

Ellen White, Health, and the Third Angel's Message: Part 3– Recognizing Environmental Hazards and Minimizing Their Impact

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Introduction

Satan's rebellion in heaven centered around his dissatisfaction with the principles and organization of the heavenly domain (Isa 14:12–14). In his first recorded interchange on earth after his expulsion from heaven, Satan inferred there was a moral defect in God's character in the words "You will not surely die" (Gen 3:4) in response to Eve's repetition of God's advice that death would follow disobedience (v. 3). Eve was deceived by his persuasive reasoning. After Adam's choice to follow Eve in rebellion, God's portrait (image) commenced to be erased in humanity through disbelief and disobedience. This process has continued with the vast majority of the race.

In his perfect state, Adam was given dominion or rulership over the recently created earth. How long he retained this role is uncertain, but as soon as he joined Eve in disobedience he "betrayed his sovereignty" to Satan,¹ who thereby became prince of this world (John 14:30). In exchange Adam and Eve became slaves of Satan (Rom 6:16–18)—a poor trade for

¹ E. G. White, *The Desire of Ages* (Mountain View, CA: Pacific Press Publishing Association, 1940), 129, 130.

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gaining the knowledge of evil. There is one area Adam did not relinquish dominion over through disobedience, the human mind.

Today, God's stewards—those who are having His image remade in them through the ministry of the Holy Spirit—will display certain characteristics, for they are acting as God's representatives or ambassadors. They also will have a driving motivation to be sharers in the ministry of reconciliation (2 Cor 5:20). The primary areas of emphasis through which they endeavor to witness are highlighted in the three angels' messages. The ministry of reconciliation given to believers first and foremost involves sharing the good news of eternal salvation with others (Matt 28:19–20; Rev 14:6). However, their responsibility does not end there.

Clear thinking is required in the stewards of God's reconciliation ministry. The brain circuits need to be functioning optimally.² Such an outcome reflects advanced ideas about healthful living, for care of creation starts with the steward. The apostle Paul concisely states that we are to bring glory to God in our eating, drinking, and doing (1 Cor 10:31). The outworking of this instruction is most readily achieved by adopting a vegetarian life style, for such an approach is patterned after the original (Gen 1:29) and has been found to promote health. Such a life style not only serves to protect the magnificent machinery of the human body, but also preserves the interests of the animal world too. They should not suffer from cruelty and death on account of our perverted appetites (cf. Exod 20:10).³ Care of the animal world comes from ideas of stewardship of God's creatures and empathy concerning their feelings, but also from an understanding that an ecosystem cannot function efficiently without the preservation of all its biological components. The efficient functioning of this system requires an appreciation that human activities influence the sustainability of the planet and one might reasonably extend this to an understanding of climate change on disease incidence among the human population. The emphasis in Revelation 11:18 bears on this subject, which speaks about God's attitude towards those who show a cavalier attitude towards His works.

² E. G. White, *Education* (Mountain View, CA: Pacific Press Publishing Association), 209.

³ R. Preece, *Sins of the Flesh: A History of Ethical Vegetarian Thought* (Vancouver: University of British Columbia Press, 2008), 120.

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Instructions on preferred human practices sometimes are mentioned directly in Scripture and at other times can be inferred. These instructions are for our benefit. For example, the placement of the progenitors of the human race in a garden setting and God's attitude towards the first city dwellers (Gen 2:15; 11:1–8) is revealing. The moral and physical pollution often associated with cities is well known and the inference from our texts is that country living is the ideal.

During the exodus experience, Moses instructed the people in the principles adopted in a supplemented version of our modern Newstart health program (cleanliness and genetic diversity added).⁴ Aspects that I initially will emphasize here are personal cleanliness including animal waste disposal, the living conditions to be maintained in their dwellings, and nutrition (cf. Gen 1:29; Exod 19:10, 11; Deut 23:12, 13; Lev 11:24–36; 14:33–45). All this information was given by God in order to promote holistic health. Ellen White expanded on these principles and modern science has provided extensive further insights. As the discussion proceeds, I will attempt to indicate the understandings entertained by forward thinkers when White wrote. However, the reader should bear in mind that her primary inspiration came from the Scriptures.

Cleanliness

Environmental and social conditions are certainly factors that contribute or predispose to disease, which were not lost on the more thoughtful scientists and others operating in the nineteenth century. Community and global health are dependent on biologic, environmental, and social conditions being maintained at reasonable levels.⁵ This means that disease cannot develop without the right environmental conditions prevailing.

In the nineteenth century, while the debate was proceeding on how disease was transmitted and, indeed, its very nature, the more pragmatic sought ways in which to minimize the impact of disease. Improving the living conditions of the poor, spearheaded by the sanitary movement, was

⁴ Warren A. Shipton, "Holistic Health and the Exodus," *Asia-Africa Journal of Mission and Ministry* 13 (2016): 57–83.

⁵ L. N. Magner, *A History of Medicine* (New York: Marcel Dekker, Inc., 1992), 328; T. H. Tulchinsky and E. A. Varavikova, *The New Public Health*, second edition (Burlington, NY: Elsevier Academic Press, 2009), 24.

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championed by Edwin Chadwick in Britain. His influential report of 1842 led eventually to the passage of a significant Public Health Act (1848).⁶ A credible reason for cleanliness was offered by John Snow following his remarkable detective work on the cholera outbreak in London in 1854. His studies indicated that a contagious agent (germ) was involved, since it was possible to contract the disease in mines in the absence of sewers and swamps. Some of the cases observed in towns raised his suspicions that contaminated bed linen also acted to transfer infected material from one room occupant to another.⁷

Outbreaks of cholera occurred in the United States in 1832, 1849 and 1866.⁸ Most could see that the condition was contagious by following the pattern of spread of the pandemics, but many could see that there was also some underlying environmental cause. The idea of cleanliness and sanitation was largely an abstract notion during the earlier epidemic, but began to appeal to some as the pathway to halt the disease.⁹ A opinion developing when Ellen White wrote (1865) about cholera was that the disease was of a contagious nature,¹⁰ being able to be transmitted through contaminated bedding, filth from privies (based on somewhat inadequate observations),¹¹ and sewage contaminated drinking water, as demonstrated brilliantly by John Snow.¹² White also indicated that cholera could be transmitted through food.

The sanitary disposal of human waste and personal cleanliness today are regarded as of primary importance in controlling the disease. We now know that the reservoir of the disease is infected humans with the organism

⁶ I. Morley, "City Chaos, Contagion, Chadwick, and Social Justice," *Yale Journal of Biology and Medicine* 80 (2) (2007): 61–72.

⁷ D. Vachon, "Doctor John Snow," *Old News* 16 (8) (2005): 8–10.

⁸ R. Koch, "The Cholera Bacillus," *Science* 3(66) (1884): 574–576.

⁹ J. N. Hays, *Epidemics and Pandemics: Their Impacts on Human History* (Santa Barbara, CA: ABC-CLIO, Inc., 2005), 211–227; C. E. Rosenberg, *The Cholera Years: The United States in 1832, 1849, and 1866* (Chicago, IL: University of Chicago Press, 2009), 17–23; 125–143.

¹⁰ E. G. White, *Selected Messages* (Washington, DC: Review and Herald Publishing Association), 2: 418.

¹¹ Anonymous, "Cholera Literature," *British Medical Journal* 2 (305) (1866): 505–508; W. Budd, "Cholera: Its Cause and Prevention," *British Medical Journal* 3(116) (1866): 283.

¹² N. Paneth, "Assessing the Contributions of John Snow to Epidemiology: 150 Years After the Removal of the Broad Street Pump Handle," *Epidemiology* 15(5) (2004): 514–516.

