The public health value of the Law of Moses

Stephen Palmer

THREE MONTHS of genocide in Rwanda in 1994 resulted in over half a million deaths, mostly Tutsi civilians slaughtered by Hutu militiamen. One consequence was that at least 2.2 million refugees fled to neighbouring countries, and in particular to Zaire. The refugee camp in Goma was the largest refugee camp of recent times, with over one million people.

The current affairs magazine *Newsweek*, in its report published on 1 August 1994, described the plight of these refugees:

> "The terrified flight from Rwanda dwarfed the other mass migrations of a stricken decade. By the end of last week, 2 million or more people, a quarter of the population, had left the country . . .
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> "But the refugees sought sanctuary in a barren place: hard volcanic ground alongside the toxic water of polluted lake Kivu. They were beset by a biblical array of pestilence: cholera, dysentery, bubonic plague and measles. By last Friday they were estimated to be dying at the rate of one a minute".

The reason for the epidemics that devastated the refugees was clear to see when the World Health Organisation aid workers arrived. The volcanic ground was too hard to dig pit latrines and so the refugees used the lake as the bathroom. The lake also served as the source of drinking water. Consequently, the refugees ended up drinking sewage. One case of cholera quickly became hundreds and then thousands.

Cholera and dysentery are bacterial infections acquired by swallowing the germs that are excreted in the faeces of infected cases. In the dire circumstances of the refugee camp the excrement would end up in the drinking water drawn from the heavily contaminated lake. Probably every single person in the camp was thereby exposed to the organisms.

The Law ahead of its time

The epidemic diseases of the Rwanda camps are well known among the classical diseases of historical importance that have turned the course of human history. It is often recorded that the enteric scourges of cholera and dysentery killed more soldiers in wartime than any weapon. The best generals were those that ensured uncontaminated water and food for their soldiers. But the principles of the hygiene needed to keep such camps healthy have only relatively recently been understood.

This scene of refugees fleeing with their belongings has been repeated many times over the last few years. (Supplied by the United Nations refugee organisation.)

How was it, therefore, that the two million or so Israelites who fled overnight into a "barren place" did not suffer from "a biblical array of pestilence"?

It was not until the middle of the nineteenth century that the principles of modern public health were established, yet the Law of Moses anticipated these developments by 3,500 years. One writer has said:

> "One has but to read the Bible carefully and thoughtfully to conclude that the wisdom expressed therein regarding health, hygiene and sanitation form the groundwork of today's public health rules. As one closes the book he must realise that these biblical rules on health and hygiene were far in advance of, and superior to, any which then existed in the world. Many of these hygienic precepts have been little improved upon to this day, and are as worth following now as when they were first promulgated".[1]

The modern public health movement in Britain followed a series of cholera epidemics that swept the country. They particularly affected the populations of the rapidly growing industrial towns and cities. Relatively high wages attracted a mass migration from the countryside. However, housing was completely inadequate, with horrendous overcrowding and no sewage disposal facilities, nor, of course, was there any running water. Water would be drawn from pumps supplied with water from rivers and streams or wells heavily contaminated by the sewage that was thrown out of the houses into canals or ditches or gutters. The problem grew to such an extent that the Privy Council sent inspectors throughout the country to investigate the health of the population. Their written accounts give graphic details of the piles of human waste building up in streets and the generally awful living conditions of the working classes.

At this time the germ theory of disease had not been discovered. Then it was believed that diseases were caused by the foul odours emanating from the waste. Nevertheless, the remedy was effective; provide clean running water and build drains to remove the sewage. Money had to be raised to do this, and there was considerable opposition from the wealthier classes. To their discredit, the medical professionals were often on the wrong side of the debate. However, through the Public Health Act of 1849 local communities were empowered to raise a levy to pay for water and drains, the beginning of Local Borough Councils. The results of the sanitary revolution included the virtual disappearance of cholera from the country by the turn of the century, and a greatly reduced incidence of enteric fever and dysentery.

