Human Helminth Care Manual

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Key

Red - will or may kill, or cause the loss of, human helminths.
Amber - may cause harm to human helminths in some people.
Purple - may cause a temporary reduction in the benefits provided by human helminths.
Black - insufficient evidence exists to support a judgement on possible effects.
Green - safe, or likely to be safe, for human helminths.

Colour coding is intended only as a general guide. The effects of a substance may vary considerably depending on factors such as quantity, concentration and, in the case of herbal extracts, the part of the plant used. Even the method of extraction can make a difference, so it is important to read the details for each item.
Introduction

Helminths are just one type of parasite and, among the many types in existence, there is a wide range of responses to each substance that is claimed to be antiparasitic, so what will kill one type of parasite may not kill or even harm another. Therefore, none of the many lists of allegedly antiparasitic substances that can be found on the internet are appropriate to the needs of people hosting the two species with which this manual is specifically concerned - the human hookworm, Necator americanus (NA), and the human whipworm, Trichuris trichiura (TT/TTO).

The ova of the pig whipworm, Trichuris suis (TSO), and the cysticerci of the rat tapeworm, Hymenolepis diminuta (HDC), are not affected to the same extent as human helminths by exposure to many of the substances discussed here. Since these non-human species normally only survive in humans for a very short period of time and need to be replaced approximately every two weeks, there is less need for concern about their long-term health. There are separate lists of substances which users of non-human worms are advised to avoid, here (TSO) and here (HDC).

If you have downloaded a copy of this manual, please check regularly that you have the latest edition. This will be available in the Files sections of the Facebook Helminthic Therapy Support Group and the Yahoo Helminthic Therapy Forum. The Document history shows the date of the last edition and a list of the new and amended entries in that update.

After reading all the general points in this introduction, the best way to use this manual is to employ your device’s search function to locate whatever substance you wish to check. (Both US and UK spellings have been included to facilitate this.) This should prevent substances being overlooked because they have been included in a different section from the one in which you may have expected to find them.

If a search returns no results, and if you have spelled the substance you are searching for correctly, it is much more likely to be safe than unsafe for human helminths, although this cannot be guaranteed. Most of the worst offenders have already been identified, but this manual is a work in progress and will no doubt continue to remain so indefinitely. Its contents should therefore only be considered as a guide, and not viewed as definitive. Please see the Disclaimer.

The details in this manual are based as far as possible on the reported experience of subjects who are hosting human helminths, and details of most of these experiences have been posted to the Facebook and Yahoo groups mentioned above. Having membership of the Facebook group will allow convenient access to the details in the many posts that are linked to from this manual. Posts to the Yahoo forum can be read by non-members. Additional reports and comments on this topic are welcomed, and should be posted to either of these groups, from where the salient details will be collected and added to future editions.

This manual does not contain a comprehensive list of substances that are safe to be taken while hosting NA and TT. Instead, it concentrates on those things that will, or might, be a threat to human helminths. The few safe substances that are listed (highlighted in green) are mentioned for particular reasons, which include someone having asked specifically about them, or commented on them.

Most foods, drugs and other substances are perfectly safe for use while hosting helminths, including normal dietary amounts of most unprocessed foods, spices and herbs. However, medicinal quantities of concentrates, extracts or tinctures, especially of certain herbs, are more likely to have an adverse effect, particularly in people who have a robust immune response to helminths. These individuals are the ones who need to top up their human helminth colonies more frequently in order to maintain remission from their disease. Typically, they have Crohn’s, or one of the other intestinal diseases, but a few with other conditions, such as allergies, [link] may also be in this group.

The phytochemical compounds, isomyristicin and bergapten, are a good example of how the concentrated form of a substance can be harmful to helminths while foods containing the same substances are not. While the concentrated forms of isomyristicin and bergapten have shown significant anthelmintic activity against two helminth species, myristicin (the parent chemical from which isomyristicin is derived) and bergapten are both found in several of the fruits, herbs and vegetables consumed by humans on a daily basis, e.g., parsley, celery, lemons, figs, carrots, grape juice, Earl Grey tea, nutmeg and dill, but the risk of an anthelmintic effect from this very limited dietary intake is negligible. [Link]

Even substances that have shown an anthelmintic effect in test tube studies do not necessarily have an adverse affect on worms being hosted by humans. [Link]

For general advice about how to manage exposure to the substances that can be harmful to human helminths, there are some helpful comments in this thread.
NA and TT are robust organisms [link] and only a few things will kill them, particularly anthelminthic drugs and, at least in the case of NA, nitrous oxide. (It has not yet been definitively established whether nitrous oxide will also kill TT.)

It is unlikely that anything other than nitrous oxide will harm NA before it attaches to the gut mucosa towards the end of the third week post inoculation, as it does not feed until this point. Beyond this, NA will always be vulnerable to anything that will stun it long enough for it to be carried away from its feeding area in the small intestine, or when the host has diarrhoea/diarrhea that is very severe.

Due to the way that TT feeds and attaches to the colonic mucosa, it is not likely to be as vulnerable as NA, as is exemplified by the fact that three times more mebendazole may be required to kill TT than is needed to kill NA.

The effects that foods and other substances have on helminth egg production may not be the same as the effects they have on the prophylactic or therapeutic benefits of adult helminths. Consequently, the details below may not be relevant to the practice of helminth incubation. A tentative examination of the effect of substances on the production of hookworm ova and larvae can be found under the heading, “Promotion of egg viability by dietary manipulation,” in this document.

Pharmaceuticals

Anaesthetics (anesthetics), general

Nitrous oxide (N2O) (E942). This is the only anaesthetic in current use that is known to kill hookworms - and it may also kill whipworms, although this is not yet certain.

Nitrous oxide is a weak general anaesthetic gas that is commonly administered throughout surgical operations along with another powerful anaesthetic such as sevoflurane or propofol, although these latter two drugs are effective alone, without nitrous oxide. Nitrous oxide might also be used at the end of surgery to keep a patient unconscious while more potent anaesthetics clear from their system. The continued use of nitrous oxide during surgery has been questioned, and nitrogen, which will not harm helminths, is a suitable alternative, but nitrous oxide remains popular, possibly because of its low cost.

Nitrous oxide may also be administered by paramedics, and during treatment in accident and emergency departments, [link] as well as being used as a propellant in cans of whipped cream and other cooking sprays. The degree of concentration is likely to be important and the gas dissipates quickly in air, so, when using a nitrous oxide-propelled cooking spray, just standing back for a moment after spraying should prevent any harm to one’s worms. Alternatively, using a pump-action oil mister will completely remove any possibility of risk.

Consuming a small amount of whipped cream that has been propelled by nitrous oxide will likely not adversely affect hookworms, but eating a large amount may. So, unless a large amount is eaten, or the cream is sucked, along with some gas, directly out of the container, there’s probably no need for concern.

Nitrous oxide was used as an ingredient in "Frisson", a novel, sorbet-like ice cream in which the gas was used to create bubbles before the product was frozen at home. There was a flurry of media interest in this product in mid 2014, but it appears not to have been produced commercially.

The small quantities of nitrous oxide used as a filler in packs of potato chips and other snack foods has not been reported to present any risk to human helminths.

While several subjects have reported that just one whiff of nitrous oxide obtained directly from a whipped cream dispenser has been sufficient to terminate a hookworm population (e.g., here) and its use as a recreational drug (for its euphoric and hallucinogenic properties) may also prove fatal to hookworms, at least three people who attempted to use nitrous oxide to deliberately kill their hookworm colonies found that it was not completely effective. One subject reported inhaling "almost a full can of whipped cream" at 3 weeks post inoculation in an attempt to resolve severe side effects, but with no obvious effect on his hookworms. In another case, a ballon full of nitrous oxide failed to have any effect on a hookworm colony, some members of which were later confirmed to be alive by stool tests.

Anyone who does lose their worms to nitrous oxide will soon know that they are gone because their disease symptoms will return, typically within days or, at most, a couple of weeks after losing them.

The reaction of hookworms to nitrous oxide is extremely specific, so other forms of nitrogen, including nitric oxide (NO), nitrogen dioxide (NO2) and nitrate (NO3) should not be a problem. The same is true for pure nitrogen (N) [link] and liquid nitrogen (LN2). There is obviously something within the molecular structure of a hookworm that is
a perfect fit for the nitrous oxide molecule, which either instantly locks on and kills the worm, or at least puts it to sleep long enough to cause it to lose its grip on the intestinal wall and be flushed away.

We don’t yet know for certain how susceptible whipworms are to nitrous oxide. Given that whipworms feed by harvesting cells from their environment rather than drinking their host’s blood, it’s possible that they are more resistant to the gas, and there are suggestions that this may be the case. However, as nitrous oxide is likely to be evenly distributed between intra and extracellular spaces, whipworms may come into contact with it as they graze, so may still be affected to some extent, although perhaps less so than hookworms.

Other gaseous anaesthetics may also be a problem for helminths because, while they might not kill them outright, they may stun them, causing them to be expelled from the gut before waking up.

It has been suggested that the volatile organic compounds (VOCs) used in the early days of anaesthesia - e.g., diethyl ether and chloroform - might possibly also kill human helminths if taken in large enough quantity, although other VOCs may not. However, a clinical scientist has reported that, while hosting human helminths, he worked around more organic solvents, including dichloromethane (CH2Cl2) and chloroform (CHCl3), than most people are exposed to in a lifetime, and that his hookworms and whipworms continued uninterrupted egg production.

**Propofol.** Based on what is known currently, this injected anaesthetic (an ultrashort-acting sedative with amnesiac effects) appears to be the only worm-safe general anaesthetic. While it has been shown to adversely affect the mitochondria of roundworms in laboratory conditions, it is clear from the experience of one host of both hookworms and whipworms that propofol does not harm human helminths in the concentrations used during surgery.

Additionally, propofol is likely to leave the patient with a clearer head, less nausea, and little or no sore throat. Injected anaesthetics such as propofol may also be safer, and preferable in children. This drug is even likely to be safe in patients with food allergies [link, link], and no connection has been found between allergy to propofol and allergy to egg, soy or peanut [link], although previous egg anaphylaxis may remain a contraindication.

Any worm host contemplating major surgery should discuss these issues with both their surgeon and anaesthetist and may want to request intravenous-only general anaesthesia, which will involve the use of mostly propofol. It may also be wise to request avoidance of any local anaesthesia with one of the “caine” drugs, which are often employed to limit sympathetic response even when the patient is unconscious as a result of general anaesthesia. (See the further discussion of the “caine” drugs under Anaesthetics (anesthetics), local.

**Regional nerve blocks** may provide a better alternative to general anaesthesia for helminth hosts in some cases, especially for limb surgery.

**Anaesthetics (anesthetics), local**

Local anaesthetics may interfere with the production of white blood cells as well as the functioning of the cells in circulation, but they appear not to affect ova production by helminths and they certainly don’t kill them. While local anaesthetics can cause a temporary return of disease symptoms for up to 8 weeks, helminths generally recover after only a few days, although this varies by person, drug and dosage, making it difficult to predict exactly what will happen in any particular situation.

For dental procedures requiring a local anaesthetic, short-acting drugs are less likely to affect helminths, e.g., articaine (articadent, astracaine forte, septanest, septocaine, ubistesin forte, ubistesin, ultracaine, zorcaine) or lidocaine (xylocaine, lignocaine). So one of these would be a better choice than a longer-acting drug, such as mepivacaine (carbocaine, polocaine) or bupivacaine (marcaine), and one helminth host has reported that the short-acting articaine had no adverse effect on his hookworms. If a patient explains that they don’t want to be numb for several hours, the dentist will usually use one of the short-acting drugs, or one combined with a vasoconstrictor such as epinephrine, which helps to reduce the amount of the drug that reaches the systemic circulation.