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also displaying an ability to persist in ponds, rivers, and brackish water in association with the zooplankton.¹³ It is primarily a water-borne disease as demonstrated by John Snow in 1855 (publication date) when he showed that fecal contamination of water sources was responsible for the spread of the disease in London. Food contamination is also a potent means of transmission. All types of foods including meat products are implicated on account of improper handling, undercooking, or washing in contaminated water. In underdeveloped countries these problems are experienced on a regular basis.¹⁴ And there are a considerable number of other diseases transmitted via contaminated water, including parasites that are cancer inducing.¹⁵

In White's statements about cholera and other diseases, she was highlighting the advice given by God to Moses.¹⁶ The sagacity of this advice is illustrated too by reference to historic records. In East London's crowded quarters at the turn the nineteenth century, health practitioners were fascinated to observe the lower rates of infant deaths among the Jewish population from infectious and respiratory diseases. This positive outcome has been explained by the close attention they gave to the biblical instructions on isolation and quarantine as well as to their interest in and attention to diet, the sparse use of alcohol, and personal hygiene. Personal hygiene requirements included hand washing before and after meals and keeping the surroundings clean. Utensils used in food preparation were also kept clean and milk and meat were not mixed nor were the

¹³ G. C. de Magny, G. K. Mozumder, C. J. Grim, et al., "Role of Zooplankton Diversity in *Vibrio Cholera* Population Dynamics and in the Incidence of Cholera in the Bangladesh Sunderbans," *Applied and Environmental Microbiology* 77(17) (2011): 6125–6132.

¹⁴ A. Mrityunjoy, F. Kaniz, J. Fahmida, J. S. Shanzida et al., "Prevalence of *Vibrio Cholerae* in Different Food Samples in the City of Dhaka, Bangladesh," *International Food Research Journal* 20 (2) (2013): 1017–1022; G. H. Rabbini and W. B. Greenough, "Food as a Vehicle of Transmission of Cholera," *Journal of Diarrhoeal Disease Research* 17 (1) (1999): 1–9.

¹⁵ M. C. Botelho, I. Veiga, P. A. Oliveira et al., "Carcinogenic Ability of *Schistosoma Haematobium* Possibly Through Oncogenic Mutation of KRAS Gene," *Advances in Cancer: Research & Treatment*, 2013, 876585; UNICEF, "Water, Sanitation and Hygiene," (2003). Online: http://www.unicef.org/wash/index_wes_related.html (16/07/2018).

¹⁶ E. G. White, *The Ministry of Healing* (Mountain View, CA: Pacific Press Publishing Association, 1942), 277–280.

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implements/utensils used to handle these food items.¹⁷

Besides these explanations, the escape from cholera and other diseases by the Jews during this period has been attributed to the kosher preparation requirements for meat (resulted in there being fewer risks of diseased food being eaten), the practice of boiling water and milk, and using clean cooking and eating utensils. The religious laws also improved personal hygiene over the general population in that they required that nails be trimmed once a week and that women take a ritual bath once per month after menstruating. The immigrant Jews in London also customarily bathed on account of their general attitude towards cleanliness.¹⁸

Ellen White continually drew attention to the great principles of health outlined by the prophet Moses many years before. It illustrates the soundness of the advice given by God and the reality of the promise: “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 ...” (Exod 15:26, KJV).

Decay and Some Consequences

Historians differ on the thought movements in the mid-nineteenth century when social causes of disease (sanitation) competed with the germ theory for prominence. The sanitary conditions in some cities were appalling with their open sewers, toilets that did not discharge properly, and foul waste rotting in the streets creating an almost unbearable stench. Not surprisingly, epidemics were rife. This led to massive sanitary reforms from the mid-century onwards. By the end of the century, the emphasis was on disease prevention caused by microbes.¹⁹

Bad Air. The cholera epidemics of the nineteenth century terrified the populace and galvanized some into action. The sanitary reforms advocated by Edwin Chadwick in England in 1842 arose as a result of his efforts to find the cause of cholera outbreaks. An influential idea promoted by him and others was that decomposition of both vegetable and animal matter

¹⁷ L. V. Marks and M. P. Worboys, eds. *Migrants, Minorities and Health* (London: Routledge, 1997), 193–195.

¹⁸ *Ibid.*, 194, 207.

¹⁹ S. N. Tesh, “Miasma and ‘Social Factors’ in Disease Causality: Lessons from the Nineteenth Century,” *Journal of Health Politics, Policy and Law* 20(4) (1995):1001–1024.

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gave rise to poisons (miasma, effluvia, or atmospheric impurity), which when taken on by the human body led to fever. Miasmas, carrying volatile poisonous material, were considered the main cause of epidemics and contagious diseases. Whether the belief was in bad air or a specific microbe, an identifiable entity was involved in disease. The radical difference between the miasma and germ theories was that miasmas could cause many illnesses whereas the germ theory held that diseases were linked to specific organisms. An intermediate element was that some practitioners believed that poisons could arise from the exhalations of fevered individuals in closed rooms, which meant that the disease could be passed on—it was transmissible. Others believed that it was possible to talk of “*miasma in a germ*” just as readily as a “*contagium*” (*contagium vivum*—contagious living fluid). This type of reasoning led to an easy movement from poisons in the air to microbes carrying poisons.²⁰ For those believing contagious elements were involved in causing disease, the poisons carried by them were considered capable of explaining the symptoms. The real breakthrough came when it was discovered that the contagion or miasma containing the poison was in fact a living organism that could multiply in an individual. The discovery that microbes actually elaborated toxins came in 1886.²¹

Some hold that mid-nineteenth century the medical fraternity appreciated something of the complexity of the debate and consequently were often not dogmatic about the cause of disease. Certainly, few accepted that there was a single cause, although there was a uniform wish to avoid exposure to pollution.²²

This appears to be the opinion expressed in an article reprinted in the *Health Reformer* in 1873 dealing with typhoid fever. Comments offered in the article emphasized that hygienists spoke of poisons taken into the system, whereas other held that germs were responsible.²³ As we will observe in the following paragraphs, White wrote mainly from a hygienist's point of view rather than medical microbiology viewpoint early in her

²⁰ Ibid.; J. B. Sanderson, “Lectures on the Infective Processes of Disease,” *British Medical Journal* 2(886) (1877): 879–881.

²¹ B. Beutler and E. Th. Rietschel, “Innate Immune Sensing and its Roots: The Story of Endotoxin,” *Nature Reviews Immunology* 3(2) (2003): 169–176.

²² Ibid.

²³ M. G. Kellogg, “Typhoid Fever,” *Health Reformer* 8 (12) (1873): 253–256.

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career, although this changed marginally in some areas between 1865 and 1905 as shown in Table 1.

From our discussion so far, the conditions predisposing to disease are of primary interest. Table 1 illustrates that when White was speaking freely about germs causing human diseases, she was still speaking about miasma and effluvia when referring to emanations from rotting vegetation. Readers might be reminded that *Ministry of Healing* covered many of the issues raised in the Health Vision so that parallel comparisons can be made. This indicates to the present writer that she intended to convey to readers the concept that the principle (poison) coming from rotting vegetation was to be distinguished from microbes causing disease.

Table 1. Terms used by White from 1865 to 1905 to describe the agent involved in the acquisition of disease.²⁴

Term used	Situation	Year
Predisposing conditions for disease		
Effluvia	Decaying vegetable matter	1864/5
Poison	Decaying leaves	1864/5
Poisonous miasma	Wetting/drying of soil	1864/5
Poisonous elements	Sickroom	1905
Miasma	Poorly drained ground	1905
Poison	Decaying vegetation	1905
Contagious elements involved		
Poisonous infection/diseased air	Sickroom	1865
Humors (implied as being transmitted)	Flesh foods	1875
Germs of disease	City air	1905
Death producing germs	Decaying refuse	1905
Transmissible diseases		
Poisonous flesh	Eating swine affected by plague	1864/5
Impurities	Tuberculosis, leprosy, and cancer come because pork eaten	1865
Germs	Tuberculosis, cancer, and other fatal diseases transmitted through eating meat	1905
Parasites	Swine's flesh contains	1905

²⁴ E. G. White, *Counsels on Diet and Foods* (Washington, DC: Review and Herald Publishing Association, 1946), 388, 392, 393; *Ministry of Healing*, 13, 220, 262, 274, 276; *Spiritual Gifts* (Washington, DC: Review and Herald Publishing Association, 1945), 4a: 141, 144, 148; *Selected Messages*, 2: 419, 457, 461, 463, 464; *Testimonies for the Church* (Mountain View, CA: Pacific Press Publishing Association, 1948), 3: 363.