To us it is now obvious that sewage should be kept separate from food and water, but it was not obvious even 150 years ago, and in many parts of the world even today the basic principles of sanitation are either not understood or ignored. It is therefore all the more remarkable that the Law of Moses should emphasise the wisdom so recently discovered:

> "Moses has been characterised as the greatest sanitary engineer that the world has ever seen. His doctrines laid down in that fine treatise on hygiene, the book of Leviticus, could be summed up by the objects of sanitation today—pure food, pure water, pure air, pure bodies, and pure dwellings".[2]

Recently medical historians have become sceptical about these sorts of conclusions made by an earlier more God-fearing generation. It has been pointed out that the reasons given for keeping the 'sanitary' rules are explicitly to do with religion and not health. This is indeed the case, but it makes the insights all the more remarkable. How was it possible that an overtly religious code could, as it were in passing, capture such fundamental insights essential for the health of a huge and mobile 'refugee' camp?

Hygiene in the camp of Israel

To understand the marvel of this Law, consider the regulation about using pit latrines outside the camp:

> "Thou shalt have a place also without the camp, whither thou shalt go forth abroad: and thou shalt have a paddle upon thy weapon; and it shall be, when thou wilt ease thyself abroad, thou shalt dig therewith, and shalt turn back and cover that which cometh from thee: for the LORD thy God walketh in the midst of thy camp, to deliver thee, and to give up thine enemies before thee; therefore shall thy camp be holy: that He see no unclean thing in thee, and turn away from thee" (Deut. 23:12-14).

The principle, if followed, would have saved thousands of lives. If it could be put into practice even now in the towns, cities and villages of developing countries it would save millions of lives a year. When the infrastructures that implement the principles break down then epidemics reappear. A graphic example of this was in the early 1990s in Peru. The decay and collapse of old drains and sewers and the subsequent contamination of water supplies was blamed for the epidemic spread of cholera, which caused a million cases.

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1. Wain, *History of Preventive Medicine* (1970).
2. R. H. Major, *A History of Medicine* (1954).

But notice the reason that Israel should keep the statute. Nothing about health is mentioned. The reason was that the angelic presence walked through the camp, and angels do not like to see human faeces on the ground! What a remarkable incentive to keep the Law, and what a striking way in which to set the tone of the camp. Human excrement was considered offensive to the unseen angelic presence, and surely therefore, by inference, it should have been offensive to Israel themselves. The rule applied to a specific instance, but the wider principle inferred in the commandment would serve them well in all domestic circumstances. Here was perfect harmony between the spiritual and the natural.

We can see from this example how the Law could promise health to those who kept it, even though the motivation for keeping it was raised above the natural plane:

> "And [God] said, If thou wilt diligently hearken to the voice of the LORD thy God, and wilt do that which is right in His sight, and wilt give ear to His commandments, and keep all His statutes, I will put none of these diseases upon thee, which I have brought upon the Egyptians: for I am the LORD That healeth thee" (Ex. 15:26);
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> "And the LORD will take away from thee all sickness, and will put none of the evil diseases of Egypt, which thou knowest, upon thee; but will lay them upon all them that hate thee" (Deut. 7:15).

Washings in the Law

Coupled with the principle of digging latrines outside the camp was the emphasis given to running water. "And when he that hath an issue is cleansed of his issue; then he shall number to himself seven days for his cleansing, and wash his clothes, and bathe his flesh in running water, and shall be clean" (Lev. 15:13). The Hebrew word for 'running' means 'living', and gives a very wonderful perspective to the commandments.

This is just one commandment, but it must have put the idea into the Hebrew mind that running as opposed to stagnant water was associated with removal of the risk of contagion. The "issue" seems to have been an unnatural discharge of matter from the body. Some have associated it with the symptoms of gonorrhoea, but in the days when there were no serious cures for infection many other causes of sepsis might eventually result in a discharge from the body.

