even for longer periods, often survived and recovered. Wachtel was immediately granted unlimited funds and he responded by demanding fully equipped laboratories staffed by chemists, physicians, zoologists and general technicians.<sup>4a</sup>

A few months later Wachtel was joined by Ferdinand Flury (1877-1947) a toxicologist and pharmacologist who to that time had specialized in natural plant and animal poisons. Working with Wachtel, Flury supervised the testing of over 300 gases in chambers constructed by the Institute's mechanics. By 1915 Haber had organized teams of colloidal, physical and biochemists, chemists and pharmacologists, into several units. Invariably hovering in the background were the observers from the Prussian War Ministry who drove over every week to witness demonstrations of Nernst's latest explosive or Haber's newest asphyxiating gas. The combined operations of two chemical institutes, together with the separate institutes for physics and entomology, represented perhaps the first attempt ever to effect continuous daily cooperation in pure research. For the world the results were startling and they contributed mightily to the Kaiser's ability to hold on for a full four years following the reverse on the Marne.

Sabre-cut and shaven-headed like the Prussian Junkers Wachtel unabashedly admired Fritz Haber who had established himself as the Empire's outstanding physical chemist with publication of his landmark *Thermodynamics of Technical Gas Reactions* in 1905. Haber possessed the steely talents of technical organization and these talents were wedded to the hard work and self-discipline that made Prussia the dread of Europe. He was an internationally recognized authority on the complex relationships of science and chemical industry. He had a special aptitude for bridging the gap between a promising laboratory discovery and its industrial application. When, in 1911, he was appointed director of his own research institution with extraordinary freedom in choosing colleagues and projects, he at last had the opportunity to practice the interdisciplinary approach to research that he had so long espoused. His Institute for Physical Chemistry and Electrochemistry was sponsored by the Kaiser Wilhelm Society for the Advancement of the Sciences but was jointly financed by the Prussian State Government and the Leopold Koppel Foundation of Berlin. The latter had insisted that Professor Haber be made director as the condition of its support.

The major moving forces behind the establishment of the Kaiser Wilhelm Society in 1911 were two distinguished persons. One was physical chemist Walther Nernst (1864-1941) the discoverer of the Third Law of thermodynamics and an important theoretical contributor to Haber's ammonia synthesis process. The other was the eminent church historian Adolph Harnack (1851-1930), a grandson of the

pioneer agricultural chemist Justus von Liebig. The first two institutes were twin institutes devoted to chemical research and they were officially opened by Kaiser Wilhelm on October 23, 1912. Three years later Fritz Haber would display in his study the Kaiser's letter authorizing him to initiate chemical warfare research. After the opening there came in quick succession institutes dedicated to physics, medicine and entomology. The lofty aim of the Society was nothing less than to establish research institutes in every major branch of science, all staffed with the finest talent available in the Empire or wherever obtainable. But the ambitious program was abruptly curtailed by the outbreak of war in August, 1914. And the original blueprint was never fulfilled.

In 1913 Max Planck and Walther Nernst journeyed together to Zurich in order to persuade the reluctant Albert Einstein to take up the directorship of the Physics Institute. Another Jew, Richard Willstaetter, was awarded the equally coveted co-directorship of the Institute for Chemistry despite objections from anti-semitic elements within the Prussian Academy of Science. When Fritz Haber turned over his own chemical institute to war work he immediately recruited Willstaetter to direct gas defense strategy in order to concentrate all of his own creative energies upon the formidable challenge of developing a poison gas strike capability for the Prussian War Ministry.<sup>5</sup> The two famous chemists, both of whom eventually were to receive Nobel prizes for their respective prewar achievements, were soon to make a formidable team. Barely acquainted with one another before the war they now became close friends and were in fact next door neighbours at Dahlem. For the swift development of a most versatile and effective facial respirator or gas mask Richard Willstaetter won the Iron Cross. A quarter of a century later he would flee Nazi Germany, not abandoning, until 1939, his hope that Hitler would give up his course of madness.

Thanks to the interdisciplinary approach adopted on a scale previously unknown in scientific research, the chemical institutes of Dahlem were able to effect, overall, a much more realistic appraisal of the capabilities and limitations of war gases than their Franco-British adversaries who, at the outset of the war, lacked the highly sophisticated research and manufacturing apparatus of the twenty-five German States. At Dahlem Fritz Haber contributed to the efficiency by devising on the spot a simple but extraordinarily effective formula to test the new war gases. This was the so-called Lethal Index or *Haber product W*. By means of the formula  $C \times T = W$  ( $C$  = concentration of gas;  $T$  = exposure time;  $W$  = time when death occurs) the Wachtel team discovered that the  $CT$  of many gases such as chlorine, phosgene and mustard gas was constant; that is, if concentration increased then the length of exposure necessary to induce death at that concentration decreased in inverse proportion. However, the experiments revealed that a few gases did not behave according to the formula. Prussic acid

was one of them. An essentially noncumulative body poison, when the concentration of HCN was lowered below the threshold necessary to kill, it remained toxic to animals but was not fatal to them. Thus cats and dogs were able to endure prolonged exposure to low concentrations of HCN, while higher concentrations caused asphyxiation, sometimes in as little as five minutes. These experiments made clear to Wachtel that hydrocyanic acid would not prove effective as a war gas, for the high concentrations necessary to kill were simply not attainable.<sup>4b</sup>