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Damaging Gases and Other Substances Coming from Filth. White spoke briefly about the housing and transport arrangements for animals. In these passages she did not refer to effluvia or miasma, but rather “poison of filth” and “foul air” from filth.²⁵ She noted that animals housed indoors were sometimes forced to breathe the “poison of filth left in barns and stables” and during transport were forced to breathe the “foul air arising from accumulated filth.” As a result of this insult on nature, the lungs of the animals become unhealthy through “inhaling such impurities” and the animal becomes diseased generally.²⁶ Writing about the similar housing arrangements later (1905), she again indicated that the air in “filthy stables” led to a poor quality of meat for market.²⁷

Animal manures are high in nitrogen content. As it decays, gases are released of which ammonia is of particular interest. The most significant sources of such gases are the cattle, poultry, and pig industries.²⁸ In poultry the gas has adverse effects on hen growth and the efficient use of food. It causes irritation of the eyes, lungs, air tract inflammation and damage, shortness of breath, interference with the immune system and hence predisposes birds to bacterial infections.²⁹

Ammonia also leads to the generation of particulate matter formed through interaction with other gases. These particles are small (30 times smaller than a human hair; referred to as PM 2.5) and can enter the respiratory system readily and compromise it. The consequences to both animals and humans are irritation to the eyes and respiratory tract, lung damage and the associated shortness of breath, wheezing, and coughing.³⁰ Particulate matter may originate in other ways too. The significant feature is that inhalation of these particles adversely affects animal and human health and increases the incidence of respiratory and cardiovascular

²⁵ White, *Selected Messages*, 2: 418; *Spiritual Gifts*, 4a 147.

²⁶ White, *Selected Messages*, 2: 418.

²⁷ White, *Ministry of Healing*, 314.

²⁸ S. Bittman and R. Mikkelsen, “Ammonia Emissions from Agricultural Operations: Livestock,” *Better Crops* 93(1) (2009): 28–31.

²⁹ C. W. Ritz, B. D. Fairchild and M. P. Lacy, “Implications of Ammonia Production and Emissions from Commercial Poultry Facilities: a Review,” *Journal of Applied Poultry Research* 13 (2004): 684–692.

³⁰ Bittman and Mikkelsen, *op. cit.*

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diseases.³¹

The discourse on environmental pollutants is relevant not only to animal health, but also to human health, as I will indicate. After all, White advised a sensible processing of information in order to figure out the laws of health. Taking on board dangerous gases and particulate matter is damaging to both animal and human health. At both dates cited above when Ellen White wrote (1864/5, 1905), it was well-known that animal manure was a rich source of ammonia.³² The unpleasant and irritating effects of the gas were undoubtedly known, as every worker in manure rich environments cannot have failed to experience.

The wide ranging effects of this and other pollutants were not understood clearly in White's time, although attempts to curb pollution had occurred for at least seven centuries. After the deadly intermittent fogs in Europe from 1930 to 1952, it was well understood that cardiovascular and respiratory problems ensued with the risk of infection being increased. The precise nature of the irritants was not known by mid last century but suggestions included various gases, smoke, and diesel fumes.³³ Today, many have little excuse to be uninformed on these significant issues.

Endotoxins from Bacteria in Decaying Vegetation. White's comments went beyond considerations of poisonous substances arising from animal manure. Poisons were associated with rotting matter by scientists before the mid-1850s. However, their association with microbes was made much later (1886). It was not until 1892 that it was found that some bacteria, when they break down (lyse), release a poisonous substance that was subsequently known as endotoxin.³⁴ This substance is contained in the cell walls of one great category of bacteria (Gram negative) and when released

³¹ Q. Sun, X. Hong and L. E. Wold, "Cardiovascular Effects of Ambient Particulate Air Pollution Exposure," *Circulation* 121 (2010): 2755–2765.

³² M. Cox, "On Ammoniacal Manures," *The New Annual Register, or General Repository of History*, 30 (1810): 217–219.

³³ D. Gloag, "Air Pollution: the 'Classical' Pollutants," *British Medical Journal* 282 (6265) (1981):723–725; R. E. Pattle and H. Cullumbine, "Toxicity of Some Atmospheric Pollutants," *British Medical Journal* 2 (4998) (1956): 913–916.

³⁴ R. Adler, Victor Vaughan, *A Biography of the Pioneering Bacteriologist, 1851–1929* (Jefferson, NC: McFarland & Company, Inc., 2015), 97; Beutler and Rietschel, op. cit.

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in the animal body following death can have adverse effects.³⁵ If released into the environment as aerosols, it can induce a variety of respiratory and other symptoms.³⁶

Against this backdrop in the development of ideas, Ellen White made three interesting statements as follows:

There is constantly arising from these decaying substances [vegetable material] an effluvia that is poisoning the air.³⁷ 1864/5

Numerous shade trees cast off many leaves, which, if not immediately removed, decay, and poison the atmosphere.³⁸ 1864/5

If a house is built where water settles around it, remaining for a time [anaerobic conditions], and then drying away [aerobic conditions], a poisonous miasma arises, and fever and ague, sore throat, lung diseases, and fevers will be the result.³⁹ 1864/5

The common conceptual idea in these statements is that decaying organic material releases poisons into the air, which when breathed are deleterious to health. These poisons could be gaseous or particulate in nature. The decay processes highlighted above encompass the spectrum from decay under conditions where air is present (aerobic) to that where it is essentially absent (anaerobic).

As indicated in Table 1 above, it is my contention that the expressions effluvia, miasma, and poison were retained some forty years after they were given initially for the reason that the principle being referred to differs from that found in other situations.

If we imagine that gaseous products were produced, then those gases identifiable as having the potential for biologic activity are several. In anaerobic environments, such as where organic matter is being decayed,

³⁵ P. M. Lepper, T. K. Held, E. M. Schneider et al., "Clinical Implications of Antibiotic-induced Endotoxin Release in Septic Shock," *Intensive Care Medicine* 28 (7) (2001): 824–833.

³⁶ R. Rylander, "Microbial Cell Wall Agents and Sick Building Syndrome," *Advances in Applied Microbiology* 55 (2004): 139–144.

³⁷ White, *Selected Messages*, 2: 461.

³⁸ *Ibid.*, 463.

³⁹ *Ibid.*, 464.

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methane, propane, hydrogen sulphide, carbon monoxide, hydrogen, phosphines, and other gases would be produced.⁴⁰ Of the many gases generated, methane and hydrogen sulphide are the most significant health-wise. During situations where organic matter is decayed in the presence of air, the gas of interest is nitrous oxide (laughing gas). Now of all these gases the former two do have health impacts at high concentrations, as I will indicate shortly; the latter is of interest only if it is abused.⁴¹

Hydrogen sulphide is a toxic gas when in high concentration. WHO has indicated that hazardous levels may be found in special situations as in the vicinity of fermenting manure, stagnant wells, or in poorly ventilated wastewater facilities.⁴² Episodes of illness resulting from gas exposure under such circumstances are known.⁴³ On the other hand, methane is a well-known odorless, flammable gas formed in landfills, stagnant water, septic tank systems, and sewers. Its danger resides mainly in its health effects at high concentrations and to its asphyxiation properties. In occupational situations its ill effects are evident as dizziness, headache, and tiredness.⁴⁴

In the outdoor situations envisaged by White, it does not seem possible for gas concentrations to reach levels of significance. This is especially the case where decaying vegetation is in the largely aerobic environments (first two quotes above). The real issue to be faced is that the toxic material mentioned must be produced under both aerobic and anaerobic conditions. This means that none of the gases highlighted can figure in the explanation.