This commandment also recognised the concept of the transmission of uncleanness by direct and indirect contact with an infected person and any inanimate objects that had been in contact with the infected person:

> "Speak unto the children of Israel, and say unto them, When any man hath a running issue out of his flesh, because of his issue he is unclean. And this shall be his uncleanness in his issue: whether his flesh run with his issue, or his flesh be stopped from his issue, it is his uncleanness. Every bed, whereon he lieth that hath the issue, is unclean: and every thing, whereon he sitteth, shall be unclean. And whosoever toucheth his bed shall wash his clothes, and bathe himself in water, and be unclean until the even. And he that sitteth on any thing whereon he sat that hath the issue shall wash his clothes, and bathe himself in water, and be unclean until the even. And he that toucheth the flesh of him that hath the issue shall wash his clothes, and bathe himself in water, and be unclean until the even. And if he that hath the issue spit upon him that is clean; then he shall wash his clothes, and bathe himself in water, and be unclean until the even. And what saddle soever he rideth upon that hath the issue shall be unclean. And whosoever toucheth any thing that was under him shall be unclean until the even: and he that beareth any of those things shall wash his clothes, and bathe himself in water, and be unclean until the even. And whomsoever he toucheth that hath the issue, and hath not rinsed his hands in water, he shall wash his clothes, and bathe himself in water, and be unclean until the even" (vv. 2-11).

Everyone who has ever worked in a hospital or surgery will recognise the principles expounded in this passage. A basic requirement of the prevention of cross-infection is the safe disposal of contaminated dressings, and the decontamination of laundry and other items that have come into contact with infected patients. It is, however, very difficult to ensure that organisms do not pass from one person to another even in the most modern and well-staffed hospital. Before the introduction of antisepsis by Joseph Lister in the 1880s, hospitals were exceedingly dangerous places to be. Mortality from wound infection was huge. And doctors were very reluctant to accept that their unhygienic practices had anything to do with it. Ignaz Semmelweis had

pointed out that in the obstetric wards of the hospital in Vienna the maternal mortality from puerperal fever was much higher on the wards where medical students were being trained, compared with the wards run by midwives. The reason was that the medical staff would come to do a ward round straight from the postmortem room, carrying infection on their hands and clothes and then passing it on to the new mothers. Semmelweis instituted a regime of hand washing which reduced the death rates. The hostility of his colleagues resulted in his demotion and professional ridicule.

In the UK today it is reckoned that about one in nine patients admitted to hospital develops an infection acquired whilst in hospital. Much of this is the direct result of the failure of staff to wash their hands after handling infected people or materials. In many other parts of the world the situation is much worse. How is it possible, then, that the Law of Moses should have such a clear insight into the aspect of preventive medicine? And the Law provided a powerful incentive to avoid such contamination. To be contaminated put a person out of action for the rest of the day.

Contact with dead bodies

Throughout most of history by far the most important cause of death was infectious diseases. The body of a person or an animal dying of disease could well still be infectious. The truth of this is recognised in the hygiene precautions taken by undertakers and pathologists in handling the bodies and tissues of the dead. An example, which may have been very important in the wilderness of Sinai, is the bacterial disease anthrax, common today in Africa and other tropical areas, which can be transmitted to humans from the carcasses of fallen animals and from their skin and bones and meat. So potent is anthrax as a potentially fatal infection that it is one of the main components of the feared germ-warfare programmes of dissident countries today.

The disease known as plague can also be transmitted to humans from contact with dead bodies. One of the earliest examples of germ warfare occurred in 1347 when the Mongols of the Golden Horde laid siege to Kaffa in the Crimea. Plague broke out amongst the Mongols, probably caught from marmots used for their fur. Contemporary accounts report that the Mongols threw the bodies of those dying from plague over the walls of the city they were besieging. Plague spread along the trade routes to Europe and the resultant Black Death killed a quarter of the population of the continent.

Smallpox, another disease that throughout history until its global eradication in the early 1980s was a major scourge, can be transmitted from corpses. So also can the louse-borne disease typhus. Those disposing of the bodies of prisoners dying of typhus in the concentration camps of Europe after the Second World War themselves succumbed to the disease.

The relevance of all this to the Law of Moses is that through this Law Israel was taught to consider the bodies of dead animals and people to be unclean and to be avoided if possible. Those who did come into contact were put out of circulation for a set period of time. In the case of contact with a human corpse the one in contact had to remain outside the camp for a full week. This would be a useful period of quarantine as well as a major disincentive to touch a carcass.