If local anaesthetics are used, it can be a good idea to arrange for a small supplementary dose of worms (e.g., 10 hookworm larvae) to be available for administration the day after exposure to the drug. This small additional inoculation usually helps to reduce the time that established helminths are out of action.

**Opioid** pain killers (fentanyl, etc.), the benzodiazepine anaesthetics (versed, etc., routinely used during colonoscopies) and narcotic analgesics all appear to be harmless to helminths, so, taken orally at high strength, these may be a suitable substitute for local anaesthetics in many situations. For example, one helminth host has found that 30 mg dihydrocodeine, taken along with 1,000 mg of paracetamol (acetaminophen) an hour or two before a dental appointment can be effective in avoiding all but a few brief moments of mild, dull pain, which he found to be quite manageable. This subject even found that the combination of dihydrocodeine and paracetamol...
provided adequate pain relief when having a tooth sculpted to take a crown. Aspirin and ibuprofen are also harmless to helminths, so, if preferred, these might provide a suitable alternative to paracetamol.

Another option for completely avoiding any risk to helminths from local anaesthetics was the GumEase cryo-allergenic mouthpiece. This device, which is apparently no longer available to purchase, provided pain relief for up to 20 minutes, and was appropriate for most procedures, including fillings, crowns, extractions and root canals. Previously available from two sources [link, link] this device unfortunately never caught on with dentists who are firmly wedded to the use of injectable drugs.

Another pain-free alternative is laser dental surgery, which is likely to become increasingly available in the future.

If more invasive dental surgery is required - where bone needs to be removed, for example - it may be best to request conscious sedation. This renders the patient unaware of what is taking place, but is not the same as a general anaesthetic. Conscious sedation might involve a combination of versed (a short acting IV benzodiazepine) and fentanyl (a short acting IV opiate), both of which are perfectly safe for worms. However, if you are given a nasal cannula to supply oxygen, make sure that no nitrous oxide (see separate entry, here) is added to the oxygen, as this could instantly kill hookworms, and possibly also whipworms.

**Anaesthetics (anesthetics), topical**

Topical anaesthetics such as lidocaine are unlikely to affect helminths because not enough of the drug will get into the blood stream to affect the worms. Topical lidocaine used before blood tests or the fitting of a catheter, or on the mucous membranes in the mouth or nose, are therefore worm-safe. Alternatively, an ice pack can be very effective on skin, including for punch biopsies, though some people may prefer lidocaine for a biopsy involving scalpel and stitches.

**Anthelminthics**

A number of drugs are used to terminate helminth infections, but the effectiveness of different anthelminthics against a single species varies greatly. In one study, a triple dose of albendazole (3×400 mg over 3 consecutive days) showed a cure rate against hookworms of 92%, whereas a triple dose of mebendazole (3×500 mg over 3 consecutive days) only achieved a cure rate of 58%.

Each anthelminthic drug may have varying degrees of effectiveness against different helminths. For example, while a triple dose of albendazole (3×400 mg over 3 consecutive days) showed a cure rate against hookworms of 92%, the same regimen only achieved a 56% cure rate against whipworms [link] and, in patients with an excessive whipworm infection, albendazole may need to be taken for 5–7 days. [Link]

Information about each of the anthelminthic drugs in use currently is readily available online, but, if it becomes necessary to terminate a colony of helminths, the subject should obtain the advice of a medical doctor and follow their directions. However, under no circumstances should mebendazole ever be combined with metronidazole (Flagyl), and this is something about which many doctors and pharmacists may be unaware. There is a risk that this combination may cause Stevens-Johnson Syndrome/Toxic Epidermal Necrolysis.

**Bephenium hydroxynaphthoate** (Alcopar, Alcopara, Befenium, Debefenium, Francin, Nemex). This is an anthelmintic agent once used to treat hookworm and roundworm infections.

Isomyristicin and bergaptenix are two phytochemical compounds isolated from the Bhutanese medicinal plants, Corydalis crispa and Pleuroserpmum amabile, which have shown significant anthelmintic activity against the helminths, Schistosoma mansoni and Trichuris muris. In concentrated form, they may therefore be harmful to other whipworms and possibly also hookworms. [Link] However, it should be noted that myristicin (the parent chemical from which isomyristicin is derived) and bergapten are both found in very small quantities in the vegetables, herbs and fruits consumed by humans on a daily basis, e.g., parsley, celery, lemons, figs, carrots, grape juice, Earl grey tea, nutmeg and dill, but the risk of an anthelmintic effect from this very limited dietary intake is negligible. [Link]

**Nitazoxanide** (Alinia, Nitaside) is a broad-spectrum antiparasitic and broad-spectrum antiviral drug used to treat various helminthic, protozoal and viral infections. It has demonstrated activity against tapeworms, [link] so may also have an adverse effect on hookworms and whipworms.

**Odanacatib** (codenamed MK-0822) is an investigational treatment for osteoporosis and bone metastasis developed by Merck & Co., and possibly available for clinical use from 2016. Unfortunately, this drug has been shown to kill the hookworm, Ancylostoma ceylanicum, in hamsters, decreasing worm burdens by 73%. [Link] Consequently, it is likely to be trialled as a potential alternative to albendazole and may have an adverse effect on the human hookworm as well as other helminths, so should be avoided by helminth self-treaters.
**Pyrvinium** (Vanquin, vipryniun). This anthelmintic was previously used to treat pinworm (Enterobius vermicularis) infections, but has been largely replaced by other anthelmintics, e.g., mebendazole or pyrantel pamoate.

**Piperazine.** Piperazine hydrate and piperazine citrate are anthelmintic drugs that kill 60-70% of adult roundworms. There is also a whole raft of piperazine-derived compounds that may potentially have an anthelmintic action. These include many antidepressants including trazodone (Deperyl, Desyrel, Molipaxin. Oleptro. Trazodil, Trazorel, Trialodine, Trittico), antipsychotics such as olanzapine (Lanzenk, Zypadhera, Zypraxa), prochlorperazine (Compazine, Stemzine, Buccastem, Stemetil, Phenotil), ziprasidone (Geodon, Zeldox), the migraine treatment, Migraleve Pink, and antihistamines including buclizine, cetirizine (Zyrtec, Reactine), chlorcyclizine (Di-paralene, Mantaddil, Pruresidine, Trihistan), cinnarizine (Stugeron, Stunaron, R5), cyclizine, hydroxyzine (Vistaril, Atarax), levocetirizine (Xyzal), meclizine (Bonine, Bonamine, Antivert, Postafen, Sea Legs, dimenhydrinate (Dramamine) and niaprazine) as well as antianginals, anxiolytics such as buspireone (Buspar), urologicals, e.g., sildenafil (Viagra, Revatio) and vardenafin (Levitra, Staxyn). However, this does not mean that all these piperazine derivatives will kill helminths. For example, Viagra does not kill hookworms, and they can survive at least one 50mg dose of dimenhydrinate (Dramamine).

Anthelmintic residues may be encountered in farmed meats, especially the livers of cattle and fowl, but it is not known whether, or to what extent, these might affect therapeutic helminths in hosts who eat this meat.

Canine anthelmintics that have been applied to a dog’s skin should not be a problem for anyone who pets a treated animal so long as they wash their hands immediately after the contact. [Link]

**Antibiotics** (Also see “Alternative antibiotics”)

While two hookworm hosts have said that they did not lose their worms following treatment with amoxicillin, two others have reported losing their colonies after taking this drug. Combination drugs that contain amoxicillin (e.g., amoxicillin/clavulanic acid [co-amoxiclav] and Augmentin) may therefore also be a threat to human helminths.

One hookworm host has reported losing her colony to the nitromidazole drug, metronidazole (Flagyl), which may be particularly harmful if taken in combination with clindamycin (Dalacin, Lincomycin, Daclin), as discussed here. Metronidazole and clindamycin are favoured by some dentists due to their proven efficacy against anaerobic bacteria. The nitromidazoles also include tinidazole (another antiparasitic drug), and nimorazole.

Someone has reported losing her hookworms to a combination of azithromycin (an azalide, a type of macrolide antibiotic) and doxycycline (a broad spectrum antibiotic of the tetracycline class), whereas a whipworm host did not lose her colony from taking this same combination of drugs. Azithromycin (brand names include: AZIF-500, Azithral, Azithrocin, Azyth, Azin, Z pack, Zeto and Zithromax) has been used in isolation to treat a child with PANDAS without any worm loss, although its use did result in a temporary suspension of benefits.

Doxycycline (Vibramycin, Monodox, Microdox, Periostat, Vibra-Tabs, Oracea, Doryx, Vibrox, Adoxa, Doxyhexal, Doxylin, Doxoral, Doxy-1 and Attridox, etc.) is a tetracycline antibiotic that also has antiprotozoal, antibacterial and some anthelmintic effects, although the latter have been claimed to only affect filarial nematodes. In this case, the drug kills a symbiotic bacterium in the worm’s reproductive tract, thus rendering it sterile. Moreover, an eight-week course of doxycycline may be necessary to achieve this effect. One hookworm host has reported that he took doxycycline for a total of 5 weeks without noticeable effect on his worms [link], but another has said that her hookworms “completely stopped working” after taking doxycycline for only three days. [Link] She said that this happened “pretty much overnight”, and that, in spite of getting a supplementary dose of worms a month or so after taking the antibiotic, [link] she didn’t feel right again for the following 6 months. [Link] (NB: doxycycline has also been found to have unexpected effects on mitochondria.)

Short courses of most other antibiotics will usually cause a temporary loss of benefit for between 2 and 8 weeks (e.g., erythromycin [link]), although it is possible for efficacy to be reduced for longer, e.g., 4 months, and even 6 months, and there is anecdotal evidence suggesting a correlation between the length of a course of antibiotics and the length of time that affected helminths are out of action.

It is possible that even a small dose of antibiotic could cause a return of symptoms in some people. For example, one hookworm host has reported experiencing a recurrence of significant disease symptoms after using 3 drops per day, for only 1½ days, of a solution of Tobramycin 3mg (0.3%) and Dexamethasone 1mg (0.1%), although this one-off occurrence could have been a coincidence.

When it is essential to take oral antibiotics, the duration of their negative effect on hookworms can be significantly reduced - perhaps to as little as 2 weeks - by taking a small top-up dose of 5-10 larvae after finishing the course of drugs. This inoculation can be carried out on the day following the last dose of antibiotic.

It has been suggested that the reduction in the benefits derived from hosting human helminths that is seen after taking antibiotics might result, at least in part, from a loss from the gut microbiome of helpful bacterial species and...
the proliferation of less beneficial ones. This suggestion, and the fact that taking probiotics alongside antibiotics is known to help offset the gastrointestinal symptoms typically associated with these drugs, has led some commentators to speculate that the use of high doses (perhaps 5 or 10 times the normal dose) of good quality probiotics might help to reduce the time that helminths are out of action after using these drugs.

It is possible that the consumption of galacto-oligosaccharides (GOS) while taking probiotics may also help to restore the gut biome, as GOS has been shown to help support the recovery of beneficial bifidobacteria and increase the production of butyrate, after antibiotic treatment. GOS is available in the form of Bimuno Prebiotic Powder.

In the case of someone needing to take antibiotics regularly, or on a long-term basis, there would be little point in them using hookworms until completely off these drugs. Some worm benefits may be maintained in users of the human whipworm, so long as doses of this organism are being taken regularly, every few weeks. Another solution for those who need to take antibiotics frequently, or for prolonged periods, would be to switch to TSO (Trichuris suis ova) as these are less likely to be adversely affected by antibiotics. HDC (Hymenolepis diminuta) cysticercoids may also be less susceptible to antibiotics than human helminths, although two users of HDC have reported that the antibiotic, Dapsone (diamino-diphenyl sulfone), causes a return of their disease symptoms.

Fosfomycin (also known as phosphomycin, phosphonomycin, Monurol and Monuril) A single, one-off, 3g dose if this broad-spectrum antibiotic that was taken by a hookworm host to treat a urinary tract infection had no obvious effect on her worms. [Link] However, larger doses or a longer treatment period may produce a different result.