A common factor in all situations mentioned by White could involve

⁴⁰ M. Alexander, *Introduction to Soil Microbiology* (New York: John Wiley & Sons, Inc., 1961), 227, 229, 231, 287, 368.

⁴¹ A. J. Waclawik, C. C. Luzzio, K. Juhasz-Pocsine et al., "Myeloneuropathy from Nitrous Oxide Abuse: Unusually High Methylmalonic Acid and Homocysteine Levels," *Wisconsin Medical Journal* 102 (4) (2003): 43–45.

⁴² C.-H. S. J. Chou, *Hydrogen Sulphide: Human Health Aspects* (Geneva: World Health Organization, 2003), 4, 8.

⁴³ M. M. Watt, S. J. Watt and A. Seaton, "Episode of Toxic Gas Exposure in Sewer Workers," *Occupational and Environmental Medicine* 54 (1997): 277–280.

⁴⁴ T. S. S. Dikshith, *Hazardous Chemicals: Safety Management and Global Regulations* (Boca Raton, FL: CRC Press, 2008), 266–268; D. L. Morse, M. A. Woodbury, K. Rentmeester et al., "Death Caused by Fermenting Manure," *Journal of the American Medical Association* 245(1) (1981): 63, 64.

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an outer wall component of the degrading bacteria. The predominant category of bacteria responsible for decay in both aerobic and anaerobic conditions (Gram negative) release a powerful toxin (endotoxin) and other damaging components from their cell walls when they die, which occurs readily when drier conditions prevail. These components are identified readily in outdoor environments associated with such activities as handling household waste, agitating sewage, and being exposed to biological dusts. Toxins are released in association with farming operations and disturbing once flooded soils. The bacteria responsible are known to grow rapidly in stagnant waters of various types. Chronic exposure to endotoxin/other microbial cell wall components, even at levels found in some work environments, can lead to respiratory problems and infections.⁴⁵ The reality of this was brought to public consciousness by Katrina Cough and other respiratory ailments following the inhalation by workers of particulate matter and endotoxins associated with restoration work subsequent to the devastating hurricane in New Orleans.⁴⁶

Inhalation of organic dusts results in nasal and throat irritation, especially among asthma susceptible individuals. When a pure endotoxin sample was inhaled in test situations the symptoms included fever, headache, joint and muscle pain, nausea, and tiredness. Hence, the endotoxin content in organic dusts was considered the major cause of the discomfort by the investigators.⁴⁷ The statements of White are consistent

⁴⁵ G. M. Solomon, M. Hjelmroos-Koski, M. Rotkin-Ellman et al., "Airborne Mold and Endotoxin Concentrations in New Orleans, Louisiana, After Flooding, October-November 2005," *Environmental Health Perspectives* 114 (9) (2006): 1381-1386; R. Rylander, "Microbial Cell Wall Agents and Sick Building Syndrome," *Advances in Applied Microbiology* 55 (2004): 139-154; J. Thorn, L. Beijer and R. Rylander, "Airways Inflammation and Glucan Exposure Among Household Waste Collectors," *American Journal of Industrial Medicine* 33 (5) (1998): 463-70; J. Thorn, L. Beijer, T. Jonsson and R. Rylander, "Measurement Strategies for the Determination of Airborne Bacterial Endotoxin in Sewage Treatment Plants," *Annals of Occupational Hygiene* 46 (6) (2002): 549-554; P. R. Yadav, *Environmental Air Pollution* (New Delhi: Discovery Publishing House Pvt. Ltd, 2009), 42-43.

⁴⁶ R. J. Rando, C. W. Kwon and J. J. Lefante, "Exposures to Thoracic Particulate Matter, Endotoxin, and Glucan During Post-Hurricane Katrina Restoration Work, New Orleans 2005-2012," *Journal of Occupational and Environmental Hygiene* 11 (1) (2014): 9-18, doi: 10.1080/15459624.2013.839879.

⁴⁷ J. Thorn and R. Rylander, "Inflammatory Response After Inhalation of Bacterial Endotoxin Assessed by the Induced Sputum Technique," *Thorax* 53 (1998): 1047-1052.

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with what is known about endotoxins and the explanation offered calls for serious consideration.

General Comments on Air Pollutants. Besides endotoxins and fungal toxins found in damp buildings, indoor air pollution (gases and soot) arising from heating and cooking activities using solid fuels in simple stoves and open fires adversely affects an estimated 3 billion people. As a result, an estimated 4.3 million people died prematurely from heart, pulmonary disease, pneumonia, and cancer in 2016. Susceptibility to other diseases is increased as the immune system is impaired and the oxygen carrying capacity of the blood reduced.⁴⁸

Outside air pollution is a major environmental health concern and comes from a variety of sources both in urban and rural areas (energy production, fires, incineration, and transport). Pollutants increase the risk of respiratory and cardiovascular disease, asthma, and cancer. Premature deaths from this cause have been estimated in the region of 3.7 million in 2012.⁴⁹

Air pollution with small size particulate matter (PM 2.5) is the most significant as the risk of cardiac and pulmonary disease are increased, particularly for the young and old. There are no safe levels of exposure. Particles come from gaseous pollutants, incompletely combusted carbon, and other sources. Toxic materials may attach to the carbon. For example, the exhaust particles from diesels contain group 1 carcinogens for humans (worst category).⁵⁰

Smoke, dust, poisonous gases, and germs in city air received negative late (1905) mention by White.⁵¹ This is in line with her urging to consider country living as far as possible. She advised this primarily to promote spiritual development in the family, but also to aid maintenance of health and well-being. For those who were sick, she promoted “nature as God’s

⁴⁸ World Health Organization, “Household Air Pollution and Health,” (2014). Online: <http://www.who.int/mediacentre/factsheets/fs292/en/> (16/07/2018).

⁴⁹ World Health Organization, “Ambient (outdoor) air quality and health,” (2014). <http://www.who.int/mediacentre/factsheets/fs313/en/> (16/07/2018).

⁵⁰ World Health Organization, Regional Office for Europe, Health Effects of Particulate Matter (Copenhagen, Denmark: World Health Organization, 2013). Online: http://www.euro.who.int/__data/assets/pdf_file/0006/189051/Health-effects-of-particulate-matter-final-Eng.pdf (16/07/2018).

⁵¹ White, *Ministry of Healing*, 262.

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physician,” and commented that the fragrance from certain trees contained life-giving properties.⁵² The essential oils from balsam and pine trees that she mentioned indeed possess antimicrobial properties. This may be what she had in mind.⁵³

Dampness in Dwellings and Health

White's health vision emphasized that “The lungs, in order to be healthy, must have pure air.”⁵⁴ Everything else that she wrote at that time or subsequently on the topic of the gaseous living environment is a subtext of this statement. I have already mentioned some elements contained in White's advice. Additional elements are developed here.

Damp Rooms Predispose to Disease. Of particular interest is the caution given by White to avoid living in damp rooms.⁵⁵ The idea of microbes growing on moist surfaces in the built environment and causing disease is a continuing story of discovery. In the preface to a special volume in *Advances in Applied Microbiology* (2004) devoted to the subject, David Straus commenced his discourse with the record given by Moses in Leviticus (14:33–45) and gave credit to him for recording an accurate description of indoor mold growth and of giving an indication of its deleterious effects on health. Today we know that mold growth occurring indoors gives rise to spores that are airborne. Exposure to these and other fragments is associated with a variety of respiratory problems and eye irritation. Infrequently, exposure is associated with fever, headache, and muscle and joint pain.⁵⁶

It is the well-known principle understood by all microbiologists that microbes require moisture to grow and that damp environments are the

⁵² E. G. White, *Country Living* (Washington, DC: Review and Herald Publishing Association, 1946), 15–19; White, *Ministry of Healing*, 263, 264.