The instructions to the Israelites were as follows:

> "These [the various creeping animals of the preceding verses] are unclean to you among all that creep: whosoever doth touch them, when they be dead, shall be unclean until the even. And upon whatsoever any of them, when they are dead, doth fall, it shall be unclean; whether it be any vessel of wood, or raiment, or skin, or sack, whatsoever vessel it be, wherein any work is done, it must be put into water, and it shall be unclean until the even; so it shall be cleansed. And every earthen vessel, whereinto any of them falleth, whatsoever is in it shall be unclean; and ye shall break it. Of all meat which may be eaten, that on which such water cometh shall be unclean: and all drink that may be drunk in every such vessel shall be unclean. And every thing whereupon any part of their carcase falleth shall be unclean; whether it be oven, or ranges for pots, they shall be broken down: for they are unclean, and shall be unclean unto you. Nevertheless a fountain or pit, wherein there is plenty of water, shall be clean: but that which toucheth their carcase shall be unclean. And if any part of their carcase fall upon any sowing seed which is to be sown, it shall be clean. But if any water be put upon the seed, and any part of their carcase fall thereon, it shall be unclean unto you. And if any beast, of which ye may eat, die; he that toucheth the carcase thereof shall be un-

> clean until the even. And he that eateth of the carcase of it shall wash his clothes, and be unclean until the even: he also that beareth the carcase of it shall wash his clothes, and be unclean until the even" (Lev. 11:31-40);
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> "He that toucheth the dead body of any man shall be unclean seven days . . . Whosoever toucheth the dead body of any man that is dead, and purifieth not himself, defileth the tabernacle of the LORD; and that soul shall be cut off from Israel . . . And whosoever toucheth one that is slain with a sword in the open fields, or a dead body, or a bone of a man, or a grave, shall be unclean seven days" (Num. 19:11-16).

In these passages there is a clear recognition that the carcasses of diseased animals can transmit 'uncleanness' to anything which they come into contact with, and that these secondarily contaminated objects can also transmit 'uncleanness'.

Food laws

The food laws of the Hebrews are very well known and frequently commented upon. Only a few animals were good for food, and generally we would recognise these as food animals today. Although in the Far East and Africa exotic game is considered a delicacy, there are significant risks to health. In particular, Israel were forbidden to eat pork. Nowadays, in modern hygienic farms, pigs can be reared without the historically important diseases such as the pork tape worm and the round worm *Trichinella spiralis.* But in the wilderness setting, as in any uncontrolled environment, the habit of pigs of eating waste and carrion means that they are a considerable risk as food animals.

The pork tape worm is more sinister for humans than the bovine form. Humans become infected when they ingest the cysts of the tape worm in the flesh of the pig. The cysts hatch in the gut to form a tape worm many feet long. The eggs of the tapeworm are excreted in the faeces. Pigs pick up the eggs in their grovelling and become infected with the larval stage of the parasite. Unfortunately humans can also ingest the eggs from their own or another's infection, and they then develop a much more serious form of the disease, with cyst formation throughout the body. These cysts can infect the brain, and it is possible that Legion (see Luke 8:26-36) was suffering from this disease. A link between his condition and the herd of swine seems very likely, and not just in his mind.

Another disease, trichinosis, is common in parts of the world, and the major culprit is undercooked pork or wild boar. This disease can be fatal. In the setting of the ancient world it was a wise precaution to avoid pork. The fact that the Israelites were commanded to eat only animals which chewed the cud (Lev. 11:3) of course taught the important spiritual lesson of the need to 'chew the cud' of the Word of God.