It is almost comical, upon reflection, to think that these conclusions escaped the French who in the meantime had become positively obsessed with the combat potential of this traditional poison that first gained notoriety when the brilliant German chemist Victor Meyer (describer of mustard gas) took his life with it, in 1897. With enthusiasm the French stored up thousand of HCN compound shells (HCN and phosgene) in early 1916, calling them *Vincennite* after the city of their loading. However, the Parisian cabinet recoiled at the idea of employing so diabolical a weapon even on the Huns and the go ahead for its use was not given until the Battle of the Somme in July. Long after French intelligence reported that prussic acid filled shells were having no noticeable effect upon the Germans the French 75's were still firing them and continued to fire them to the end of the war. German intelligence had learned of the French intent to use hydrocyanic acid only a scant week before the opening of the Battle of the Somme. The Willstaetter team was notified and prescribed one gram of powdered silver oxide to be sandwiched between the potash layers of the Willstaetter gas mask. This effectively neutralized the French weapon.

For their part, the Germans employed various cyano compounds to augment their always limited supplies of chlorine, phosgene and mustard gas. With HCN used in this manner they had hoped to obtain some deadly synergistic effects resulting from complex gas interactions. The Austrian Army pioneered the use of cyanogen bromide, a prewar pesticide, as a weapon in their "CE" artillery shells. The debut was made in September 1916 which was only two months after the French had introduced hydrogen cyanide (Prussic acid) during the Battle of the Somme. Curt Wachtel estimated, excluding other cyanogen compounds, that the more than 4,000 tons of hydrogen cyanide or HCN released over Europe in Vincennite shells by the French, had it been employed instead in gas chambers, would have been adequate to snuff out 20,000 million lives. In 1916 this was equal to some ten times the world population.<sup>4c</sup>

Virtually all of the technical problems encountered in the design of gas chambers for the rapid destruction of human beings were solved by the Kaiser Wilhelm Institute for Physical Chemistry and Electrochemistry after 1914. There, researchers determined that 10 to 40 cubic meters was an efficient capacity for chambers

devoted to the simulation of killing the enemy. In larger chambers an undesirable stratification of the gas developed. The greater concentrations tended to collect in the lower regions. Though this could be offset somewhat by the introduction of fans a further loss was incurred by absorption of the gas upon chamber walls. Finally, it was discovered that this absorption rate varied according to floor, wall temperatures and humidity factors.

In improvisations to simulate human conditions, toxic gas testing was most inventive at Dahlem. For example, it was discovered that the toxicity threshold for monkeys was similar to that of humans. In order to make more accurate evaluations along these lines Flury and Wachtel summoned Emil Pfungst, a specialist in animal psychology, to Dahlem. Pfungst soon concluded that young rhesus monkeys exhibited similar gas reactions to those of young men up to 20 years of age.<sup>4d</sup> It was further discovered that young suckling pigs, whose tender skins resembled those of humans, were almost ideal for testing vesicants such as mustard and lewisite gases for combat potential. However, all these experiments were not conducted without undesirable effects upon the staff. Otto Hahn, father of the nuclear age, wrote concerning his experiences as a member of the Haber wartime team: "As a result of continuous work with these highly toxic substances our minds were so numbed that we no longer had any scruples about the whole thing..."<sup>9</sup>

With such an admission, one wonders if the Wachtel team experienced any revulsion over the destruction in a single day of a thousand puppies pegged to the ground of the Warthe-Lager manoeuvring field in Posen during the first full scale tests on mustard gas, conducted in September or October, 1916.<sup>4e</sup> The French and the English also tested their combat gases upon animals, subjecting dogs to lethal gas barrages laid down on trench systems dug into the quiet hills of Provence.

With both sides the really important consideration was to win -- to win at all costs. The mood then prevailing in Berlin was well summed up by a remark attributed to Paul Friedlaender (1857-1923), synthesizer of artificial indigo. A key consultant to Haber after the chemists Lommel and Steinkopf had failed to solve the intricate mass production problems of mustard gas (which the Germans called *LOSS* after the two chemists) Friedlaender exclaimed "We have no time for satisfying the curiosity of baby chemists."<sup>4f</sup> By this standard Fritz Haber qualified as an adult chemist. Yet his brilliant achievements in peace and war could not prevent Curt Wachtel from writing a quarter of a century after Ypres: "... the superiority of chemists over medical experts proved just as disastrous as did -- everywhere, in all armies -- the superiority of the professional army officer over every kind of scientist."<sup>4g</sup> When they instituted gas testing programs on human guinea pigs the Nazis made sure that medical considerations prevailed in their quest to find the agent that killed the quickest.