Trimethoprim (Alprim). One hookworm host has reported continuing to enjoy full benefits from her worms after taking seven 300 mg doses of this drug to treat a urinary tract infection. Another has reported that, when used to treat UTIs, Alprim not only did not affect her hookworm colony, but did not even arrest the production of ova by her worms. [Link]

Topical antibiotics. If applied to the skin, or used as eye drops, these are unlikely to affect helminths in most cases. Four drops of cyloxan (0.3%) applied to each eye 3 times per day, for 2 weeks, had no effect on the colonies of two hookworm hosts. [Link] However, as mentioned above, one hookworm host has reported experiencing a recurrence of significant disease symptoms after using 3 drops per day, for only 1½ days, of a solution of Tobramycin 3mg (0.3%) and Dexamethasone 1mg (0.1%).

(NB. Some antibiotics are arguably best avoided for other reasons. For example, fluoroquinolone antibiotics, such as ciprofloxacin (cipro) quinolone, levofloxacin (Levaquin, Tavanic, etc.) and gatifloxacin (Gatiflo, Tequin, Zymar) can be extremely dangerous for some people, while clarithromycin has been shown to increase the risk of a fatal heart attack by an estimated 76 per cent compared to penicillin V. No increased risk was seen with roxithromycin.)

Anticoagulants

Anticoagulant medicines and herbs (which reduce the clotting ability of blood) do not harm helminths, but may prolong bleeding from the tiny feeding sites of hookworms, which, themselves, secrete minute amounts of anticoagulants to help their digestive process. Anticoagulant drugs include warfarin and heparin. Other drugs that have an anticoagulant effect include aspirin, and products containing it, such as Alka-Seltzer and Pepto-Bismol. Herbs with an anticoagulant effect include ginkgo biloba. All of these compounds may prolong bleeding at hookworm feeding sites to some extent, so may potentially contribute to anaemia (anemia) in susceptible individuals, especially if several of these drugs/supplements are taken at the same time.

Antifungals

The antifungal drugs, fluconazole (Diflucan and Trican) and nystatin, both appear to be safe for use with human helminths, as does the fatty acid, caprylic acid. [Link] However, anyone with a coconut allergy/intolerance should note that caprylic acid is a coconut/palm kernel derivative. The enzyme-based anti-candida product, candex, is also worm-safe, and one hookworm host took 4 Candex capsules twice a day for over a month without any obvious harm to his worms. [Link]

Some probiotics may help to control candida, especially Saccharomyces boulardii, which significantly inhibits adhesion by C. albicans, thus preventing the formation of biofilms and filamentation, and it is as effective as nystatin in reducing fungal colonization and invasive fungal infection. S. boulardii has also been taken by at least two helminth hosts without any obvious effect on their worms. However, there has been one report in an online group of a very slow increase in intestinal inflammation while taking it.

Sodium butyrate is a powerful antifungal that inhibits pathogenic yeast growth. It is available as a food supplement and is also manufactured in the human intestines by the fermentation of vegetables. The bacteria responsible for butyrate production are vulnerable to antibiotics, but can be reintroduced, or supplemented, by...
means of fecal microbiota transplants (FMT), or the addition of the butyrate-producing bacterial species, *Clostridium butyricum*, which generates butyrate directly in the gut. C. butyricum is available as the probiotic, Miyarisan Tablets, in Japan, and is available online, e.g., from eBay and Amazon, and in the probiotic formulations, Bifilac and Bifilac HP, the first of which is available from here. C. butyricum is also available as an animal feed additive. Nutrients that help to increase butyric acid concentrations in the colon include pectin and larch arabinogalactan, which is available as a supplement, although arabinogalactan can worsen rheumatic conditions. [Link, link]

Ascorbic acid (vitamin C) may interfere with the yeast-to-hypha transition of candida.

Apple cider vinegar has been revealed as a possible treatment for Candida species involved in denture stomatitis, and there have been suggestions that, if ingested, vinegar might induce the body's gut defence system to help combat a Candida albicans infection. Advice on using apple cider vinegar as part of an anti-candida treatment regimen can be found here and here.

Iodine appears to have antifungal properties, is worm-friendly, and has proved effective against candida for one hookworm host.

Vitamin D turns on genes that make antimicrobial peptides, including cathelicidin, which has been shown to kill Candida. However, dosage with this vitamin may be critical, and excessive amounts might be counter-productive. Aiming for the optimum blood level of vitamin D would therefore appear to be ideal.

Some foods, eaten in normal dietary amounts, may help support an anti-candida programme, but see the separate notes on cayenne, coconut and ginger. Fresh garlic may be particularly helpful, and dietary forms of garlic are known to be worm-safe. However, we don’t yet know what effect a garlic extract might have on helminths.

Some herbal antifungal products may adversely affect helminths, especially if they are in a concentrated form, so any herbal medicine that claims to have antifungal properties should be approached with caution.

When candida is a problem, very low carbohydrate (VLC) diets are best avoided because these cause ketosis, and yeasts love ketones.

Monolaurin (also known as lauric acid, glycerol monolaurate, glycyril laurate and 1-Lauroyl-glycerol) is a fatty acid found naturally in coconut oil and human breast milk. Shown in test tube studies to have antibacterial and antiviral activity, it is commonly used as a surfactant in cosmetics, including deodorants, and as an emulsifier in foods. While it is active against candida, one subject has reported that taking two teaspoons of monolaurin daily, for a few weeks, produced no obvious effect on his worms. [Link, link] Another believes that she probably ingested a significant dose of monolaurin by drinking full fat coconut milk daily, but that her hookworms and whipworms both survived this. [Link] Others have also confirmed that monolaurin is worm-safe. [Link]

Cellular silver. The manufacturers of Advanced Cellular Silver (ACS) 200 Extra Strength claim that this product achieves a 99.9989% kill against C. albicans. Although there have been no reports to date of its possible effect on human helminths, its similarity to colloidal silver suggest that it may not kill the worms but only cause a temporary reduction of benefits.

Chlorophyll. A chlorophyll-based solution has been found to be effective against candida albicans and there have been no reports to suggest this might be harmful to helminths. (Also see Chlorophyllin.)

Lactoferrin (also known as lactotransferrin [LTF]) is found naturally in secretory fluids, such as milk, saliva, tears and nasal secretions. It has antibacterial, antiviral, antifungal and antiparasitic properties, and is effective against candida. Its antimicrobial properties are enhanced by the peptide, lactoferricin, the anti fungal effects of which exceed those of lactoferrin. However, there have been no reports so far of the possible effect of lactoferricin on helminths.

Lavender has antifungal activity and may be of value in treating candida. [Link]

Propolis. Candida has been shown to be susceptible to propolis extract [link], and to red propolis alcoholic extract. [Link]

Polygodial, which has both antifungal and antimicrobial properties and is used as an insecticide, is an active constituent of Dorrigo pepper, mountain pepper, horopito, mountain horopito, Kolorex, canelo (Drimys winteri, winter’s bark) paracress and water pepper. Whilst polygodial has been shown to be effective against single-celled parasites such as protozoa, the only report so far that it might also have an adverse effect on helminths comes from a hookworm host who suspects that she killed her colony by taking Kolorex, which contains a mixture of horopito and aniseed.
Sambucus, a form of elderberry, contains pinoresinol, which has antifungal properties. However, the European elder, sambucus nigra, also known as European elderberry, European black elderberry, elder, elderberry and black elder, may not contain pinoresinol, so may not be an effective antifungal. There have been no reports as yet about the effect on helminths of any form of elderberry.

Undecylenic Acid. This is the common name for 10-Undecenoic Acid, which is used in the Thorne Research product, Formula SF722. It is a potent antifungal mono-unsaturated fatty acid extracted from coconut and the castor bean. It has been shown to be 11 times stronger than caprylic acid, and is also claimed to have antiparasitic properties, although there have been no reports about this from hosts of therapeutic helminths.

Curcumin inhibits candida, even at low concentrations, but see this separate entry on curcumin for more details.

Black cumin (nigella sativa). Also known as blackseed, black caraway, fennel-flower, nutmeg flower, Roman coriander, and 'Love in the Mist'. Extracts of this herb have shown antifungal effects against different strains of Candida albicans, but it has also been used as an anthelmintic since ancient times. In India, today, nigella seeds are combined with various purgatives to help kill and expel intestinal parasites.

Gymnema sylvestre is effective against candida, but hydroalcoholic extracts of this herb have been found to have anthelmintic activity against the Indian earthworm, Phereetima posthuma. [Link] Even though the research worm, C. elegans, appears to be unaffected by gymnema and there are genetic similarities between C. elegans and N. americanus, one helminth host suspects that gymnema was responsible for the loss of his hookworm colony.

Lufenuron is a benzoyleurea pesticide used on crops and in veterinary medicine (in flea control, heartworm treatments and other anthelmintic products). Its powerful anti-fungal effects may be due to its ability to inhibit the synthesis of chitin, which is unfortunately an important constituent of the mouthparts of the hookworm.

Some foods are coated with edible films containing antifungal compounds such as natamycin (pimaricin) and oregano oil, but the quantities used in this application are probably insufficient to affect helminths, and there is no evidence to date that natamycin harms intestinal flora.

NB. Prolonged treatment with antifungal drugs can disrupt commensal fungal populations and cause an increase in the severity of disease states, as seen in one study in acute and chronic models of colitis and allergic airway disease.

Antihistamines

Several popular antihistamines are derived from, or closely related to, the anthelmintic drug, piperazine. (See the separate entry on piperazine here.) These include cetirizine (Zyrtec, Reactine), levocetirizine (Alcet, Alllear, Curin, levect, Seasonix, T-Day Syrup, Teczine, UVNIL, Vozet, Xaltoc, Xozal, Xuzal, Xusal, Xyzal, Zilola, Zyxem), phenylephrine, desloratadine (NeoClarityn, Clarinex, Clarinex, Larinex, Aeriiz, Dazit, Azomyr, Deselex and Delot) and possibly acrivastine (Semprex-D in the US).

While some people have taken cetirizine, levocetirizine or desloratadine concurrently with helminthic therapy - sometimes for very long periods - and had no loss of benefit from their worms (for example, here and here), there have been others who have suspected that these drugs have been responsible for adversely affecting or even killing their worms.

There are a number of other less common antihistamines that are derived from, or related to, piperazine. At the present time, there is no indication whether, or to what extent, many of these might affect human helminths. They include buclizine, chlorcyclizine (Di-paralene, Mantadil, Pruresidine, Trihistan), cinnarizine (Stugeron, Stunarine, R5), cyclizine, hydroxyzine (Vistaril, Atarax), meclizine (Bonine, Bonamine, Antivert, Postafen, Sea Legs), dimenhydrinate (Dramamine) and niaprazine.

Chlorphenamnene (chlorpheniramine, piriton). While we don’t yet have any confirmation of the effect on helminths of this first-generation antihistamine, it has been suggested by someone who has investigated this that it is unlikely to be harmful to worms.

Cromoglicic acid (cromolyn, cromoglicate or cromoglicate, sodium cromoglicate [Nalcrom] or cromolyn sodium, plus Gastrocrom and Intercron). This is a mast cell stabiliser which prevents the release of histamine from mast cells and is used to treat some allergic conditions. One hookworm host has taken 8x100mg capsules of Nalcrom daily for periods of up to 10 days without any adverse effect on her colony. [Link]

Doxylamine (Dozile, Restavit, Valocordin-Doxylamine and Vomentin). One hookworm host believes that an unexpected return of gut symptoms and dry skin may have been caused by taking a quarter of a tablet of this first-generation antihistamine every night for a couple of weeks. [Link]
Ketotifen. This antihistamine and mast cell stabilizer, which has similar effects to cromoglicic acid, is sold under a large variety of trade names that include Allerban, Allergen, Bentifen, Ketasma, Mastifen, Zaditen and Zylofen. In a small in vitro test, one hookworm self-treater found that exposing a sample of Necator americanus larvae to Naziden left them "a bit lethargic but alive" [link] and that they were still alive the next day. [Link] However, effects in vivo don't always correspond with those observed in a petri dish, and ketotifen is a piperazine-related substance so it may have an adverse effect on human helminths in vivo in at least some users.