⁵³ S. C. Chao, D. G. Young and C. J. Oberg, “Screening for Inhibitory Activity of Essential Oils on Selected Bacteria, Fungi and Viruses,” *Journal of Essential Oil Research* 12(5) (2000): 639–649; A. Pichette, P-L. Larouche, M. Lebrun et al., “Composition and Antibacterial Activity of Abies Balsamea Essential Oils,” *Phytotherapy Research* 20 (5) (2006): 371–373.

⁵⁴ White, *Selected Messages*, 2: 463.

⁵⁵ *Ibid.*, 2: 462, 463.

⁵⁶ K. Reijula, “Moisture-problem Buildings with Molds Causing Work-related Diseases,” *Advances in Applied Microbiology* 55 (2004): 175–189; D. C. Straus, “Preface,” *Advances in Applied Microbiology* 55 (2004): xv–xvi.

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avored place of activity for the vast majority. The drastic consequences of this were realized in the late nineteenth and early twentieth centuries when it was understood that deaths had occurred through inhalation of a poisonous arsenic gas produced by molds growing on wall paper and paints containing arsenic-based pigments. This was termed Gosio's disease. The cause was recognized by the Italian physician Bartolomeo Gosio in 1892 after a long history of suspicion surrounding green coloring dyes reaching back about 75 years. The disease is no longer a common feature of life, but we know that individuals living in damp accommodation are at greater risk of developing asthma than those living under drier conditions. Molds also increase the incidence of upper respiratory disease in children. Furthermore, illness in animals and humans has been recorded since the 1920s associated with inhaling mold toxins (in spores) coming from their growth on the walls of damaged buildings or through handling/inhaling moldy animal feed/grain. The incriminating evidence continues to mount.⁵⁷

Scientists recognize the priority of Moses' revelation on this subject. Ellen White was bringing it forward in a more modern setting for believers. She stated that "Every form of uncleanness tends to disease. Death-producing germs abound in dark, neglected corners, in decaying refuse, in dampness and mold and must."⁵⁸ Her urging to allow the air and sunlight into rooms⁵⁹ would function to hasten the drying process and contribute to the demise of some microbes.

The truthfulness of these ideas can be illustrated in modern times by an event in Cleveland, Ohio, just a few years ago. There a dramatic health problem arose among infants who lived in substandard accommodations. The common feature associated with these outbreaks was a fungal growth on the wet interior wallboards of the buildings. These microbes possessed powerful toxins that were present in their airborne spores. Scientists have suggested that when these spores were inhaled, the toxins inhaled with them led to the development of dramatic respiratory malfunction, which

⁵⁷ J. Emsley, *The Elements of Murder* (Oxford: Oxford University Press, 2005), 123–126; B. Richardson, *Wood Preservation* (New York: Taylor & Francis, 1993), 122; W. A. Shipton, *The Biology of Fungi Impacting Human Health* (Singapore: Partridge, 2014), 35, 51–52, 128–129; C. Thom and K. B. Raper, "The Arsenic Fungi of Gosio," *Science* 76 (1980) (1932): 548–550.

⁵⁸ White, *Ministry of Healing*, 276.

⁵⁹ *Ibid.*, 274.

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sometimes resulted in death.⁶⁰ Today, there is considerable public interest in “sick building syndrome” and “building related illness.” Some of the episodes may be associated with building dampness and the growth of microbes. The effects of such microbial activity are apparently able to adversely influence human health causing problems to the immune, neurological, and respiratory systems and the skin.⁶¹

Generalization. The general health principle that White was stating, viz., that exposure to air, sunlight, and freedom from moisture is damaging to microbial survival and growth is something that is accepted by every microbiologist. It may be less well appreciated by others, with some unpleasant results. There are many instances recorded in the literature where maintenance of moist conditions around organic material can give rise to vigorous microbial growth and subsequent poor outcomes. The abundant growth of fungi and bacteria on composting and other material is well known and part of the composting process. Less well known perhaps is that disturbed such material releases abundant spores and other material into the atmosphere leading to an increased risk of respiratory disease and infection.⁶²

Cold Chills and Illness

The role of temperature in predisposing to human disease is not well researched. This is in marked contrast to some other organisms where temperature has an influence on disease incidence.

The possible involvement of chilling on disease was mentioned by

⁶⁰ Institute of Medicine (US), *Damp Indoor Spaces and Health* (National Academies Press, 2004), 146–149; Shipton, *Biology of Fungi*, 33; S. J. Vesper, D. G. Dearborn, I. Yike et al., “Hemolysis, Toxicity, and Randomly Amplified Polymorphic DNA Analysis of *Stachybotrys Chartarum* Strains,” *Applied and Environmental Microbiology* 65 (1999): 3175–3181.

⁶¹ Y. Assouline-Dayana, A. Leong, Y. Shoenfeld et al., “Studies in Sick Building Syndrome. IV. Mycotoxicosis,” *Journal of Asthma* 39 (2002): 191–201; Institute of Medicine (US), *Damp Indoor Spaces and Health* (Washington, DC: National Academies Press, 2004), 170, 171.

⁶² K. K. Heldal, L. Madsø and W. Eduard, “Airway Inflammation Among Compost Workers Exposed to Actinomycetes Spores” *Annals of Agricultural and Environmental Medicine* 22 (2) (2015): 253–258; S. Roussel, G. Reboux, J-C. Dalpin et al., “Farmer’s Lung Disease and Microbiological Composition of Hay: A Case–Control Study,” *Mycopathologia* 160 (2005): 273–279.

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White in her vision as recorded in 1865. Her particular emphasis was decrying the practice of leaving the shoulders and arms of infants bare in the interests of fashion. At the same time, other parts of the body were tightly bound in clothing. These practices were persisted with irrespective of the shivering and complaining reactions of the children. White's account appears to connect the exposure of the shoulders and arms rather directly to predisposition to disease implied in the words that this practice "induces disease."⁶³

Studies on the incidence of viral disease have shown that many of them display a marked seasonality with a peak in winter.⁶⁴ For example, one interesting recent study (northern hemisphere) on the seasonal occurrence of a pneumonia type disease showed that it peaked October to May and had a lower occurrence in summer. This was the pattern observed in infants and children whereas in adults there was a marked midwinter peak.⁶⁵ The uncertainty in interpretation is whether the environmental conditions influence the disease organism, the host, or both and indeed whether other factors contribute.⁶⁶

There is a body of opinion that both pathogen and the host immune system are influenced by cold weather conditions. Exposure to cold or induced hypothermia has been shown to increase the risk of upper and lower respiratory tract infections. Cooling of the body surface, stress associated with this, and the actual inhalation of cold air appear to contribute. Suppression of the immune responses of the body and the reactions of the respiratory tract membranes has been associated with the increased susceptibility. The restriction of blood supply to respiratory system surface tissues by body surface cooling is thought to act through providing fewer white cells to fight infection. The impact of low temperatures is most acutely felt by the young and the elderly and, not surprisingly, the risk of infection increases with increase in the duration of

⁶³ White, *Selected Messages*, 2: 467, 468.

⁶⁴ D. Fisman, "Seasonality of Viral Infections: Mechanisms and Unknowns," *Clinical Microbiology and Infection* 18 (10) (2012): 946–954.

⁶⁵ P. E. Kim, D. M. Musher, W. P. Glezen et al., "Association of Invasive Pneumococcal Disease with Season, Atmospheric Conditions, Air Pollution, and the Isolation of Respiratory Viruses," *Clinical Infectious Diseases* 22(1) (1996): 100–106.

⁶⁶ Fisman, op. cit.

exposure.⁶⁷

The belief that cold exposure influences disease incidence is of long standing.⁶⁸ The evidence is still accumulating, but it appears that popular opinion from the time of Aristotle is now being supported by science.