A reservist, Fritz Haber enlisted during the great teutonic euphoria of August, 1914 and held the rank of sergeant-major (*Vizewachtmeister*) in the artillery. *Naturwissenschaft*, for which he frequently wrote, reported that he showed a "cool head...and contempt for death under fire in the front line." Nonetheless, when the great sweep to the Channel in which he was participating became unhinged on Paris, Haber excitedly wrote a bold missive to the German General Staff which bore the rather strange title: *Memorial from Sergeant Haber Concerning the Protection of the German Front by Impenetrable Gas Clouds.*<sup>7a</sup> The text of this memorial has, unfortunately, not survived. It is not even mentioned by Haber biographer Goren. Delivered through a Colonel Bauer it had the immediate effect of returning Haber to Dahlem where he initiated experiments with toxic gases.

In September or early October, 1914, physical chemist Walther Nernst was asked by the Prussian War Ministry to suggest some chemicals that would drive the French from their trenches.<sup>8a</sup> Nernst had just completed a tour of duty as a volunteer driver with General Kluck's armies. He suggested the use of some irritating powders, basically non-lethal chemicals that induced coughing, sneezing or tears. In the first month of the war the French had in fact pioneered the use of tear gas with a 26mm rifle grenade containing a mixture of methyl and ethyl bromoacetate, a mixture that had been used to good effect on the Bonomi gang of automobile thieves in pre-war Paris. There is no evidence that Nernst advocated the use of toxic substances. Having witnessed the failure of the Schlieffen plan firsthand he may have felt that no chemical was capable of redeeming the Kaiser's dreams of glory. At Neuve-Chapelle, in France, on October 27, 1914, the Germans tried out some 10.5mm canister shot whose spaces were filled with the irritant chlorosulphonate of ortho-dianisidin. It was ineffective and efforts were next focused upon a series of bromo compounds. The first of these — a mixture of xylyl bromides — was suggested by von Tappen, a chemist under Haber. Named T-stoff (for Tappen) the new material was the first use in modern warfare of a gas of lethal capability. Enclosed in artillery shells, it made its debut on the Russian front on January 7, 1915. But it was not powerful enough and again the Germans were disappointed by the results. According to leading gas specialists in France and England, Fritz Haber was at work on toxic gases as early as August, 1914. A dramatic setback came to his efforts in December when an explosion occurred in an experiment involving cacodyl oxide and phosgene: in this the brilliant Haber protege Oscar Sachur was killed. Haber turned next to chlorine with which the *Auergesellschaft*, named after Carl Frederick Auer (1858-1929), the metallurgist, had been experimenting at Dahlem since October. The gas was both abundant and cheap as it was widely used in the manufacture of synthetic dyes of which Germany enjoyed a virtual world monopoly. The success of the first great yellow-green chlorine cloud released by Germany near Ypres, in Belgium, on April 22, 1915, surpassed all expectations.

Thanks to the element of surprise, and supervision of the field work by Haber himself, within a matter of minutes a whole French Moroccan division was wiped out, five thousand soldiers died in agony and another ten thousand, including some British soldiers, were incapacitated. This first massive lethal gas attack in history set the precedent for the mass asphyxiation of millions of Jews and Gypsies in eastern Europe a quarter of a century later. But in 1915 the only immediate dividend for Germany was the acquisition for two or three days of a few hundred yards of Belgian farmland. Due to the lack of respirators in the first two gas attacks it is not surprising that they managed to produce more casualties than any other attacks made during the war despite subsequent improvements in gases and their delivery systems. The weapon from the outset proved inadequate to its task — breaking the deadlock induced by trench warfare. Eventually, the Germans suffered enormous gas casualties of their own — losses that their regimental histories, official statistics and war memoirs notably glossed over. Poison gas proved to be Prussia's Ibsenian 'corpse in the cargo'.

On May 31, 1915, the Germans mounted a massive chlorine cloud attack on the Russian front, selecting as their target the Bzura-Ravka River line. The attack, supervised in the field by Fritz Haber, employed 12,000 cylinders or twice the number used in the Ypres attack. Within a matter of minutes 6,000 Russian soldiers perished and another 3,100 were poisoned.<sup>4h</sup> Impressed, but unable to follow up these coups for lack of reserve chemicals, the Prussian War Ministry gave Haber's institute the green light to develop newer and deadlier gases, failing to realise that the universally adopted facial respirator would largely neutralize the gas weapon on the battlefield.

At first the Entente was poorly equipped to retaliate, having little ready manufacturing capacity for chlorine and phosgene, basic chemicals in Germany's world monopoly on synthetic dyes. At the same time the Entente's mass production capability, as Haber must have known full well from his extended visit to the United States in 1902, greatly exceeded that of Germany. When the Franco-British retaliation finally commenced, in the fall of 1915, it managed to improve upon the German delivery systems and fairly maintained those delivery initiatives, which to some extent offset Germany's superior gas chemistry, to the end of the war. Yet for two critical years — April, 1915 to July, 1917, — and even beyond, the Germans maintained the chemical initiative, Haber's institute being able to introduce a thoroughly tested new gas in as little as three to six months. Generally, it took the Entente twice that long to imitate chemicals that the Germans had already fielded. Yet for reasons still not fully understood the Germans were very slow to copy the effective British Stokes mortar gas shell system, even though Haber himself is said to have suggested the use of gas mortars as early as 1914. When later the British supplemented their small Stokes mortars with

batteries of huge electrically fired Livens projectors, the Germans were still clinging to artillery gas shells and the occasional cloud attack. In 1916 Haber was promoted to Captain and made chief of the Chemical Warfare Service. He and his assistants worked feverishly - sometimes all night - to develop new offensive gases and a dependable 'defensive' gas weapon. In December, Haber requested a personal interview with General Ludendorff. He told the hero of Tannenberg that he was convinced that a certain compound 2,2'-dichlorodiethyl sulphide had ended his search for the ultimate gas defense weapon, that is, one that could be laid down like a carpet to discourage a ground attack or to cover a strategic retreat. The material was not new. It had been discovered in 1880 by the Scots chemist Guthrie and was fully described by the German chemist Victor Meyer in 1886, the year that prussic acid was first used as a pesticide.