Promethazine (Phenergan, Promethegan, Romergan, Fargan, Farganesse, Prothiazine, Avomine, Atosil, Receptozine, Lergigan, and, in the UK, Sominex). This does not appear to kill helminths, especially when administered by intramuscular injection. However, one helminth host has reported that this drug reduced his worm benefits when taken orally.

Worm-safe antihistamines are diphenhydramine, loratadine (Claritin) and fexofenadine (Allegra, Fexidine, Telfast, Fastalen, Tiffur, Vifas, Telfexo, Allerfexo). Of these, diphenhydramine is the most likely to cause drowsiness, and fexofenadine the least likely.

Most Benadryl-branded products sold in the US contain only diphenhydramine so are worm-safe, e.g., Benadryl Allergy Ultratab Tablets / Benadryl Allergy Dye-Free Liqui-gels / Children's Benadryl Allergy Liquid, but Childrens’ Benadryl Allergy Plus Congestion also contains phenylephrine, which has anthelminthic properties and has caused a brief return of disease symptoms in one worm host after a single dose.

Benadryl products sold in the UK all contain drugs with anthelminthic potential - either cetirizine (Benadryl Allergy Liquid Release Tablets/Capsules / Benadryl One a Day Relief Tablets/Capsules / Benadryl Allergy Children's (2+ years) 1mg/ml Oral Solution / Benadryl Allergy Children's 6+ 1mg/ml Oral Solution) or acrivastine (Benadryl Allergy Relief Plus Decongestant Capsules / Benadryl Allergy Relief Capsules).

The term, “antihistamine” is usually reserved for H1 antagonists whose main therapeutic effect is mediated by negative modulation of histamine receptors, but H2 histamine receptor antagonists can also be considered to be a type of antihistamine. H2 antagonists include ranitidine (Zantac) which works by blocking histamine and thus decreasing the amount of acid released by the cells of the stomach. Other common H2 antagonists are cimetidine (Tagamet), famotidine (Pepcid) and nizatidine (Arid, Tazac). H2 antagonists are a separate class of drugs from proton-pump Inhibitors.

Antimalarials

There has been no suggestion so far that any antimalarial medication might harm helminths, including quinine. One subject who has taken large quantities of the malaria drug, hydroxychloroquine, concurrently with HT, did not observe any adverse effect on his worms.

Antiprotozoals

Metronidazole (Flagyl). This is one of three derivatives of nitroimidazole that is used against anaerobic bacterial and parasitic, as well as protozoan, infections. One hookworm host has reported losing her colony to this drug, which should never be combined with mebendazole due a risk that, together, they may cause Stevens-Johnson Syndrome/Toxic Epidermal Necrolysis, something about which many doctors and pharmacists may be unaware, especially in the US.

Antivirals

Famciclovir (Famvir). One hookworm host took Famciclovir (500mg) 3 times per day for many months without any noticeable effect on her colony. [Link]

Nitazoxanide. See separate entry under Anthelminthics, here.

Valaciclovir/valacyclovir (Valtrex, Zelitrex). This antiviral drug was taken by one worm host for a week without any adverse effect on his hookworms or whipworms.

Immunosuppressive drugs

Immunosuppressive drugs that have been reported to be safe for use by hosts of human helminths are: cyclosporin; synthetic corticosteroids including prednisone and its active metabolite, prednisolone; the thiopurines, azathioprine and mercaptopurine/6-MP (purinethol); the TNF inhibitors, infliximab (Remicade),...
Adalimumab (Humira), certolizumab pegol (Cimzia) and golimumab (Simponi); humanized antibody drugs, e.g., omalizumab (Xolair); humanized monoclonal antibody drugs such as natalizumab (Tysabri); and recombinant fusion protein drugs such as etanercept (Enbrel). It can be an advantage to be taking one of these drugs in the early stages of helminthic therapy because they can reduce, or even prevent, the transient side effects triggered by helminths, and their anti-inflammatory action can also help human helminths to become established. So anyone who is already taking one of these drugs should resist the temptation to stop taking it too soon after starting HT. This applies particularly to subjects with Crohn’s and other intestinal diseases, who tend to have a very vigorous immune response to helminths. Suddenly withdrawing a drug that has been keeping this response in check will likely cause a rebound effect that could result in a flare and, potentially, a loss of worms. This is explained in more detail here.

**Immunotherapy**

**Allergen immunotherapy.** In the form of sublingual drops/tablets, subcutaneous injections, and allergy “shots”, this is safe to be used concurrently with helminthic therapy. In fact, many who have used the two therapies together have been very pleased with the combined effects.

**Laxatives**

It is possible to lose hookworms to diarrhoea/diarrhea, but only if this is very severe, or severe and prolonged, i.e., lasting for several weeks. (More detail here.) People who get diarrhoea/diarrhea as a side effect following their first inoculation with hookworms don’t lose all their worms as as result of this, and hookworms are able to withstand the typical colonoscopy prep.

It would seem logical to assume that hookworms might be better able to resist being flushed out after the point at which they attach to the gut wall, which is towards the end of the third week, post inoculation.

While adult hookworms do move around to feed, and are therefore theoretically more likely to be lost if diarrhoea/diarrhea strikes while they are on the move, this is unlikely to lead to any significant loss. So, as long as laxatives are taken in the recommended amounts, they should not pose a problem for hookworms.

It is unlikely that laxatives would dislodge whipworms once these are mature and embedded in the colonic mucosa, but laxatives could potentially flush them out before this, especially around 21-22 days post inoculation. It may therefore be best to avoid the use of laxatives around this time. After 28 days, they should not be affected at all.

**Recreational drugs**

**Piperazine-based recreational drugs** are a group of stimulant drugs with similar effects to ecstasy. (See this separate entry for more details on piperazine.) The main piperazine-derivatives that have been used for recreational purposes include BZP (Benzylpiperazine, A2, Frenzy, Nemesis), TFPMP (1-[3-(trifluoro-methyl) phenyl]piperazine) and mCPP (meta-chlorophenylpiperazine, 1-[3-Chlorophenyl]-piperazine). These drugs were frequently mixed with caffeine and a range of vitamins and binders to make party pills that were marketed as “natural” or “herbal” highs, but were actually purely synthetic. Other piperazine-derived designer drugs include: AcBZP (4-Acetyl-1-benzylpiperazine, AceticBenzylPiperazine), MBZP (1-methyl-4-benzylpiperazine), 2C-B-BZP (4-Bromo-2,5-dimethoxy-1-benzylpiperazine), DBZP (1,4-Dibenzylpiperazine) and MDBZP (3,4 Methylenedioxy-1-benzylpiperazine).

It has been opined that anything that enters the blood stream and disorients a host has a potential to do the same to hookworms - since they feed on their host’s blood - and that, if the disorientation is excessive, it may cause the worms to lose their grip on the mucosa and possibly be flushed away from their home base in the small intestine, and be lost. However, the assumption that the worms will become inebriated by anything that inebriates their host has been questioned because the 'nervous system' of helminths is quite different from that of mammals.

There is one recreational drug in particular that might produce this effect and cause the loss of hookworms, and this is the South American drug yage, also known as ayahuasca, as well as by a number of other names. This psychodelic brew, which is concocted by combining a variety of plant materials, was used as part of S. American native religious rituals and, since being commercialised, has become much more mainstream. Available in Europe and N. America through “churches” set up for its import, this drug causes a deep and immersive hallucinogenic experience during a “trip” lasting 4-8 hours, or 12-18 hours if the subject is re-dosed, which is not uncommon. Ayahuasca can also cause severe diarrhoea.

**Hypnotics** are generally worm-safe, e.g., propofol (an ultrashort-acting sedative with amnesiac effects); anything in the benzodiazepine class of drugs (e.g. valium); the short-acting nonbenzodiazepine hypnotic, zolpidem (e.g., valium).
Opium, heroin, cannabis/marijuana/hashish, quat, etc., are all commonly and regularly used in areas where helminths are endemic - Africa, S.E. Asia, S. America, etc. If any of these were harmful to helminths they would have been identified as such long ago and would have become a folk remedy for one worm or another. One host of both hookworms and whipworms has confirmed the presence of eggs from both species after cannabis use, and another hookworm host who used 10 drops of hemp CBD (cannabidiol) oil twice daily, plus a few drops of THC (tetrahydrocannabinol) oil to help with sleep, has reported that her hookworms were unaffected. [Link] Cocaine, in its pure, unadulterated state, could be added to this list of worm-safe drugs, but it is commonly adulterated with other substances that might harm helminths, particularly levamisole.

Betel leaves. The leaves of the Piper betle vine (part of the Piperaceae family, which includes pepper and kava) are used as a mild stimulant and are thought likely to be safe for human helminths, although there have been no reports from helminth hosts to confirm or contradict this. The betel nut, or areca nut, seed of the areca palm (and also known as the areca nut palm, betel palm, Pinang palm and Indian nut) is often chewed wrapped in betel leaves - a combination known as paan that is used for its stimulant and psychoactive effects. Betel nuts contain the anthelminthic, arecoline and have been used as a tapeworm remedy. Fresh betel nuts are also known to be used very effectively by Torres Straigh Islanders as a treatment for all types of intestinal worm, and surveys have found that the betel chewers were almost all worm-free, while others weren't. (Prolonged use of the betel nut can create addiction and the World Health Organization classifies the betel nut as a carcinogen.)

Most other recreational drugs should be safe for use by helminth hosts, including tobacco, nicotine and most forms of alcohol.

Alcohol. Normal social drinking should not have any adverse effect on helminths, but there have been hints that overindulging in alcohol may cause a temporary reduction in worm benefits, although this clearly isn't the case for everyone and the effect is likely to be dose-dependent. Excessive consumption of alcohol that results in the user going into a coma due to alcohol poisoning may incur a greater risk to helminths. One alcoholic drink that might present more of a risk is absinthe, which was traditionally made using herbs reported to have antiparasitic properties, including wormwood. (See separate entry here.) However, the risk from absinthe has been questioned because it only contains the essential oil of wormwood, while the anthelminthic activity of this herb has been linked more to the bitter principles and the alkaloids, which are not included in absinthe.

MDMA (ecstasy). As primarily a serotonin and dopamine agonist, this is thought unlikely to have much effect on helminths. However, serotonin agonism increases peristalsis, so using MDMA may not be a good idea until after the worms have attached to the intestinal mucosa. Once they are attached, the increased peristalsis alone would not dislodge them.

DMT (N,N-Dimethyltryptamine or N,N-DMT) is a psychedelic compound with powerful hallucinogenic effects. While this may be safe for use while hosting human helminths, there have been no reports to confirm this, and it is possible that high doses may have an impact on helminths.

LSD (Lysergic acid diethylamide) is unlikely to harm helminths, although there have been no reports to confirm this.

Myristicin. This psychoactive drug, which is the traditional precursor for the psychedelic and empathogenic drug MDMA, is found in very small quantities in vegetables, herbs and fruits consumed by humans on a daily basis, e.g., parsley, celery, lemons, figs, carrots, grape juice, Earl grey tea, nutmeg and dill, but this dietary intake is unlikely to be harmful to helminths. [Link]

Peyote (Lophophora williamsii). This cactus, which contains psychoactive alkaloids, including mescaline, is thought unlikely to harm helminths, but there have been no reports to confirm this.