Essential Nutrients and Disease

The relationship between nutrition and disease susceptibility is well-understood today, but the significance of protein, specific trace elements, and vitamins in particular was not known until the latter part of nineteenth century or thereafter. However, the concept of essential nutrients preventing specific diseases comes from antiquity.⁶⁹ It was understood before the discovery of essential minerals and vitamins that certain conditions developing under impoverished dietary regimes led to diseases that were irreversible. For example, iron deficiency leads to bony overgrowth of the skull, iodine deficiency will ultimately result in growth and mental development issues, vitamin B3 (niacin) deficiency gives rise to dermatitis, diarrhea, and dementia.⁷⁰

Extreme Diets. Some of this knowledge would have been available to Ellen White when she wrote (1890, 1905). Health was compromised, she indicated, by extremes in dietary practice, including the use of simple foods with little variety. She had observed almost intractable diseases in individuals as a result of practicing such ideas.⁷¹ Much earlier (1867) she warned that in adopting diet reform great care needed to be exercised in supplying all the nutrients necessary. In practice this meant studying carefully to ensure that items deleted from the diet were replaced by

⁶⁷ E. G. Mourtzoukou and M. E. Falagas, "Exposure to Cold and Respiratory Tract Infections," *International Journal of Tuberculosis and Lung Diseases* 11(9) (2007): 938–943.

⁶⁸ Anonymous. "How Colds Are Caught," *British Medical Journal* 1 (693) (1874): 490–491; B. Rush. *The Works of Thomas Sydenham M. D. on Acute and Chronic Diseases: With Their Histories and Modes of Cure* (Philadelphia, PA: B. & T. Kite, 1809), 363–364.

⁶⁹ L. McDowell, *Vitamin History, The Early Years* (Gainesville, FL: University of Florida Press, 2013), chapter 1.

⁷⁰ A. Blatner, "Discovering Nutritional Deficiency Diseases" (2010). Online: <http://www.blatner.com/adam/consctransf/historyofmedicine/5-deficiencydiseases/5-deficdis.html> (16/07/2018).

⁷¹ White, *Counsels on Diet*, 197.

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adequate substitutes. Her advice against eating largely of porridge (mush)⁷² appears to be a warning to include adequate protein in the diet.⁷³ However, the discovery of protein deficiency occurred after vitamin deficiency was understood (1930s).⁷⁴ White's overall advice, as insurance against deficiency diseases, was to provide variety. She even advised continuing to use some meat and animal products until suitable substitutes were available or an existing disease condition had been resolved.⁷⁵ For example, as a cure for the life-threatening condition suffered by Dr. Cress (pernicious anaemia), she advised mixing eggs with grape juice in a drink (1901).⁷⁶ This was well before experiments were completed on curing the disease through adopting a special diet (muscle meat, liver, eggs, fruit, vegetables) and finally the discovery of vitamin B12 in 1948.⁷⁷ Liver was found especially beneficial and for this discovery the Nobel Prize in Physiology and Medicine was awarded in 1934.⁷⁸ This work marked the beginning of progress towards discovering vitamin B12.

General Comments. White's advice is relevant today particularly among vegans and vegetarians, but also amongst others. The uncertainty and controversy surrounding vitamin B12 has sometimes reached an intensity beyond reason. For example, readers may be unaware that an Adventist couple were convicted in recent years of manslaughter of their young son and jailed on account of failure in this area. They cited Ellen White as their guide in dietary matters in respect of their adherence to a strict vegan diet.⁷⁹ This distortion of her writings is regrettable. The issues

⁷² Ibid., 200.

⁷³ Blatner, op. cit.

⁷⁴ H. C. Trowell and J. N. P. Davies, "Kwashiorkor—I. Nutritional Background, History and Distribution," *British Medical Journal* 2 (4788) (1952): 796–798.

⁷⁵ White, *Counsels on Diet*, 207, 208, 315, 394.

⁷⁶ White, *Counsels on Diet*, 204.

⁷⁷ G. R. Minot and W. P. Murphy, "Treatment of Pernicious Anemia by a Special Diet," *Journal of the American Medical Association* 87 (7) (1926): 470–476; I. Chanarin, "A History of Pernicious Anaemia," *British Journal of Haematology* 111 (2) (2000): 407–415.

⁷⁸ G. M. Holmgren, "Award Ceremony Speech," The Nobel Prize in Physiology or Medicine 1934, Online: http://www.nobelprize.org/nobel_prizes/medicine/laureates/1934/press.html (16/07/2018).

⁷⁹ Bettina Krause and Brenton Stacey, "New Zealand: Death of child Demonstrates Dangers of Health Fanaticism," *Adventist News Network* (June 10, 2002). Online: <http://news.adventist.org/en/all-news/news/go/2002-06-10/new-zealand-death-of-child-demonstrates-dangers-of-health-fanaticism/> (16/07/2018).

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surrounding this vitamin are of the greatest concern for vegans, although vegetarians are not immune to deficiency.

Low vitamin B12 levels have been measured in vegetarians and vegans in a number of studies. It is, in fact, a world-wide problem.⁸⁰ This vitamin is found in animal based foods (red meats, poultry, dairy and derived products, fish, fermented fish sauce). Lacto-ovo-vegetarians may obtain adequate supplies from eggs, cheese, milk, and yoghurt, but vegans are at particular risk. The adequacy of non-animal sources of B12 for humans is contested in some circles (readers must remember that there are active and inactive forms of B12). Inactive forms are of no use, so false claims can be made. Adequate quantities of the active form appear to have been found in some seaweeds (green and purple laver) and shiitake mushrooms. Other sources are found in tempe, kimchi, and fermented black tea. On the basis of the evidence available, in many parts of the world adequate sources of the vitamin are available consistently only from fortified plant sources.⁸¹ Now vitamin B12 is required to prevent anemia and irreversible nervous system damage in the fetus as well as neurological disorders in the ageing. It is no small matter to think of the legacy one can give in ensuring adequate supplies of this vitamin are supplied to infants. The Vegan Society recognizes this. For those who cannot eat animal, fortified soy milk, or other products should supplement their intake through the use of tablets or by using fortified foods. The need for supplementation is higher

⁸⁰ B. D. Hokin and T. Butler, "Cyanocobalamin (Vitamin B-12) Status in Seventh-day Adventist Ministers in Australia," *American Journal of Clinical Nutrition* 70 (Suppl. 3) (1999): 576S–578S; A. L. Rauma, R. Torronen, O. Hanninen et al., "Vitamin B-12 Status in Long-term Adherents of a Strict Uncooked Vegan Diet ("Living Food Diet") Is Compromised," *Journal of Nutrition* 125 (10) (1995): 2511–2515; S. P. Stabler and R. H. Allen, "Vitamin B12 Deficiency as a Worldwide Problem," *Annual Review of Nutrition* 24 (2004): 299–326.

⁸¹ W. J. Craig and A. R. Mangels, "Position of the American Dietetic Association: Vegetarian Diets," *Journal of the American Dietetic Association* 109 (7) (2009): 1266–1282; W. J. Craig, *Nutrition and Wellness: A Vegetarian Way to Better Health* (Berrien Springs, MI: Golden Harvest Books, 1999), 218; P. C. Dagnelie, "Comments on the Paper by Rauma et al.," *Journal of Nutrition* 127(2) (1997): 379; R. Pawlak, P. S. James, S. Raj et al., "Understanding Vitamin B12," *American Lifestyle Medicine* 7 (1) (2013): 60–65; F. Watanabe, Y. Yabuta, T. Bito et al., "Vitamin B12-containing Plant Food Sources for Vegetarians," *Nutrients* 6 (5) (2014): 1861–1873; C. L. Zeuschner, B. D. Hokin, K. A. Marsh et al., "Vitamin B12 and Vegetarian Diets," *Medical Journal of Australia* Open access 1(Suppl. 2) (2012): 27–32.

in some countries than others, which is a reflection of the dietary habits adopted and the amount of meat consumed. In developed countries, individuals over 50 years of age (irrespective of their food preferences) often require supplementation in order to avoid deficiency.⁸²

The question of vitamin B12 deficiency in plants has caused some to question the adequacy of the diet provided by God to the newly created couple in Eden. One highly significant fact that we must bear in mind in answering this question is that we are no longer in Eden and many changes have come upon the human race and the earth as a result of the curses that have been experienced as a result of sin (Gen 3:16–17; 4:12; cf. 9:3, 4). That having been said, I have no completely adequate answer as to how supplies of this vitamin were provided originally, as no plant or animal synthesizes a bioavailable form of the vitamin (classically it is regarded as a bacterial product). However, it has been noted in some disease states that the blood levels of this vitamin and folic acid are elevated due to excessive growth of bacteria in portion of the small intestine usually supporting poor bacterial growth on account of the high acidity of that environment.⁸³ This suggests that the delicate balance of microbes in the intestines may have changed after the fall accounting for difficulties now seen in humans.