Haber's formula,  $C \times T = W$ , showed that mustard gas (as the British dubbed it on account of its garlicky mustard-like odor) was fully effective even at the lowest concentrations, an important consideration in open warfare. The atomized liquid was a powerful vesicant and bronchial irritant and it had the uncanny ability to linger in the ground for days or even weeks. The suffering it caused was intense.<sup>23</sup> Against it gas masks were only partially effective. Little wonder that it caused more casualties on both sides than any other chemical weapon used in the war. With a flair for the historic and dramatic, the Germans introduced mustard gas near Ypres on the night of 12 July 1917, near the site of their first chlorine attack. However, Haber warned the general staff that if Germany did not win the war by June 1918 the Entente would be in a position to retaliate, his gas evaluation committee having told him that it would take England and France about a year to solve the complex mass production problems posed by the chemical. Ludendorff gambled. In June, 1918, as predicted, the Entente began to employ mustard gas, a scant month before the beginning of the last German offensive of the war. The words that Walter Rathenau had applied to unrestricted U-boat warfare in 1917 "... a leap over the abyss only succeeds if its success is a hundred per cent success"<sup>10</sup> suggests that had the World War continued beyond 1918 some kind of doomsday spray might have been the eventual product of the inevitable oneupmanship game of the scientists. The British, in their gas planning for 1919, were looking forward to releasing such deadly concoctions as adamite, lewisite and poisonous particle fogs that were capable of penetrating any gas mask of the day. Rathenau had said it all, even earlier, when he wrote in the March 23, 1913, *Neue Freie Presse*, "Money and armaments alone will not avail to avert our doom. Material forces only call up material forces in reply." However, in 1914, the author of these brave words conceived and directed the War Raw Materials Department in Berlin which succeeded in stockpiling virtually everything that Germany needed in order to wage a prolonged war under blockade.

The belief that applied science could save mankind from its self destructive tendencies was still widely held in 1917, even when it had been apparent for some time that such a belief was a forlorn hope. Unfortunately, chemists, physicists, in fact all scientists, individually and collectively, possess moral vision which is neither better nor worse than the rest of mankind. In microcosm the folly of science and scientists can be seen in just three Haber achievements that happened to span a seven day period: July 10 to 17, 1917. During that particular week, when the war was nearly three years old, two new Haber lifetaking devices made their battlefield debuts — arsenicals and mustard gas. And a Haber lifesaving device, an acoustical whistle designed to warn coal miners of firedamp, quietly received a Swiss patent. The dilemma of the scientist in war was rather pathetically summed up in 1917 by Walther Nernst, just after he had lost the second of two sons on the western front. In the introduction to one of his works he wrote "Nothing is as good as physics to divert the mind from the present time...which is to be deplored."<sup>8b</sup> Had Nernst lived to 1945 (he died in 1941) he would probably have derived little comfort even in the reading of physics in the light of what *nuclear* physics did to the Japanese that year.

According to Charlotte Haber, whom Fritz married in October, 1917, her husband's eyes were not opened to the prospect that Germany might lose the war until early in 1918. At the home of his friend Albert Einstein the *denizen of Dahlem* was told by Walther Rathenau that a desperate Admiralty was falsifying the tonnages of Entente shipping sunk.<sup>11a</sup> Up to that time Haber's own astonishing achievements as an industrial chemist had contributed to preventing him from entertaining the possibility of defeat. His Haber-Bosch ammonia synthesis process, of which Germany enjoyed exclusive monopoly until 1919, had, after all, helped the Kaiser to keep on fighting for four years after the great reverse on the Marne. The great importance of the process was candidly summed up by Voerster, member of the Prussian House of Deputies, who claimed that "without the new nitrogen process of Professor Haber the war would have been lost in three months."<sup>12</sup>

Just as Haber had embarked in 1904 upon his successful quest to find a method of synthesizing ammonia directly from its elements, nitrogen and hydrogen — for the blessing of mankind — in 1914 his cohorts at the Dahlem Institute probably had just as commendable an objective in mind when they began looking for a pesticide more effective than HCN. In cooperation with their sister Institute of Entomology, they methodically sifted through reports of fatalities by cyano compounds registered over the world. And then they began looking for improved pesticides based on prussic acid, HCN. Between 1915 and 1916 they developed the product *zyklon* (cyclone),<sup>14</sup> later referred to as *zyklon A*. This consisted of a mixture of methyl and ethyl cyanoformates with the addition of about 10% of esters of chloroformic acid to act as a marker.<sup>4</sup> Cyanoformates liberate up to