Psilocybin, a substituted tryptamine, is a naturally occurring psychedelic compound produced by more than 200 species of mushroom. Although illegal in most countries/states, psilocybin is used for the self-treatment of cluster headaches, and one hookworm host has reported using this compound for two months to treat severe migraines, without noticing any apparent effect on his worms. However, it is possible that higher doses of this hallucinogenic may disorient hookworms for long enough to cause their loss.

Miscellaneous pharmaceuticals and chemicals

Aciclovir (Cyclovir, Herpex, Acivir, Acivirax, Zovirax, Zoral, Xovir and Imavir). There have been no reported problems with this drug so far. See also the related drug, Valaciclovir/valacyclovir.
**Baclofen** (Kenstro, Lioresal, Liefen, Gablofen, Beklo and Baclosan) is a derivative of gamma-aminobutyric acid (GABA). One host who took 20-30 mgs of baclofen daily reported no loss of worm benefits.

**Barbiturates** have now largely been replaced in routine medical practice by benzodiazepines, but they may still be encountered in general anaesthesia, for epilepsy, and in the treatment of acute migraines. These drugs depress the central nervous system, producing effects ranging from mild sedation to total anaesthesia, so, taken in sufficient quantity, they may disorient hookworms sufficiently to cause them to lose their grip on the intestinal mucosa and be flushed away from their feeding site.

**Benzodiazepines (BZD), benzos**. There have been no reports of this type of drug having any adverse effect on helminths. The short-acting anti-anxiety drug, alprazolam (Vanax), was taken by one hookworm host (0.5 mg 3 or 4 times over the course of a month) without any apparent effect on his worms. [Link] and the tranquilizer, clonazepam (Klonopin), was found to be worm-safe by another helminth self-treater. [Link] Lorazepam (Ativan) has also been reported to be worm-safe. [Link]

**Bismuth subsalicylate** (pink bismuth, the active ingredient in various stomach-settling medications such as Pepto-Bismol and Kapectate). There has been one suggestion that bismuth may have a temporary adverse effect on human helminths, similar to that caused by local anaesthetics/anesthetics, but this has not been confirmed by others. Pepto-Bismol is listed as containing aspirin (acetylsalicylate) or an aspirin-like substance, so see Anticoagulants regarding this ingredient.

**Carbamazepine** (Tegretol, Equetro). This appears to be worm-safe. One host who took this for two weeks was still producing ample hookworm ova at the end of this period.

**Chlorine**, as a constituent of chlorinated water at swimming baths is no threat to helminths, as explained here.

**Cortifoam**, a hydrocortisone rectal aerosol, uses propane and isobutane as propellants, neither of which is known to have any adverse effect on helminths.

**COX-2 inhibitors**, e.g., celecoxib (Celebrex), are safe for use with helminths.

**Cromoglicic acid** (cromolyn, cromoglicate or cromoglicate, sodium cromoglicate [Nalcrom] or cromolyn sodium) is a mast cell stabiliser with anti-allergy effects. One hookworm host has taken 8x100mg capsules of Nalcrom daily for periods of up to 10 days without any adverse effect on her colony. [Link]

**Cry5B**. This is one of a family of proteins produced by Bacillus thuringiensis (Bt), a bacterium that has been engineered into food crops such as corn and rice to render them pest resistant, and residues of B. thuringiensis-based insecticides have been found on fresh fruits and vegetables. [Link] Cry5B can kill intestinal worms and is used as a natural insecticide on crops in some organic farms. The probiotic bacterium, Bacillus subtilis, can also be engineered to express the Cry5B protein, a small dose of which has been shown to kill intestinal nematode parasites, achieving a 93 percent elimination of human hookworms in hamsters. [Link] Although researchers may be pursuing this development as a means of delivering anthelmintics via foods and food supplements, the strain of Bacillus subtilis currently used in probiotics that have been manufactured for human consumption is not known to have been modified in this way, and one hookworm host has reported that his worms were unaffected after eating a lot of natto (made using Bacillus subtilis) and taking the Bacillus subtilis-containing probiotic product, Megasporebiotic. [Link]

**DMPS** (Dimercapto-propane sulfonate/2,3-Dimercapto-1-propanesulfonic acid) and its sodium salt, Unithiol. There have been no reports so far about possible anthelmintic effects following the use of this drug, but there do appear to be some serious risks attached to its use.

**DMSA** (Dimercaptosuccinic acid, also called succimer). The meso isomer form of this organosulfur compound is used as a chelating agent for the treatment of heavy metal toxicity. One hookworm host has taken 25 mg DMSA every 3 hours around the clock for 5 days, and repeated this every 3 weeks for a year without harming her hookworm colony. [Link] DMSA is apparently such an effective chelator that it may deplete levels of beneficial minerals, so should arguably be used under the guidance of a practitioner. [Link]

**DMSO** (Dimethyl sulfoxide) has been used by one helminth host without adverse effect.

**EDTA** (Ethylenediaminetetraacetic acid). There are, as yet, no reports from helminth hosts about the possible effects on intestinal worms of this heavy metal chelator.

**Essential oils**. These are also known as volatile oils, ethereal oils, aetherolea, or simply as the "oil of" the plant from which they were extracted. Certain essential oils contain some of the most potent antimicrobial compounds available and can be considered to be natural antibiotics. For example, **oregano oil** and **peppermint oil** can affect human helminths if ingested. However, when essential oils are diffused into the air using a nebuliser, heated over a
candle flame or burned, these should not harm helminths, even when using blends containing oregano or peppermint oil. [Link, link]

**GABA** (gamma-aminobutyric acid). It has been reported that the anthelmintic drug, ivermectin, causes paralysis in worms by increasing GABA, and a hookworm host has mentioned that she “used to do really well with GABA, but worms don’t like it.” On the other hand, a child with Type 1 diabetes was given GABA (750mg x 4 per day) alongside hookworm therapy without any indication that the worms were affected by this [link], and another hookworm host who took 20-30mgs per day of baclofen (a derivative of GABA) reported no loss of worm benefits.

**Genistein** is an isoflavone (phytoestrogen) with antioxidant and anthelmintic properties that has been found to be the main substance responsible for the deworming activity of the root-tuber peel extract of Felmingia vestita, the plant traditionally used as an anthelmintic by the Khasi tribes of India. Genistein is a potent cestocide, being highly effective against several species of tapeworm, as well as a pork trematode and a sheep liver fluke. Given the strength of its effect against these other helminths, it is reasonable to assume that concentrated or synthesised forms of genistein (such as KBU2046 and B43-genistein) may also harm or even kill therapeutic human helminths, although there is no evidence that eating soy products might be harmful to human helminths as a result of the naturally occurring genistein they contain.

**Guaifenesin.** This oral expectorant and muscle relaxant is sold under various brand names, including Mucinex, and is added to many other medicines. There have been no reports of this drug having any ill effect on helminths, and one hookworm host has reported that he regularly takes between 2 and 6 x 400 mg guaifenesin tablets to treat congestion, without any apparent effect on his worms.

**Helium** appears to be worm-safe, based on the experience of one hookworm host who deliberately inhaled a small volume of the gas (to enjoy the timbre-changing effect on his voice!) while blowing up balloons, and had no loss of effect from his worm colony.

**Hydrogen peroxide** (H2O2). This may kill helminths in a petri dish but it is so highly reactive that, if ingested, there is likely to be little left by the time it reaches the stomach. It is therefore thought to be unlikely to be a problem for helminths, although no one has reported on this, one way or the other, so it may pay to be cautious with H2O2 until there is more certainty.

**Iodine.** This appears not to have any anthelmintic effect in the case of some species of roundworm and lungworm and no reports of adverse effects have been posted by helminth hosts who are taking iodine supplements.

**Isotretinoin** (13-cis retinoic acid, Roaccutane, Accutane, Amnesteem, Claravis, Absorica, Isotretin and Epirus) is used to treat acne and other skin conditions. Although there have been no reports of harm to helminths as a result of taking this drug, anyone considering its use might appreciate knowing that it has been linked to autoimmune disease, which is of course what many readers of this document are already dealing with. The link is controversial, but this paper sets out the facts.

**Lactulose.** This synthetic, non-digestible sugar used in the treatment of chronic constipation and as a test for small intestine bacterial overgrowth (SIBO) has not been reported to have any untoward effects on human helminths.

**Loperamide** (Immodium, Lopex, etc.) This drug has been taken by numerous worm hosts and there have been no reports of it harming their worms.

**Low dose naltrexone** (LDN). This is compatible with helminthic therapy and several people have had good results from this combination, although this drug doesn’t suit everyone.

**Mepacrine** (quinacrine [Atabrine]). This is an antiprotozoal drug that has also been used against tapeworms, so it could harm hookworms and whipworms. No one has so far reported any problem with it, but it’s likely that few, if any, helminth hosts will have taken it, especially as, "Mepacrine is not the drug of choice because side effects are common, including toxic psychosis, and may cause permanent damage."

**Metformin** [Glucophage], phenformin, and rosiglitazone [Avandia] are anti-diabetic medications (also known as oral hypoglycemic or antihyperglycemic agents) that have been shown to have antibiotic properties, so might therefore have some degree of anthelmintic effect when used in higher doses. However no reports of such an effect have been posted so far by hosts of therapeutic human helminths.

**Methotrexate.** Some people are able to take methotrexate alongside HT without any problem, but one individual got no benefit from his worms for over a year, until he stopped taking this drug.

**Montelukast** (Singulair, Montelo-10, Monteflo, Lukotas, Arokast and Pulmikast). This leukotriene receptor antagonist has been taken intermittently, in 10 mg doses, by one hookworm hosts with no apparent effect on her colony. [Link, link]
**Muscle relaxants.** Anything that relaxes a worm host has the potential to do the same to his or her human helminths, conceivably affecting the ability of hookworms to maintain their grip on the host’s mucosa, and therefore possibly causing their expulsion, although this effect will likely be dose-dependent. **Carisprodol** (Soma, Sanoma and Carisoma) was suspected by one worm host of causing the loss of his hookworm population, although **Guaifenesin appears to be safe.** Whipworms may not be as vulnerable as hookworms, due to the fact that they do not feed directly from the bloodstream and they anchor themselves in the colonic mucosa.

**Non-steroidal anti-inflammatory drugs (NSAIDs, NSAIAs or NSAIMs)** e.g: aspirin, diclofenac (sold under many trade names), ibuprofen and naproxen, are safe for use with helminths, but see Anticoagulants regarding aspirin.

**Ozone.** **Ozone therapy** is used as an alternative treatment for various diseases in humans but is still controversial. Ozone is also used to kill microorganisms, in some instances being employed in place of chlorine as a bactericide. It is also used to eradicate water borne parasites such as Giardia lamblia and Cryptosporidium, and to kill insects in stored grain. So there would appear to be a potential for ozone to have an adverse effect on human helminths, although this may depend on dosage and there have been no reports to date of the use of ozone by helminth hosts, so caution would seem to be warranted until more is known.

**Paracetamol** (acetaminophen). This is safe for use with helminths.

**Pentobarbital** (US), pentobarbitone (UK), e.g., Nembutal, is a short-acting **barbiturate** that has been used as a sleep aid, as well as to euthanise animals and to execute humans. It’s possible that the dosages used to encourage sleep might not have any deleterious effect on human helminths, but, if this drug were to disorientate hookworms, they could lose their grip on the intestinal mucosa and be flushed away. So far, there have been no reports about this drug from any helminth host, although, few, if any, will have taken it.

**Piracetam.** This nootropic, cognition- and memory-enhancing drug (**Nootropil, Qropi, Myocalm, Dinagen**) was suspected as the cause in one case of sudden worm loss.

**Proton-pump inhibitors (PPIs), such as omeprazole (e.g., Losec) and lansoprazole (e.g., Prevacid).** These gastric acid inhibiting drugs appear to be safe for use with helminths.

**Pseudoephedrine** is a stimulant nasal decongestant that is sometimes added to antihistamine preparations and other products, including some formulations sold under the *Sudafed* brand. Pseudoephedrine has not been reported to have any adverse effect on helminths.