Prebiotics, Probiotics, and Disease

Prebiotics were unknown in White's day, the term having been introduced relatively recently (mid 90s). However, her advice on dietary matters is consistent with that given by leaders in this area of endeavor today. Prebiotics involves stimulating beneficial bacteria in the intestinal tract through the intake of non-digestible substances included in the diet. Bacteria involved in food fermentation, such as lactobacilli, may also confer health benefits (represent the probiotic category). Both the Bible

⁸² The Vegan Society. "Vitamin B12" (2018). Online: <https://www.vegansociety.com/resources/nutrition-health/vitamins-minerals-and-nutrients/vitamin-b12-your-key-facts> (16/07/2018); Craig, op. cit., 215, 218; Craig and Mangels, op. cit., 1270; R. Pawlak et al., op. cit.; F. S. Sizer and E. N. Whitney, *Nutrition: Concepts and Controversies*, eighth edition (Belmont, CA: Wadsworth/Thomson Learning, 2000), 206, 229, 230.

⁸³ J. F. B. Arendt and E. Nexo, "Unexpected High Plasma Cobalamin: Proposal for a Diagnostic Strategy," *Clinical Chemistry and Laboratory Medicine* 51(3) (2013): 489–496; G. Mouton and E. Zanger, "Elevated Blood Levels of Vitamin B12: A Sign of Small Intestinal Bacterial Overgrowth?" *Nutrition Practitioner*, Winter (2008), 47–52.

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(Gen 1:29; 3:18; 18:8; the Hebrew *chemah* in the last verse can be translated curds, curdled milk, butter, cheese) and White⁸⁴ makes some positive comments about dietary choices in both areas (e.g., bananas, wheat, onions, turnips, soft cheese, etc).

Diet is a significant determinant of the microbes that will flourish in the intestines. One of the most important complex plant saccharides capable of stimulating useful gut bacteria in the colon is oligofructose. It is found naturally in foods such as wheat, bananas, onions, leeks, garlic, and others. Another is inulin (made of fructose units) found naturally in many thousands of plants.⁸⁵ This means that individuals devoted to a vegetarian life-style or those who eat a range of grains, fruits, root, bulb and leafy vegetables will acquire some of these useful components.⁸⁶ When fermented foods are utilized, useful live organisms are introduced with the product and deliver health benefits to the consumer. This is the area of microbiology known as probiotics (feeding microbial supplements for health benefits). The most commonly used probiotics involve milk as a carrier.⁸⁷ Even without supplementation, naturally occurring fermentation microbes in milk products are beneficial. Introduced organisms can aid recover from certain bowel malfunctions, such as those consequential on antibiotic usage. They are thought to produce inhibitory substances against pathogens and stimulate the immune system.⁸⁸

Most human cultures have their own fermentation products. For

⁸⁴ A. L. White, Ellen G. White. *The Later Elmshaven Years 1905-1915* (Washington, DC: Review and Herald Publishing Association, 1982), 6: 315; E. G. White, "Visit to Honolulu," *Bible Echo and Signs of the Times* 7(1) (1892): 8, 9; White, *Counsels on Diet*, 310, 319, 359, 360; E. G. White, *Manuscript Releases*, (Washington, DC: Ellen White Estate, 1990), 5: 385; 14: 339.

⁸⁵ F. Guarner, A. G. Khan, J. Garisch et al., "World Gastroenterology Organisation Global Guidelines: Probiotics and Prebiotics October 2011," *Journal of Clinical Gastroenterology* 46(6) (2012): 468–481. doi: 10.1097/MCG.0b013e3182549092.

⁸⁶ J. van Loo, P. Coussement, L. de Leenheer et al., "On the Presence of Inulin and Oligofructose as Natural Ingredients in the Western Diet," *Critical Reviews in Food Science and Nutrition* 35 (6) (1995): 525–552.

⁸⁷ R. Nagpal, A. Kumar, M. Kumar et al., "Probiotics, their Health Benefits and Applications for Developing Healthier Foods: A Review," *FEMS Microbiology Letters* 334(1) (2012): 1–15. Online: <https://doi.org/10.1111/j.1574-6968.2012.02593.x> (01/07/2018).

⁸⁸ K. Azizpour, S. Bahrambeygi, S. Mahmoodpour et al., "History and Basics of Probiotics," *Research Journal of Biological Sciences* 4 (4) (2009): 409–426.

example, fermentation of cabbage and related plants is of ancient origin. Today, specific organisms are cultured in food materials and fed as supplements in order to shorten the duration or prevent the incidence of certain diseases.⁸⁹

Pre- and pro-biotics are linked and both are devoted to improving intestinal health. The cruciferous vegetables (cabbage family, includes turnips) are rich in dietary components that stimulate the multiplication of selected, beneficial bacteria. One group of metabolites produced are the isothiocyanates, which are capable of decreasing the risk of certain cancers.⁹⁰ Some of the bacteria present in probiotic preparations are able to reduce the impact of damaging chemicals found in the diet.⁹¹

It appears to this writer that we may soon arrive at the time when animal-based products, regularly consumed by lacto-ovo vegetarians, are too risky to use.⁹² Indeed, in some parts of the world the time for discarding the use of these products seems to have arrived already.⁹³ Thankfully, suitable alternatives are becoming available. For example, increasingly the health benefits derived from fermented dairy products are being substituted by other products, which includes the use of fruit juices and other plant based beverages fortified with helpful bacteria. Some of these products confer benefits beyond those offered by the animal-based derivatives.⁹⁴

⁸⁹ V. K. Gogineni, L. E. Morrow, P. J. Gregory et al., "Probiotics: History and Evolution," *Journal of Ancient Diseases & Preventive Remedies* 1(2013): 2. Online: <http://www.esciencecentral.org/journals/probiotics-history-and-evolution-2329-8731.1000107.pdf> (16/07/2018).

⁹⁰ F. Li, M. A. J. Hullar, Y. Schwarz et al., "Human Gut Bacterial Communities Are Altered by Addition of Cruciferous Vegetables to a Controlled Fruit- and Vegetable-free Diet," *Journal of Nutrition* 139(9) (2009): 1685–1691; E. Hong and G-H. Kim, "Anticancer and Antimicrobial Activities of β -phenylethyl Isothiocyanate in *Brassica rapa* L.," *Food Science and Technology Research* 14(4) (2008): 377–382.

⁹¹ Azizpour, et al., op. cit.

⁹² Refer to the statements by White, *Counsels on Diet*, 365, 366); G. zur Hausen, "The Search for Infectious Causes of Human Cancers: Where and Why," *Angewandte Chemie International Edition*, 48(32) ((2009): 5798–5808.

⁹³ Y. Yan, "From Food Poisoning to Poisonous Food: the Spectrum of Food-safety Problems in Contemporary China," in *Re-orienting Cuisine—East Asian Foodways in the Twenty-first Century*, ed., Kwang Ok Kim (New York: Berghahn Books, 2015), 263–286.

⁹⁴ M. Perricone, A. Bevilacqua, C. Altieri et al., "Challenges for the Production of Probiotic Fruit Juices," *Beverages* 1 (2015): 95–103.