30% of their weight of HCN in presence of moisture and being much less volatile than HCN itself are less easily blown away and lost. As an insecticide zyklon proved highly efficacious for the destruction of typhus carrying lice amongst civilians and German troops in Poland and Russia in 1917-18. As a war gas it proved rather ineffective, but was sometimes mixed with other gases, especially mustard gas, when these were in short supply.<sup>4</sup>

It appears that after 1919, owing to the prohibition of the manufacture of poison gas by Germany by the terms of the Versailles Treaty, the production of zyklon-A was discontinued.<sup>14</sup> However, research on insecticides continued and by 1924, the technical director of DEGESCH, Dr. Walter Heerdt, had perfected a saleable form of prussic acid. In the pure form HCN is a very volatile liquid and liable to polymerisation. DEGESCH stabilised it with oxalic acid and sold it in sealed hand-sized canisters in which it was absorbed either in kieselguhr (lump form) or in cellulose (cardboard chips etc.). In this form it proved storable and safely transportable. As the DEGESCH company had previously produced zyklon, the name was retained: this time as *Zyklon-B*. Once again some chloroformic ester was added as a warning agent, for it should be remembered that not everyone can smell HCN. Prussic acid in this form was relatively safe to handle in fumigation work.

The third and only other known Zyklon developed by DEGESCH was *Zyklon C*. In a 1926 article in *Disinfektion* chemists T. Pohl and Brune Tesch (the latter the Tesch of the "Zyklon B Case") described it as a mixture of 10 parts HCN, one part of a danger indicator and 0.3 parts of ethylbromoacetate. The danger indicator or warning material was none other than chloropicrin the infamous "vomiting gas" material that the Germans had used in diphosgene "green cross" gas shells in 1916. Like T-Gas (T for Tesch), Zyklon C was adaptable, according to its describers, to the disinfection of isolated flats in apartment houses without disruption to the lives of the adjoining occupants.

Lucy Dawidowicz recently reminded the world that it was Zyklon B which was selected for use at Auschwitz "by a committee of physicians and medical experts, headed by Brandt".<sup>13</sup> The presence of chloroacetate esters, which vigorously attack mucous membranes, especially the eyes, must have proved exceedingly painful to those who were murdered in the gas chambers.

The origins of DEGESCH itself are still a bit obscure. According to Heinz Liepmann, in his 1937 published gas study, Fritz Haber created, during the spring of 1917, a committee affiliated with the Prussian War Ministry. It was called The Technical Committee for the Destruction of Noxious Creatures (*Technische Ausschuss fuer Schadlingsbekaempfung* or *TASCH*.) DEGESCH's fiftieth anniversary plant history, distributed in 1969, states that *TASCH* was established

by Professor Fritz Haber to combat meal worm and various kinds of lice.<sup>14</sup> In the context of the times — typhus caused by lice was a severe problem on the eastern front in 1917 — the DEGESCH statement is credible. However, while DEGESCH confirms that the Committee TASCH was affiliated with the Prussian War Ministry, Liepmann claims that the committee was established for the purpose of coordinating combat gas production from nine German chemical firms including Bayer, Hoechst, BSAF, Grieschein Elektronen and Kalle & Company.<sup>7b,15</sup> The plant history admits to the fact that DEGESCH grew out of *TASCH*. It was then incorporated, on March 13, 1919, as the German Limited Liability Pest Control Company, a joint partnership between government and private enterprise. The company was established along the lines advocated by Walter Rathenau in his writings on War Industry Companies and industrial reform, the same Rathenau made scapegoat for the Kaiser's failures in 1920. He was assassinated by youths in 1922.

The year after it was founded DEGESCH moved from Berlin to its present location, Frankfurt am Main. However, this was no longer Hermann Hesse's "good old staunchly democratic city of Frankfurt with its markedly Jewish culture, a city which the Hohenzollerns had so thoroughly detested..." but a great commercial metropolis, headquarters of the expanding *I.G. Farbenindustrie* chemical cartel and later the home of the fledgling national airline Lufthansa. In 1922 DEGESCH restructured itself as a purely private company marketing prussic acid and other chemical pesticides. In 1925, it reorganized, once again, deciding this time to restrict its research and marketing structure to cyano compounds which it realised somewhat more quickly than its competitors, were the most effective vermin control agents.

It was for the purpose of carrying out exhaustive tests on Zyklon B that DEGESCH's World War II director, Dr. Gerhard Peters, joined the firm, in 1922. Gradually, DEGESCH gained a monopoly over the marketing of Zyklon and in 1929 divided the world market with American Cyanamid Corporation. It also transferred all marketing rights for Zyklon in Germany to two affiliate firms. One of these was Heerdt-Lingler (HELI) in Frankfurt, under virtually the same management as DEGESCH. The other was the earlier mentioned Tesch and Stabenow (TESTA) of Hamburg, the firm that set up the gas chambers at Auschwitz and supplied them with Zyklon B. In 1930, the omniverous *I.G. Farbenindustrie* cartel expanded its interest in DEGESCH to become a 50% partner. When the Allies broke up the trust in 1945 I.G.'s interest in DEGESCH was simply transferred to Bayer and Company, a chemical giant of the original I.G. structure. In this manner DEGESCH survived the war, its ownership reshuffled on Germany's chemical chessboard.