**Radioactive iodine** (also known as radioiodine), which is used in the treatment of hyperthyroidism, can adversely affect hookworms, at least temporarily. One worm host found that **isotope I-128** (used in diagnostics) put her colony out of action for a week or two, and has suggested that **isotope I-131** (used to kill thyroid tissue) may have a similar effect.

**Sildenafil (Viagra).** This does not kill hookworms.

**Simethicone.** This anti-foaming agent is used in different dosages, and in combination with a variety of other drugs, in a huge number of products, including Gas-X, to reduce bloating and the discomfort caused by excessive gas. Simethicone has been tested directly on pig whipworm ova (TSO) and found to have no effect on them, but there have been no reports so far to suggest whether or not it might affect human helminths.

**Sodium oxybate** (Xyrem, Alcover) is the sodium salt of γ-hydroxybutyric acid (**GHB**), which is unlikely to harm helminths because it’s an endogenous substance found naturally in the human body, and one hookworm/whipworm host has confirmed that it did not affect her worms.

**Steroid hormones.** One host of both hookworms and whipworms takes DHEA, progesterone and testosterone with no adverse effect on her worms.

**Tetanus vaccine.** Three helminth hosts have claimed that they may have lost their hookworms after a tetanus shot, although others have had tetanus shots without any worm loss, and no problems have been reported with other vaccines.

**Turpentine.** Also known as spirit of turpentine, oil of turpentine, wood turpentine and, colloquially, turps, this is distilled from pine tree resins. If applied topically to the skin - for example as a treatment for lice - it is unlikely to harm helminths. However, it has been used traditionally as an anthelmintic, so it may be harmful to human helminths if taken internally. It may, however, also be toxic to humans!

**Vicks First Defence.** This cold preventative nasal spray does not contain antiviral chemicals, but forms a microgel that coats the lining of the nose to trap the cold virus and prevent this from reaching, and infecting, the cells within the nose. The microgel also reduces the pH inside the nose, which further helps by making it harder for the cold
virus to multiply. It seems unlikely that any of this product’s ingredients would harm helminths, although there have been no reports to confirm this.

Volatile Organic Compounds (VOCs), as found in paints, felt tip markers, etc., are unlikely to harm helminths. One helminth host who regularly worked with organic solvents (including CH2Cl2 and CHCl3) has reported that his helminths have not been affected.

**Medical procedures**

**Colonoscopy.** As whipworms live in the colon, they may be at some risk of being struck by a colonoscope, but much of their body is embedded in the soft mucosa, and they are well lubricated with mucus, so few, if any, are likely to be damaged. Hookworms should not be affected by colonoscopy at all because they live in the small intestine, which is much higher up the GI tract. Hookworms might possibly be seen during a colonoscopy, but only if the colonoscope is advanced into the terminal ileum, and only then if any hookworms have taken up residence in the ileum, which is not common as they normally concentrate in the upper part of the jejunum, which is above the ileum, and is shown in red in this representation.

Anaesthesia for colonoscopy is likely to involve the use of opioid pain killers (fentanyl, etc.), benzodiazepine anaesthetics (Versed, etc.) and/or narcotic analgesics, all of which appear to be harmless to helminths. If a general anaesthetic incorporating nitrous oxide were used, this would definitely kill hookworms - and possibly whipworms too, though this is less certain. The injected anaesthetic, propofol, appears to be the only worm-safe general anaesthetic, and this is arguably the anaesthetic of choice for endoscopic procedures, and is safe for use in children. See Anaesthetics (anesthetics), general for more detail. And see Laxatives regarding colonoscopy prep.

**Colonic Hydrotherapy.** This will not harm hookworms and is unlikely to harm whipworms unless the fluid used contains something to which the whipworms are vulnerable.

**Detoxification.** The use of infrared saunas is safe for helminths, and chelation therapy using the Andy Cutler protocol has been used by one hookworm host with no obvious adverse effect on her colony. (Also see DMPS, DMSA and EDTA.)

**Enemas.** These will not affect hookworms at all, and the liquid used is unlikely to have any adverse effect on whipworms unless this contains something to which they are susceptible.

**Endoscopy.** A standard upper endoscopy (via the mouth) will not reach past the duodenum, and probably only as far as the second of the four parts of this section of the small intestine. It would therefore not harm hookworms or even allow a doctor to see the jejunum, which is the predominant location of hookworms by 20 weeks post-inoculation, shown in red in this representation. For information about the use of anaesthesia for endoscopy, see the details, here.

**Radiation therapy** (also known as radiotherapy, and abbreviated as RT, RTx, or XRT) is a treatment for cancer that used ionizing radiation. It is unlikely that this would harm helminths, [link] although there are not yet any reports to confirm this.

**Radiology.** Radiological procedures (e.g., radiography using X-rays) and the contrast materials used in these (e.g., barium and gadolinium) have been found to be safe by several hookworm users. [Link, link]

**Alternative therapies**

**Cellular silver.** The manufacturers of Advanced Cellular Silver (ACS) 200 Extra Strength claim that it is “...effective against an enormous array of disease causing organisms; literally oxidizing the cell wall of gram positive and gram negative bacteria, spirochetes, virus, fungus, parasites and more without harming healthy flora or damaging human tissue”. Research shows that this form of silver may be more effective than colloidal silver, but, so far, there have been no reports from helminth hosts to suggest what effect, if any, it might have on human helminths.
Colloidal silver. Some sources have claimed that, if taken orally, this may kill parasite eggs and possibly harm adult worms, but many helminth hosts have taken colloidal silver and there have been no reports of worms being lost as a result. Colloidal silver appears to be the most worm-friendly of the more effective natural antimicrobials. Although it can reduce helminthic benefits in a dose-dependent manner while it is being taken, the benefits soon return after its use is discontinued - usually in a matter of days. (Use of this Silver Safety Auto-calculator will ensure that total silver intake remains at a safe level.)

Grapefruit seed extract (GSE). Also known as citrus seed extract and grapefruit seed oil, and often labelled as citrus seed oil. It is used in herbalism and natural therapies as an antibiotic and preservative, and is claimed to be a powerful broad spectrum bactericide, fungicide and antiviral that is effective against a large number of single-celled and multi-celled parasites. However, research has shown that many “natural” GSE products are adulterated with undeclared synthetic chemicals, commercially available preservatives and disinfectants, such as triclosan and benzethonium chloride. Some versions of GSE may not contain any authentic grapefruit seed extracts whatsoever, such that its sale may well be one of the most insidious herbal product scams ever. Even if genuinely pure, natural GSE could be found - which, given the evidence, seems doubtful - there may be little point in taking it as an antimicrobial because pure GSE has been shown to have no intrinsic antimicrobial action. And, as the makeup of proprietary GSE products varies so widely, these can not be recommended for worm hosts due to the possibility that one or more of the undeclared ingredients may harm human helminths. (NB. The flesh of grapefruit will not harm helminths.)

Ayurvedic remedies

The following ayurvedic remedies are used, in combination, to treat pinworms, so may also have an adverse effect on other helminths: vidanga (Embelia ribes), Gymnema sylvestre (cowplant, cowplant, gurmar, gurmarbooti, gurmar, periploca of the woods, meshasringa, Bedki cha pala and miracle fruit - more details here), and trikatu - a combination of black pepper (Piper nigrum - more details here), long pepper (Piper longum) and ginger (Zingiber officinale - more details here).

Triphala. This is an Ayurvedic herbal formula combining three myrobalans: Amalaki (Emblica officinalis), Bibhitaki (Terminalia bellirica/Terminalia bellerica), and Haritaki (Terminalia chebula). The latter two of these are reported to be anthelmintic, but they also have laxative properties, and this latter characteristic, rather than actual worm-killing ability, may be the source of any 'anthelmintic' effects.

Chinese herbal medicines

Chinese herbs used to treat roundworms: Chuan Lian Gen Pi (Cortex meliae radicis), Bing Lang (Semen arecae).

Chinese patent medicines used to treat roundworms: Wu Mei Wan (Mume Pill), Qu Hui Wan (Dispel Roundworms Pill).

Chinese herbs used to treat hookworms: Lei Wan (Sclerotium omphaliae). Also, a combination of Guan Zhong (Rhizoma dryopteris crassirhizomae), Ku Lian Gen Pi (Cortex meliae radicis), Tu Jing Jie (Herba chenopodii ambrosioidis), and Zi Su Ye (Folium perillae).

Chinese herbs used to treat pinworms: Ku Lian Gen Pi (Cortex meliae radicis), Shi Jun Zi (Fructus quisqualis).

Chinese herbs used to treat flukes: Bing Lang (Semen arecae). Also a mixture of Bing Lang (Semen arecae), Da Huang (Radix et rhizoma rhei), and Qian Niu Zi (Semen pharbitidis).

Homeopathic remedies

Antiparasitic homeopathic remedies: Cina (a homeopathically potentised form of Eurasian wormwood - Artemisia cina), Cuprum oxidatum nigrum, Indigoz, Teucrium marum, Podophyllum, Spigelia, Sabadilla, Santoninum and Stanum.

Foods, supplements, spices and herbs

There are lists on the internet claiming that common foods and spices such as pumpkin seeds, turmeric, and even carrots, will kill helminths, but normal dietary amounts of most unprocessed foods, spices and herbs, will not harm helminths. For example, carrots and sweet potatoes are both claimed to be 'antiparasitic' in some online lists, but one individual who eats 400 g (14 oz) of one or other of these vegetables every day, is still able to maintain a thriving hookworm colony, and there are others who have eaten far more than this without harming
their worms. There are several further reports confirming the safety of dietary amounts of foods and spices here, here, here and here.

The only problem that is likely to arise with foods, spices or herbs is when these, and particularly herbs, are artificially concentrated or processed to create extracts or tinctures. Any herbal medicine that claims to have antiparasitic, or even antibacterial or antifungal properties may present a potential risk to human helminths and should therefore be approached with caution. The ultimate potency of these substances will depend on a number of factors, including, in the case of plants, the part used, the method of extraction, the extent of concentration and/or processing, and dosage.

The effect of such substances also appears to vary between individuals, probably due to differences in the strength of their immune response to helminths, and some people, particularly those who have more difficulty holding on to a viable helminth colony and therefore need more frequent top-ups (especially a subset of patients with BD or coeliac disease, and some with allergies) may find that ingesting certain substances that have no effect on the worms of other hosts may tip the balance in their case and cause a temporary dip in worm benefits, or even a loss of worms. For example, one helminth host has reported taking peppermint oil continuously without any apparent adverse effect on his worms, yet another individual could not keep a worm colony at all while taking peppermint oil.

In the case of some foods and herbs, a single part of the plant, usually a part that is not normally eaten - perhaps the bark or root - may have antiparasitic properties, while other parts of the same plant may be perfectly safe to eat. For example, the seeds of pomegranates are safe to eat, while the bark of the stems of this plant contains an anthelmintic compound, and the bark of the root contains an even more potent form of this alkaloid, which is used to treat roundworms, pinworms and tapeworms.

So, while bearing in mind the general principles set out in the Introduction and the last few paragraphs above, and using the details in the list below, helminth hosts need to observe their own responses and learn what they, as individuals, can and cannot safely consume while hosting helminths.

There will often be a warning indication whenever one’s worms are not happy. This may be a general loss of wellbeing, or a return of specific symptoms. For example, one person always gets a marked increase in nasal congestion if something compromises the health of his worms.

Foods

**Bitter melon** (*momordica charantia*). This cucumber-shaped vegetable found in Asian markets is also known as *karela*, *ampalaya* and *bitter gourd*. Both fruit and seeds have been and still are used in a number of countries to treat pinworm infections, and for expelling parasites generally. However, the quantities quoted as being necessary in order to eradicate worms are rather large, for example two whole melons each day for seven to ten days, repeated after two months. It is therefore unlikely that normal dietary amounts of bitter melon will adversely affect helminths.