Quarantine

The way in which leprosy was controlled has drawn considerable comment. Much debate has been taken up with the question of whether the leprosy of the Bible was the disease called by that name today. In all probability it was not. It looks as though several different conditions may have been covered by the detailed clinical descriptions in Leviticus 13. Possibly it was a specific condition which is not prevalent today. Even so the account is remarkable in its close attention to signs. One writer has said: "The material contained in some portions of the Pentateuch (such as chapter 13 of the book of Leviticus) is so factual that even the sophisticated present-day student cannot help but be amazed at what he reads there".[3]

Once the diagnosis was suspected the patient was put into isolation for a week and then examined again. If doubt continued, so did the quarantine. If the diagnosis was confirmed, the patient was put outside the camp until cured. How many cases did remit quickly and how many were chronic or life-long infections we cannot tell. What we can say is that the principle of contagion recognised in this law was not understood by societies for many hundreds of years after Israel were taught about it:

> "Among the physicians of classical antiquity we find no consistent view of transmission of infection by contact. Indeed the whole idea of infection was effectively absent from them, so that preventive measures based upon them could not be developed. It was reserved for the Middle Ages to conceive serious official measures against spread of epidemics. *These measures were constantly derived from the leper ritual of the Bible* with its fundamental concept of isolation".[4]

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3. F. Rosner, *Medicine in the Bible and Talmud* (1977).
4. C. Singer and E. A. Underwood, *A Short History of Medicine* (Oxford, 1962).

Two other prescriptions of the Law are of particular importance today. The commandments against sexual contact outside marriage would protect Israel against one of the commonest groups of infections worldwide. In some parts of the world the prevalence of sexually transmitted diseases in the adult population is measured in tens of per cents. One sexually transmitted disease is of particular importance. It is remarkable that, from its first recognition, HIV / AIDS spread around the world within a couple of years. In parts of South Africa the prevalence of HIV in the general adult population may be as high as ten to twenty per cent. Globally, the World Health Organisation reports that there are now 30 million infected people.

HIV, as with many other infections, such as hepatitis B and C, can also be spread by blood-to-blood contact, as when drug users share needles or when knives are used for scarification rituals, or indeed in tattooing parlours and for any unhygienic body piercing. We do not know whether HIV was around in Bible times. Diseases do come and go throughout the course of history. But it seems to me highly likely that blood-borne infection would have been a threat then as now. It is therefore particularly interesting that scarification and piercing were prohibited by the Law: "Ye shall not make any cuttings in your flesh for the dead, nor print any marks upon you: I am the LORD" (Lev. 19:28).

Conclusion

The only possible explanation for the fact that the Law was three-and-a-half thousand years ahead of its time is the claim the Scriptures themselves make for it. It was not in fact the Law of Moses, but the Law that God gave to Moses. The absence of direct reference to the medical value of the Law should not throw us. It is in fact a remarkable additional point. If the Law had been a human work then we would have expected to see among the rituals designed by human imagination at least some things that would be dangerous as far as modern medicine is concerned. The fact that the whole tenor of the Law promoted health is a truly remarkable sign of its inspiration. The contemporary societies surrounding Israel knew nothing of these principles. Theirs was a world of magic and incantations. The complete absence of error in Scripture is a strong rebuff to the idea that Moses learned the wisdom of the Law from Egyptian or Sumerian society.

Calibrated radiocarbon dating

John Watts

THESE ARE difficult times for believers, and the confident assertions of scientists can erode faith. We are assured that there are scientific 'facts' that prove or demonstrate this or that about the past and that flatly contradict Scripture. The uninformed listener is easily persuaded; but a closer, more informed look at science always shows that this confidence is an illusion.

The reason for this rather technical survey of radiocarbon dating is to show that there is little reason to be concerned about the claims of the chronologists. These notes are in fact a revision and expansion of a short article on radiocarbon dating published over thirty-five years ago in another *Testimony* Special Issue.[1] All that has really changed is that the method then acclaimed by scientists as totally reliable has been found untrustworthy, and has been replaced with a new approach, which is also claimed to be most certainly reliable. We have been here before; theories come and go, but God's Word still stands.

The method

The introduction of the radiocarbon method of dating during the 1940s was welcomed with enthusiasm as an independent, objective, scientific approach that would once and for all allow precise dating of the past. It was based on very simple principles. Atmospheric carbon, almost entirely in the form of the gas carbon dioxide, contains a small amount of the radioactive isotope carbon-14 (C14). By the conventional laws of radioactivity, this isotope decays at a fixed rate, with a half-life of decay of about 6,000 years. Decayed C14 is replaced by the formation

1. "Carbon 'Fourteen' Dating", Sept. 1965, p. 353.