If DEGESCH's antecedents were not truly a pest control committee in the Kaiser's disintegrating war machine but a critical committee

coordinating the logistics of the ever expanding war gas production, as Liepmann has claimed, then one asks: what possible motive could there have been in giving it such a misleading and banal name? Most likely the answer lies in national security. A disastrous explosion had taken place in May, 1917, at the Berlin works producing the first mustard gas, an explosion which came only a month after America's declaration of war on the Central Powers and which delayed the introduction of the gas by one or two crucial months. Sabotage had been on the increase in the Fatherland, some of it caused by hungry, disgruntled workers, some of it caused by enemy agents. No further setbacks could be tolerated in the mustard gas program and strict new security precautions were instituted. To all this Haber undoubtedly reacted in his typical way. He enjoyed making jokes out of serious occasions, such as the time when he and his Dahlem colleague Frederick Epstein carried on lively discussions of embalming methods at the funeral of Siegfried Haber, enjoying the uncomfortable reactions of the mourners.<sup>16</sup> His charades on family and friends, often accompanied by poems or limericks, were common knowledge. He also had a passion for naming things and he and Willstaetter were encouraged to name the inner streets of the Dahlem complex. The Technical Committee that Haber chaired from 1917 coordinated the war gas and delousing agent production of a great, sophisticated decentralized chemical combine spearheaded by the I.G. Farben trust. Whether Haber gave the committee its *double entendre* name or not, the precedent that the fiction created was to have truly baleful consequences.

DEGESCH's brief corporate history statement admits that the firm was "in a way a child of the First World War", but not that it grew out of a committee that controlled chemical warfare production. The history is more concerned with detailing the postwar throes of the company and is, of course, silent concerning the fact that during the second world war its Zyklon B development facilitated the extermination of perhaps the largest number of people ever massacred in so small a place in so short a time, including the worst devastations of aerial bombardment. One thing remains certain: masking mass murder behind a pest control façade originated not in the sick brains of Himmler and Hitler, during the Third Reich, but within the orbit of the Prussian War Ministry during World War I. It was then that 'medical solutions' for the enemies of the Fatherland were first conceived.

The Prussian subterfuge had its influences on the course of Germany's secret rearming during the 1920's and 1930's. In the early 1920's for example, the Hamburg chemical manufacturer Hugo Stoltzenberg stored phosgene cylinders for gas experimentation in violation of the Treaty of Versailles. To ward off the unwanted snoopings of the peace commission inspectors he was inspired to hang a sign outside one of his plants which read:<sup>7b</sup>

*Technical Committee for the Destruction of Noxious  
Creatures.*

Stoltzenberg began a long chemical career with contributions to the conversion of beet sugar wastes, called *Schlempe*, into useful additives for superphosphates. At the outset of the 1914 war he made contributions to the technology of substitute high explosives in a nitrate starved Fatherland. But it was his postwar work that earned him his notoriety. In 1924 the *Chemische Fabrik Dr. Hugo Stoltzenberg* was awarded a German patent for a new method for destroying swarms of noxious creatures with aircraft and flame-throwers. The idea was to spray the ground with tiny, self-dissolving film capsules enclosing lethal gas. A similar proposal for the spraying of plants "from great heights" secured him a personal patent in 1926. The jargon of these patents and certain Stoltzenberg pamphlets of the period conveys the impression that this Pied Piper of circumlocution was really offering his country some exciting new ways of exterminating its enemies.<sup>17</sup> The last entry attributed to the Hamburg chemist in *Chemical Abstracts* occurs in 1943. It contains a summary of a patent awarded to Stoltzenberg for the design of filters to prevent acid gas from entering breathing air, which sounds suspiciously like gear intended for new model bomb shelters. The previous year, Ferinand Flury the pharmacologist of Dahlem published an article in the *Arch. Gewerbepathologie und Gewerbehygiene* with Walther which discussed, with sincere professional detachment, the effects of liquid prussic acid applied to the skins of mice and rabbits - while as many as 1000 Jews per day were perishing in the carbon monoxide and prussic acid gas chambers in Poland.

In October, 1919 a disillusioned but still energetic Fritz Haber established his famed Colloquium, which was inspired by the Nernst Colloquium of earlier years. In February he reorganized the Dahlem Institute of Physical Chemistry and Electrochemistry, adding new departments in pharmacology, organic chemistry, textiles and insect pests to existing departments in physics, colloidal, physical and electrical chemistry. The insect pest unit, euphemistically called Economic Entomology, was the natural outgrowth of four concentrated years of experimentation with lethal war compounds. Just twelve months after the reorganization, on February 7, 1920, an Entente commission asked the Weimar government to cooperate in the extradition of some 895 German "war criminals". Among the distinguished names in science on the list were those of Dr. Carl Duisberg, director of the Leverkusen works, chairman of the wartime chemical



industries board and a sometime consultant to Dahlem; Walther Nernst whose development of the *Flammenwerfer* and substitute high explosives had earned him the Iron Cross; and Fritz Haber. Ironically, Duisberg, a double doctorate and *father* of the *I.G. Farbenindustrie* cartel, woke up one morning in 1945 to find himself once more branded a war criminal.