**Carrot** (*Daucus carota, subsp. sativus*). The taproot of the carrot is rich in beta carotene, a precursor for vitamin A, which has been claimed to increase resistance to penetration by larvae. Carrots have also been claimed to be offensive to all parasites and valuable in the elimination of threadworms, but normal dietary amounts are not harmful to therapeutic helminths, and many helminth hosts have regularly eaten significant quantities of this vegetable (e.g., up to 1kg daily [link]) without adversely affecting their worms.

**Chicory** (*Cichorium intybus*). This is well known for its toxicity to intestinal parasites, and studies have indicated that ingestion of chicory by farm animals results in reduced worm burdens. This plant contains volatile oils similar to those found in plants in the related genus *Tanacetum*, which includes *Tansy*, and is said to be similarly effective in eliminating intestinal worms, but eating dietary quantities of chicory has not been reported to adversely affect human helminths.

**Citron** (*Citrus medica*). Alcoholic extracts of the rind of citron have shown ‘moderate’ anthelmintic activity against the human roundworm, *Ascaris lumbricoides*, in test tube studies. These extracts *may* therefore also have an adverse effect on other helminths, though there is no evidence that eating normal dietary amounts of the flesh of this fruit might harm human helminths.

**Coconut**. Coconut products contain medium-chain fatty acids that have been shown to be effective against many parasites including giardia, other protozoa, and also tapeworms. However, in the case of dried or ground coconut *flesh*, only a very large quantity will harm therapeutic helminths. For example, eating an entire cake baked with coconut *flour* brought a return of disease symptoms for one hookworm host. [Link] Most helminth hosts find that they can eat normal dietary amounts of coconut products without adversely affecting their worms, as can be seen here, here, here, here, here and here. Nevertheless, coconut products do have a
potential to affect helminths in some individuals, especially coconut oil and coconut milk, and the effect is dose-dependent.
For example, one hookworm host who checks the egg output of his worms has reported that they produced zero eggs for a time after twice drinking coconut milk. Another hookworm host who ate several curries in a row that contained meat and vegetables cooked in coconut milk, has said that she experienced a loss of worm benefits for three weeks. [Link] And yet another hookworm host gets increased pain a few hours after ingesting coconut milk or powder. [Link]

Someone else found that, while consuming 200 mg of coconut milk caused a temporary return of mild symptoms of his disease, he regularly eats coconut oil without any obvious problem, but another hookworm host has reported that his colony continues to thrive and produce eggs when he takes 3 tablespoons of coconut oil every day [link] although, at this dosage, about ½ of the larvae he incubates will be dead and the rest "less energetic"; so he normally restricts himself to 2 tablespoons per day.

Coconut water may also adversely affect a hookworm colony, as one host found after drinking 1 litre of coconut water, [link] but coconut sugar should not carry the same degree of risk because, whereas coconut milk, oil and flour are all obtained from the flesh of mature coconuts, and coconut water is also from inside the fleshy part of the coconut, coconut sugar comes from the sap of coconut palm flower buds and consists largely of sugars.

Cranberry (Vaccinium macrocarpon). This is claimed by some sources to contain antiparasitic enzymes, and cranberry powder is sometimes included in proprietary antiparasitic formulations, although evidence for its effectiveness in this context is lacking. Cranberry juice was used traditionally to treat urinary tract infections (UTIs), but it works by changing the bacteria in ways that prevent bacterial adhesion rather than killing them. While drinking 15 fl oz of cranberry juice per day is claimed to help arrest a mild urinary infection, cranberry powder capsules are more effective, and D-mannose, a cranberry derivative, is even more effective than the powder.

Date syrup, also known as "rub". Laboratory tests have revealed that some forms of date syrup may have antibacterial activity, possibly due to the presence of phenolic compounds that form naturally in the dates as they mature. Significantly, the syrup was able to inhibit the growth of bacteria faster than Manuka honey, which several people have suspected of having adversely affected their worms. However, eating dates is unlikely to be harmful to helminths.

Dietary fibre (fiber). Some sources claim that eating a lot of fibre may reduce the number of intestinal worms, but fibre consumed as an integral part of a normal diet has not been reported to be a problem for human helminths.

Genetically modified foods (GMOs). Some food crops, such as corn and rice, have been genetically modified to produce Cry5B, a protein that can kill intestinal worms, including the human hookworm. Bacillus thuringiensis (Bt), the bacterium that produces Cry5B, is also applied as a natural insecticide on crops on some organic farms, but there is no indication yet that GM foods are a potential threat to human helminths.

Grapefruit (citrus paradisi). The flesh of the common grapefruit is perfectly safe to eat while hosting helminths, although grapefruit seed extract does have a potential to harm helminths due to the typical addition of synthetic adulterants. Also potentially harmful are some extracts of the rind of Citrus decumana, a close relative of the grapefruit.

Honey. Honey can contain antivirals and powerful antimicrobials, some of which can have effects comparable with those of antibiotics such as clarithromycin, and certain types of honey have particularly potent antimicrobial activity. Several people have suspected that Manuka honey (which inhibits dental plaque as effectively as chlorhexidine mouthwash) has adversely affected their worms, while others have reported that raw honey reduces the benefits from their worms, for example causing increased pain several hours after ingestion, [link] and research reported in 2014 may explain why raw honey might have this effect. However, one hookworm host, who regularly takes a manuka honey/apple cider vinegar combination, has not noticed any loss of benefits, and another two have reported no apparent adverse effect on their worms after consuming raw honey, e.g, here.

Kefir. Although kefir has been claimed online to kill "parasites", it doesn't harm helminths.

Lime (Citrus acida). While alcoholic extracts of the rind of limes have shown 'moderate' anthelmintic activity against the human roundworm, Ascaris lumbricoides, in test tube studies, and extracts of the rind may have an adverse effect on other helminths, there is no reason to believe that eating the flesh of limes will harm human helminths.

Medium-chain triglycerides (MCTs) are extracted from coconut oil, amongst other things. However, there have been no reports about MCTs having an adverse effect on helminths, which is not surprising considering that MCTs are food elements, and that 10-20% of the fatty acids found in the milk of cows, sheep and goats are MCTs.

Onion (Allium cepa). This is used as an ingredient in some proprietary deworming formulations and has been claimed to create an 'uninhabitable environment' for intestinal worms and to help eradicate tapeworms in particular. However, if eaten in normal dietary quantities, onion should not harm therapeutic human helminths.

Organic foods. While these are less likely to be contaminated with chemicals, some organic farmers apply Bacillus thuringiensis (Bt) to their crops as a natural insecticide. This bacterium produces Cry5B, a protein that can kill
intestinal worms, including human hookworms. However many hosts of human helminths have eaten organic foods without them affecting their worms.

Papaya (Carica papaya, also known as or papaw, pawpaw or paw paw). The fruit and leaves contain both antiseptic and antiparasitic compounds, including one called carpainte, which is claimed to kill and expel intestinal worms. Papaya latex has been shown to be an effective anthelmintic against a variety of nematode parasites. However, it is unlikely that eating normal dietary amounts of the flesh of the fruit will adversely affect human helminths and, when someone who grows his own hookworms added a large amount of papaya - comparable to a human eating 2 to 3 pawpaws - to a petri dish full of larvae, these were unaffected. However, Papaya seeds are also rich in carcinin which is reportedly effective in expelling roundworms, and a randomized, placebo-controlled study concluded that air-dried papaya seeds are effective against various types of human intestinal parasites.

Pomegranate (Punica granatatum). The flesh and seeds of the pomegranate have not been reported to harm human helminths. However, the rind of the fruit, and the bark of both the root and stems of the pomegranate tree contain an anthelmintic alkaloid, punicine, which is used to treat roundworms and pinworms and is said to be highly toxic to tapeworms. One hookworm host has reported losing benefits after accidentally consuming a small amount of pomegranate extract. [Link] Pomegranate extracts should therefore be avoided.

Pumpkin (Cucurbita species). This is also referred to as squash or gourd, depending on species, variety and local parlance. Pumpkin seeds contain an antiparasitic compound called curcurbitacin and they were used traditionally as a remedy for tapeworms and roundworms. However, their effect is likely to be dose-dependent, and large amounts are recommended by herbalists for deworming, e.g., up to 25 ounces for adults. One worm host has reported that eating moderate amounts of pumpkin seeds has not adversely affected her hookworms, and eating the flesh of the pumpkin/squash/gourd is unlikely to have any adverse effect on any human helminth.

Radish (Raphanus sativus). This has been used as an alternative treatment for intestinal parasites, and is included as an ingredient in some proprietary deworming formulations, but it is unlikely to have any adverse effect on human helminths if eaten as part of a normal diet.

Squash. See Pumpkin.

Sweet potato (Ipomoea batatas). Like the carrot, this root vegetable is rich in beta carotene, a precursor for vitamin A, which it has been claimed can increase resistance to penetration by larvae. However, numerous hosts of human helminths regularly eat significant amounts of sweet potato (e.g., up to 1kg daily [link]) without any adverse effect on their worms.

Walnut, English (Juglans regia). Also known as the Persian, common, California, or Carpathian walnut. This does not appear to have gained a reputation as an anthelmintic, unlike the black walnut.

Xylitol. One hookworm host has reported that he takes xylitol daily in place of sugar and has not noticed any effect on his colony.

Yam (Dioscorea). Like carrot and sweet potato, the yam is rich in beta carotene, a precursor for vitamin A which is thought to increase resistance to penetration by larvae. However, numerous hosts of human helminths regularly eat this vegetable without adversely affecting their worms.

Nutritional supplements

5-HTP (5-Hydroxytryptophan, also known as oxitriptan and marketed under trade names such as Cincofarm, Levothym, Levoetonine, Oxyfan, Telesol, Tript-OH and Triptum) This is used as an antidepressant, appetite suppressant and sleep aid. One hookworm host has reported taking 5-HTP without any adverse effect on her worms.

Acetylcysteine (also known as N-acetylcysteine, N-acetyl-L-cysteine and NAC). One hookworm host has reported taking this from time to time without causing any problem for his colony.

Activated charcoal (also known as activated carbon). There has been one confirmation that charcoal doesn’t harm hookworms [link], and another report that taking it didn’t cause any return of symptoms in a Crohn’s patient. [Link]

Alpha lipoic acid (ALA), also known as Lipoic acid (LA), α-lipoic acid and thioctic acid. This organosulphur compound is made naturally in animals, where it is essential for aerobic metabolism. Because of its antioxidant properties, it is also sold as a dietary supplement and is available in some countries as a pharmaceutical drug. One host of both hookworms and human whipworms has taken between 300 and 600 mg of alpha lipoic acid per day without any harm befalling their worms.
**Amine oxidase** (also known as diamine oxidase, DAO and histaminase). This enzyme, which is involved in the metabolism of histamine, is produced by the body and found in high concentrations in the digestive tract and placenta. It has therefore been suggested that it is unlikely to be harmful to helminths, although there are not yet any reports to confirm this.

**Atrantil** contains three active botanicals: M. balsamea Wildl (peppermint) leaf extract, quebracho extract and conker tree extract. While peppermint oil has proved to be a problem for some hosts of human helminths (see the entry for peppermint), it is possible that the leaf extract may be worm-safe. However, quebracho extract has been shown to effectively reduce worm burdens in sheep. [Link]

**Bee pollen.** One hookworm host has reported that eating small amounts of this has had no obvious adverse effect on this worms.

**beta-Sitosterol** has demonstrated anthelmintic effects [link] and two hookworm hosts have reported a return of their disease symptoms after taking beta-Sitosterol. [Link, link]

**Betaine hydrochloride.** One hookworm host has reported using betaine HCL without noticing any loss of benefits from her worms. [Link, link]

**Chlorella.** One hookworm host took ½ teaspoon of this single-cell green algae daily for a year without any obvious effect on her worms. [Link]

**Chlorophyllin.** This semi-synthetic derivative of chlorophyll is used as a food colouring agent (e.g., E number E141) and as a treatment aimed at reducing various bodily odours, but its suitability for use by helminth hosts has been questioned because of its apparent ability to kill mosquito larvae and other small animals at low concentrations, although this effect appears to be dependent on the presence of sunlight. (Also see Chlorophyll.)