Chemical Contaminants/Residues

In White's day heroic medical practitioners used heavy metals and poisons from the vegetable kingdoms in an attempt to cure disease. White made no direct comments about specific chemical residues or contaminants affecting health that are so common today. However, inferences can be made from her advice to drink only pure water, to be careful of the poisons in the "mineral kingdom," and from a warning given.⁹⁵ The warning involved the common practice of doctors prescribing calomel (mercurous chloride) as a purgative for certain disease conditions. She was shown in vision the dire effects of such a practice and gave strenuous warning against its use and that of other dangerous medicines.⁹⁶ Heroic medicine was on the decline in the latter part of the nineteenth century,⁹⁷ but nevertheless her advice, if heeded, would have saved many. In a brief reference of support about avoiding mercury in our present world, it is worth acknowledging that the drastic effects of mercury derivatives are recognized in government advisories. For example, the Canadian government has indicated that consumption levels of specified fish (higher food chain species), which concentrate mercury in their tissues, should be strictly limited.⁹⁸

It is not my purpose to comment on chemical contaminants extensively except to note that I believe we can extend White's cautions about taking poisonous medicines to the intake of food and water containing heavy metals and chemical residues. This is simply using her oft repeated urging to reason from cause to effect and follow advances made in science. We are still doing this on the subject of aluminum additives to foods (cf. baking powders liberally used in nineteenth century America),⁹⁹ with the risks of

⁹⁵ White, *Counsels on Diet*, 304; *Spiritual Gifts*, 4a: 140.

⁹⁶ White, *Selected Messages*, 2:441-448.

⁹⁷ Kellogg, op. cit.; H. A. Baer, *Biomedicine and Alternative Healing Systems in America: Issues of Class, Race, Ethnicity, and Gender* (Madison, WI: University of Wisconsin Press, 2001), 8, 9.

⁹⁸ Health Canada, "Mercury in Fish—Questions and Answers," (2011). Online: http://www.hc-sc.gc.ca/fn-an/securit/chem-chim/environ/mercur/merc_fish_qa-poisson_qr-eng.php (16/07/2018).

⁹⁹ Anonymous, "Baking-powders," *Science* 13 (330) (1889): 422-426; White, *Counsels on Diet*, 316, 319.

toxicity still debated.¹⁰⁰ However, acceptable daily intake limits have been suggested on account of potential effects on the reproductive and nervous systems.¹⁰¹

Several examples will suffice to illustrate the dangers of chemical contaminants. Exposure to arsenic is through drinking contaminated water and eating contaminated food. Arsenic is found in the earth's crust and occurs naturally in groundwater in certain countries. It affects over 100 million people making it a global health problem. Exposure is not limited to Asia but also occurs in the United States. An extensive list of pathological problems is linked to its long term consumption including increased incidence of certain cancers. An increased risk of infections and chronic diseases are linked to an impaired immune response.¹⁰²

Exposure to other contaminants is via pesticides. The use of pesticides is mainly on fruit and vegetables and continues to increase worldwide. The number of poisonings and deaths recorded annually is substantial. However, the fraction attributable to oral intake in food and drink containing residues is unknown. It is not just in water and food that the residues are located, but they can contaminate the atmosphere as well. One of the effects of exposure to residues is an increase in the risk of cancer development. And then there are the environmental impacts in which other living organisms are affected and the ecological balance changed.¹⁰³

¹⁰⁰ G. Schaeffer, G. Fontès, E. Le Breton et al., "The Dangers of Certain Mineral Baking-powders Based on Alum, When Used in Human Nutrition," *Journal of Hygiene* 28 (1) (1928): 92–99; Robert A. Yokel, "Aluminum in Food—The Nature and Contribution of Food Additives," in *Food Additive*, ed., Yehia El-Samragy (InTech, open access, 2012), chapter 12. Online: <https://www.intechopen.com/books/food-additive/aluminum-in-food-the-nature-and-contribution-of-food-additives> (16/07/2018); Food Standards Australia New Zealand, "Aluminium," May, 2018. Online: <http://www.foodstandards.gov.au/consumer/chemicals/Pages/Aluminium-and-Food.aspx> (01/07/2018).

¹⁰¹ Joint FAO/WHO Expert Committee on Food Additives, Seventy-fourth meeting, Rome, 14–23 June 2011. Online: <http://www.fao.org/3/a-at873e.pdf> (16/07/2018).

¹⁰² N. L. Dangleben, C. F. Skibola and M. T. Smith, "Arsenic Immunotoxicity: A Review," *Environmental Health* 2013, 12:73. doi:10.1186/1476-069X-12-73; World Health Organization, "Arsenic" (2012). Online: <http://www.who.int/mediacentre/factsheets/fs372/en/> (16/07/2018).

¹⁰³ WenJun Zhang, FuBin Jiang, JianFeng Ou, "Global Pesticide Consumption and Pollution: with China as a Focus," *Proceedings of the International Academy of Ecology and Environmental Sciences* 1(2) (2011):124–144.

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While it is easy to record the effects of contamination of the environment, it is much more difficult to find practical solutions in many instances. This is the struggle each local community must engage in and resolve as satisfactorily as possible.

Health Principles Highlighted

Ellen White was in no doubt that the principles of health could be understood and that it was the duty of believers to seek a thorough understanding of them and to keep abreast of scientific knowledge. If this advice was followed, she believed they could become capable leaders in matters of health in their communities.¹⁰⁴ Additional health principles have been identified by scientists since White's time. She understood the nature of knowledge and advised believers to listen to sound information.¹⁰⁵ In our quest to allow God to perform His regenerative work in us, we do well to respect this information, and practice the principles of health in our daily lives.

The main ideas identified here relating to environmental hazards and health are as follows:

- Gases arising from decomposing manures can damage the respiratory tissues.
- Endotoxins released by bacteria growing on decaying vegetation can cause respiratory difficulties and disease.
- Organic dusts and small airborne particles often are associated with emerging health issues.
- Damp living conditions favor microbial growth and can predispose individuals to respiratory problems through the inhalation of toxins and other microbial components.
- Exposure to cold chills can dampen the immune system and increase the risk of contracting certain diseases.
- A balanced nutrition is essential for achieving acceptable health outcomes. This is especially applicable to the vitamin B12 supply. Vegetable-based diets otherwise are adequate nutritionally when care is exercised.

¹⁰⁴ White, *Counsels on Diet*, 24.

¹⁰⁵ E. G. White, *Counsels on Health* (Mountain View, CA: Pacific Press Publishing Association, 1951), 566.

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- Designated complex plant carbohydrates are able to stimulate growth of beneficial microbes in the gut resulting in enhanced intestinal and general health.
- Heavy metals and chemical residues are capable of impacting health adversely.

Concluding Remarks

Human society is responsible for much of the destruction and pollution we too frequently observe. Our excessive consumerism and pursuit of individual interests in contrast to community interests has placed the world in a critical position ecologically. If we fast track backwards to some 150 years ago, the streets in many areas of the large cities of the day were appalling open sewers. In these circumstances those willing to reason from cause to effect, especially among those with a firm biblical knowledge, thought they could see that environmental factors predisposed to disease and that cleanliness in both person and surroundings was essential. At the same time, the tide was turning in medicine with the decline in heroic medication, with its use of heavy metals and plant poisons. In this environment, Ellen White added a positive voice for change. Among her advice there were some puzzling statements, which have been vindicated relatively recently.

The discovery of fungal toxins in foods and airborne microbial toxins are two of the areas to which White added early comments and where intense efforts are now being made to limit human exposure. She spoke of other factors predisposing to disease, such as chills, gases released from filth, and nutrition.

God's ideal expressed in Eden was uppermost in White's consideration, and she understandingly championed the idea of country living. Many people today are interested in preserving nature, understanding the delicate machinery of the body, and the environmental safeguards necessary to maintain health. It is to these that the angel messages of Revelation 14 have special appeal, but to which others are also invited to respond. Recognizing the principles of health, which are God-inspired, leads to the challenge of learning about and responding to God's moral principles. It is our privilege as ambassadors to represent all these principles in their most attractive light both in practice and in word. The information presented by Ellen White has been expanded greatly by modern science so that the principles of health are clearer now than ever before.

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