Haber reacted to the 1920 inquest by fleeing to his chalet in Switzerland. According to Charlotte Haber he did not mind being judged by some neutral tribunal but he would have none of the vindictiveness of the victorious 'Entente'.<sup>11b</sup> He returned to Germany on his own accord when the inquiry proved to be more rhetoric than action. All the same it is known that Haber was himself deeply disturbed by the charges laid against him. His health began to deteriorate. But, in the 1920's he found fresh hope in a new cause: extraction of gold from sea water in order to repay Germany's staggering reparations. The ill-fated undertaking, which spanned several years, was initially financed by the German Gold and Silver Refining Company of Frankfurt (*Die Deutsche Gold-und Silber-Scheideanstalt*) a firm which was, in 1919, according to DEGESCH's history, the leading firm in the manufacture of prussic acid pesticides and poisonous cyano compounds.

In April, 1933, less than three months after Hitler's accession, the NAZI Ministry of Art, Science and Popular Education ordered Haber to dismiss his lower echelon Jewish staff members at Dahlem. When two of his top colleagues resigned in protest Haber proudly tendered his own resignation. The son of several generations of assimilated Jews, he had converted to Christianity to further his chemical career. Suddenly, in the wake of this disaster, his faith in Judaism was rekindled. He resumed his middle name *Jakob* and embraced the political Zionism which he had tried so hard to discredit. But he was a dying man. In succession he visited Spain, France, Switzerland and England for a new perspective, advice and medical treatment. When in Switzerland for treatment he accepted a research post at Rehovoth from a once hostile Entente chemist, Chaim Weizmann. But before he could set out he died, in 1934, his weak heart fatally taxed by asthma.

When Haber left Germany in the late summer of 1933, the president of the Kaiser Wilhelm Society for the Advancement of The Sciences (today the Max Planck Society) asked Otto Hahn to take over Haber's institute and also to continue in his capacity as director of the Institute for Chemistry. In 1915 Haber secured for Otto Hahn special noncombat duty with a group of 'active specialists' one of whose tasks was to investigate firsthand in the field the effects of poison gas on the enemy. Of a certain visit to the Russian front made in this connection, Hahn later wrote "I felt profoundly ashamed and perturbed. After all, I shared the guilt for this tragedy."<sup>6b</sup> He went on to describe the scene: "First we attacked

the Russian soldiers with our gases, and when we saw the poor fellows lying there, dying slowly, we tried to make breathing easier for them by using our own life saving devices on them. It made us realize the utter senselessness of war."<sup>6c</sup> The impression that Hahn tries to give is of an act of spontaneous compassion, but in fact his activity was only the logical extension of the medical-pharmacological approach to chemical killing practiced at Dahlem. The Nazis later made good use of such techniques when they conducted their first gas tests on prisoners in the basement of a Bavarian castle from 1938 to 1941. Simon Wiesenthal has estimated that in Hartheim Castle's gasrooms as many as 30,000 political prisoners, many of them dissident Christian clergymen, perished.<sup>18</sup> There, the most effective killer proved to be Zyklon B, the fatal dose being 1 milligram per kilogram of body weight. Years before at Dahlem the dosage for inducing immediate death by HCN had been calculated: 300 milligrams per cubic meter of air, or 270 parts per million.<sup>19</sup> To the victims it would not, of course, make a particle of difference.

Hitler's ultimate extermination weapon against the Jews, lethal gas, was not only the natural extension of the carbon monoxide fuelled euthanasia program of 1939-1941 through which thousands of Germany's aged, infirm, insane and deviate were slain.<sup>20a</sup> It was the ultimate extension of the application of science to mass murder based upon medical research largely completed during World War I. Dr. Robert Servatius, counsel for Adolph Eichmann, revealed his addiction to the Nazi pseudo medical subterfuge when he declared before the Jerusalem tribunal that his client was innocent of any responsibility for the "collection of skeletons, sterilizations, killings by gas, and similar medical matters." When interrupted by the incredulous judge, Servatius coolly explained: "It was indeed a medical matter, since it was prepared by physicians; it was a matter of killing, and killing, too, is a medical matter."<sup>20b</sup>

Since the Germans regarded many of their adversaries in World War II as *Untermenschen* it must be assumed that Servatius intended that killings on the battlefield should be included in his macabre diagnosis on grounds of consistency if on no other basis. Doubtless only a few at the Eichmann trial were sufficiently acquainted with the details of the gas operation at Auschwitz to recall that the Zyklon B canisters were transported from depot to gas chamber in panel trucks bearing the Red Cross emblem, or that German victims of the guillotine, a device originally suggested by a French physician, whose name is immortalized thereby, the method by which Nazi Peoples' Courts carried out their sentences, often as not wound up preserved in Lysol bottles for instruction in the medical schools.<sup>21</sup> But all present at the Jerusalem Tribunal, upon hearing Dr. Servatius speak, must have been reminded that a physician, Dr. Mengele, made the final selections for the gas chambers at Auschwitz which was hardly more perverse than the fact that orderlies and guards at

Dachau hurriedly donned Red Cross armbands and scurried about attending to the hopelessly broken in body and spirit when Patton's tanks came crashing through the gates.

The pharmacologists, physiologists and psychologists — that is, the doctors — associated with the Kaiser Wilhelm Institutes during WWI gassed all manner of animal life for the single minded purpose of devising more effective ways and means of gassing the enemies of the Empire on the battlefield. Wittingly or unwittingly these medicos snuffed out in a stroke the spirit of Hippocrates and gave birth to a ghastly new breed of vivisection (as did their Entente counterparts), a vivisection that had as its ultimate aim not the saving of human life but its destruction. If the Nazis could succeed in finding a political-philosophical rationale to convince Germans and Poles that Jews, Russians and Gypsies were wholly inferior to cats, dogs, and monkeys — in fact mere vermin — then mass murder on Polish soil could be smoothly substituted for animal sacrifice and blandly equated with political or economic expediency. It took the Nazis only a half dozen years following their accession to power to transform the legitimate practice of extermination of vermin on people into acceptance of the principle of exterminating *people as vermin*. The result was Auschwitz, Treblinka, Maydenek, Sobobor, Chelmo and Belzec, all sited in traditionally and historically anti-semitic Poland. This was the ultimate, obscene expression of Hermann Hesse's Germany — a people down 'on pious knees before the god of Applied Science'; of the Hesse who wrote during the summer of 1918 "... we have with smiling arrogance created a science and technology that manufactures explosives and poison gases. Where is the progress? Where is the regression? There is neither."<sup>22</sup> As Lewis Mumford reflected in a memorable March 10, 1975 *New Yorker* essay, "progress was a tractor that laid down its own roadbed and left no permanent imprint of its own tracks, nor did it move toward an imaginable and humanly desirable destination."

Fritz Haber was devoted to his three half-sisters: Else, Helene and Frieda. He called them "the three St's": Stolz (pride), Stuetze (support) and Strafe (punishment). All three made happy marriages, Else and Helene choosing medical men. Helene's was the Stettin orthopedist Dr. Weigert, to whom she bore a daughter Marianne and a son Karl. Frau Weigert was a talented orthopedic therapist who had tirelessly nursed the wounded of WWI. When Hitler came to power the Weigerts decided not to leave Germany though it could easily have been managed by Helene's eminent half-brother. In time they were arrested and dispatched to Theresienstadt, the 'model' Jewish ghetto Heydrich established in 1942 by evacuating the entire native Czech population from an old Bohemian fortress town on the river Eger. Theresienstadt was under the direct authority of Eichmann and housed mainly prominent and elderly Jews, visited by the International Red Cross, a kind of showplace concentration camp.<sup>20c</sup> Although living conditions there were generally far better than in

other camps, the less privileged suffered privations and diseases were rampant. When Dr. Weigert died, Helen, the "support" struggled bravely on nursing the sick, the lonely and the terrified, a pillar of strength to the Jews.

In 1943 the Germans undertook the "thinning out" (Ausfleckerung) of the over crowded houses and hotels of the ghetto, making regular shipments to the Auschwitz extermination centre. One day Helene Weigert found her name on the lists of transports. A chemist inmate urged her to write to Theresienstadt's commandant to remind him what Fritz Haber had done for the German War effort from 1914-1918. Although Helene was probably acquainted with the nature of the fate that lay in store for her at Auschwitz (which the Germans labeled their "worst kept secret"), she hesitated to take the advice as she was disturbed that her brother had introduced Germany to chemical warfare. She pondered her desperate situation. The fact that he had constructed the historic prototypes of the Polish gas chambers she weighed against his gas defence achievements that had saved lives of countless German soldiers.<sup>11c</sup> Painfully she revived memory of Clara Haber who committed suicide after the first Ypres gas attack when she failed to convince Fritz that he should quit the lethal gas war. She may also have pondered the words of the prophet Hosea who warned his people, "For they sow to the wind and they shall reap the whirlwind." In the end she wrote the letter, received no reply, and found her name stricken from the list of transports. Renewed in spirit she returned to nursing the sick and comforting the dying. Helene Weigert survived Nazi Germany, as did her daughter and her sister Else. Nearing 80 years of age on her liberation Helene accepted an invitation from her son Karl to come to America, supporting herself in her last years as a companion to the elderly.

In 1952, ceremonies commemorating the fortieth anniversary of the founding of the Kaiser Wilhelm Institute for Physical, Chemistry and Electrochemistry were postponed two months in order to make them coincide with the 84th anniversary of the birth of Fritz Haber. A plaque was unveiled honouring Fritz Haber, the inscription praising his service to his country and to mankind, services which included wresting bread from the air. No mention, of course, was made of the fact that he had also devoted four years of his life to wresting breath from life. The rebuilt complex is now known as the Fritz Haber Institute. The first four decades of this dark century has demonstrated, such as no previous century has, the truly schizophrenic nature of applied science, that house divided against itself in peace and in war. As it entered the second half of the twentieth century perhaps it was fitting that Haber's Institute should carry on its work in a *divided city*.

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*Abbreviations:* Asterisk (\*) — first page of an article;  
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