**Chondroitin Sulfate.** In an animal study, chondroitin sulfate was shown to prevent threadworms from establishing in the digestive system, but one subject has taken 900 mg daily for several years without any obvious adverse effect on his worms.

**Colostrum.** A hookworm host has taken this without any adverse effect on her colony. [Link]

**D-mannose.** This naturally occurring simple sugar is the ingredient in cranberries that makes their juice effective against urinary tract infections. Pure D-mannose is 10-50 times stronger than cranberry juice, making it more suitable for stubborn cases of UTI, and it reportedly resolves more than 90% of all UTIs within 1-2 days. [Link, link] Taking steps to make the urine less acidic (e.g., by taking [Tums](https://www.teva.com/) might make cranberry-based treatments even more effective. D-mannose is non-toxic, produces no adverse effects and, while there have been no reports to confirm it's lack of adverse effects on human helminths, it is unlikely to do them any harm.

**Digestive enzymes**, such as papain and bromelain, are said to make the intestinal tract inhospitable to parasites by dissolving their outer layers. In particular, papain - the milky juice of the unripe papaya - is claimed to be a powerful agent for destroying roundworms. One subject has reported a return of symptoms after taking a product containing bromelain, protease, papain, lipase and amylose for several weeks, and another individual has reported losing their entire hookworm colony after taking [Healthy Origins Broad Spectrum Digestive Enzymes](https://www.healthispowerful.net/products/digestive-enzymes), which contain amylase, protease, peptidase, alpha-galactosidase, glucoamylase, acid maltase, cellulase, pectinase, protease, lipase, lactase, beta-glucanase, invertase and hemicellulase. [Link, link] However, several other helminth hosts have taken digestive enzymes, including Terranova's quercetin nettle complex which contains bromelain, without any obvious effect on their worms [link] and one of these has regularly taken pancreatin-based products from different manufacturers, mostly from Pure Encapsulations, but also a lipase product by Integrative Therapeutics. [Link] Another hookworm host who regularly takes digestive enzymes with his meals has never noticed any adverse effect on his colony. He generally avoids papain and bromelain, but regularly takes pancreatin, lipase, Acid Ease, and occasionally Udo's Choice enzymes, selecting them according to the size and contents of each meal. Udo's Choice brand does contain some bromelain, but only a small amount. [Link] See also [Papaya].

**Folic Acid** has been claimed to help prevent the proliferation of intestinal parasites at a dosage of 400 - 800 mcg (0.4 - 0.8 mg) per day. However, this is not a problem for human helminths because they do not proliferate within their hosts, and there have been no reports of adverse effects from hosts of human worms. One subject has taken a daily vitamin B-complex supplement containing 400 mcg of folic acid without any apparent effect on his hookworms, and another has taken **800 mcg of folate** (as calcium L-5 methyltetrahydrofolate) every day for over 4 years with no adverse effect on his hookworms.

**FOS (fructooligosaccharide)** is said to inhibit parasites from attaching to the intestines but no helminth host has reported any problem with this so far.
Fulvic acid. This is a form of huminic acid. Two hookworm hosts have taken this without any apparent adverse effect on their colonies. [Link, link]

Glutathione. One hookworm host who takes liposomal glutathione, says he's confident that this does not harm his worms. [Link]

Lumbricus Tonic. This Nutricology product, which contains a powdered earthworm extract, also contains sweet flag root extract. However, this herb is last on the list of ingredients, and there have been no reports by hosts of therapeutic helminths to suggest that the product might be a problem for worms.

Melatonin. This hormone, which is commonly used as a sleep aid, has been taken by many helminth hosts, none of whom have reported any adverse effects on their worm colonies.

Modified citrus pectin (also known as citrus pectin, Pecta-Sol and MCP) is a complex carbohydrate extracted from citrus fruits using a chemical extraction process that makes it soluble, absorbable and more digestible. This is unlikely to have any effect on helminths.

Moringa (Moringa oleifera, also known as drumstick tree, horseradish tree, ben oil tree and benzoil tree) Although described as a “natural anthelmintic”, moringa has been taken by two helmint self-treaters with no apparent adverse effect on their hookworms. The first takes a 500 mg capsule of 10 to 1 extract (from 5000 mg of Moringa oleifera) twice a week, [link] while the second grows and harvests her own moringa. [Link] Whatever anthelmintic properties moringa might have may depend on the part of the plant used.

MSM (Methylsulfonylmethane) is claimed by one source to be effective against many types of intestinal worm including Enterobius (pinworm [US], threadworm [UK]) and the roundworm, ascaris. It is suggested that MSM blocks the interface between the parasite and the host by competing with the parasite for binding sites at the surface of the mucous membrane, and that the parasites may find the resulting MSM 'film' impenetrable. However, it may be necessary to take 10,000 mg of MSM per day for three or four weeks to achieve this effect and one helmint host has reported that he has occasionally taken up to 1 heaped tablespoon of MSM while hosting helminths to treat eczema flare-ups, and has not noticed any loss of worm benefits.


Probiotics. It has been claimed that some probiotics can have an adverse effect on certain therapeutic helminths, particularly the rat tapeworm, Hymenolepis diminuta (HDC). It is also known that some bacteria are capable of mobilizing nematode-trapping fungi [link], that a number of probiotics - predominantly Lactobacillus species - can have strain-specific effects on certain "parasites", most of which are not helminths [link], and that Saccharomyces boulardii can have a protective effect against the dog roundworm, Toxocara canis. [Link] However, there is no hard evidence at the present time to suggest that probiotics are harmful to any of the species of worm that are used in helmintic therapy. A leading helmint researcher who is working with HDC said, in 2016, that probiotics may produce some tightening up of the communication between the lumen of the gut and the periphery, but that this is probably simply a matter of the probiotics reducing the ability of the immune system to respond to, or perhaps to sense, what is taking place in the gut. This scientist added that, firstly, even if this does happen, it may be a temporary phenomenon and, secondly, that this is all mere speculation at the present time and no basis to advise avoidance of probiotics while using any helmint. Additionally, there are many hosts of the human helminths, NA and TTO, who take probiotics regularly, yet there have been no reports by any of them that their worms have been adversely affected.

Propolis. An apitherapist speaking at the 2010 International BTeR Conference on Biotherapy spoke about the antiparasitic properties of this bee product, and suggested that it might harm helminths. This may have been a creative extrapolation from the belief that the role of propolis is to prevent diseases and "parasites" from entering the bee hive, and there has been no suggestion yet from helmint hosts that propolis might be a problem for human helminths.

Resveratrol. This may have an adverse effect against some helminths, but this is likely to depend on dose size, and three helmint hosts who regularly take this compound report no adverse effect on their worms. (People with MS might want to avoid resveratrol anyway.)

Serrapeptase/ serratiapeptidase (Serratia E-15 protease, also known as serralysin, serratiapptease, serratia peptidase, serratio peptidase, or serrapeptidase). There have been no reports so far about the effects on human helminths of taking this proteolytic enzyme.
Spirulina. This cyanobacterium is an effective anti-inflammatory that is being used by a number of hosts of human helminths without causing any harm to their worms.

Taurine is an organic acid that occurs naturally in food, especially seafood and meat (in which form it is no threat to helminths) but it is also produced synthetically and included in a number of products such as health drinks. In this form, it has been linked to a number of health problems, and has consequently been banned in some countries. It has also been shown to have anthelmintic effects, but only against a non-therapeutic helminth in mice.

Zinc is said to inhibit the proliferation of intestinal parasites by stimulating various aspects of the immune system in the digestive tract that counteract parasites. In one animal study the rodent nematode worm, H. polygyrus, was found to be better able to survive in mice which had been deliberately made deficient in zinc. Those who claim that zinc is an effective antiparasitic in humans suggest a dosage of 15–50 mg per day, but several helminth hosts have taken supplements containing this amount of zinc, in some cases continuously, without issue. One hookworm host takes 10 mg on alternate days, [link, link] another has taken 15 mg zinc gluconate or zinc picolinate daily for several years, while yet another has taken 23 mg zinc gluconate/citrate plus 18.75 mg zinc acetate daily, and previously took 30mg zinc picolinate daily, (link) all without any adverse effect on their worms. However, zinc oxide nanoparticles (ZnO NPs) have shown strong anthelmintic potential, in vitro, against at least one helminthic parasite encountered in veterinary medicine. Zinc oxide nanoparticles are already in use in sunscreens, cosmetics and some food products (in spite of the fact that they an can cause DNA damage), but the amounts in these applications may be too small to harm helminths.

Vitamin A. Supplementation with this vitamin has no adverse effect on helminths [link] but a vitamin A deficiency may reduce colonisation by worms. [Link]

Vitamin C. This does not harm helminths.

Spices and culinary herbs

Asafoetida has been used as an anthelmintic in traditional medicine in several parts of the world [link] but there has only been one report to date of its use by someone hosting therapeutic helminths, and this user says that he hasn't noticed any ill effect on his hookworms after occasionally consuming foods that list asafoetida as an ingredient.

Black pepper (Piper nigrum). This is often used as an ingredient in proprietary parasite cleanses due to its established antiparasitic effects. It could therefore have an adverse effect on human helminths, though this is likely to be dependent on the dosage and on the form taken. So, while use of the whole spice in small quantities as a condiment is unlikely to present a problem, taking medicinal quantities of black pepper may harm helminths.

Cayenne(Capsicum frutescens, Capsicum annuumis). This is claimed to irritate parasites, and often appears as an ingredient in proprietary parasite cleansing products for pets and humans, but there has only been one report so far of an adverse effect on helminths, and this was from someone who says that even a smidgen of cayenne causes her to lose the benefits from her worms. [Link]

Chili pepper (chile, chilli). While this is used worldwide as a treatment of certain parasites, and has been demonstrated effective against fascioliasis in animals, evidence that chili might be a problem for therapeutic helminthiasis is lacking, and one hookworm host has been reported to have eaten a HUGE amount of chili during 4 years as a worm host, without any obvious adverse effect on his colony.

Cinnamon is antimicrobial, as well as being claimed to be effective against parasites, including some parasitic worms, and it appears in lists of ingredients in proprietary parasite cleansing products. The main antimicrobial component of cinnamon is cinnamaldehyde, and this is most concentrated in cinnamon essential oil and cinnamon oleoresins (solid resin extracts produced using solvents) which can be very high in cinnamaldehyde. Forms containing somewhat less cinnamaldehyde and cinnamon tinctures which are dissolved in alcohol and about half the strength of raw cinnamon. As cinnamaldehyde is steam-volatile and not water soluble, aqueous extracts of cinnamon should contain less of this substance, and dehydrated/powdered extracts (the form most likely to be encountered in dietary supplements) may contain little, if any at all, so should be less of a threat to helminths. Generally, the stronger the taste, the more cinnamaldehyde is likely to be present. Whilst there has been one report of someone with helminths relapsing after taking an unspecified supplement containing cinnamon, the raw spice should be safe for use in cooking.

Clove (Syzygium aromaticum/Eugenia caryophyllus). Clove oil, which was used traditionally to kill intestinal worms and is claimed to anesthetize fish, contains several powerful antimicrobial agents. While one of these, eugenol, is claimed to be anthelmintic, its use didn't produce any loss of benefit in one helminth host who applied it liberally to a dry socket following a difficult tooth extraction, and this was in spite of swallowing and breathing eugenol and a related compound called guaiacol.
**Fennel (Foeniculum vulgare)**. Fennel seed has a long history of use against pinworms and other parasites, with some authorities suggesting that the herb digests parasite eggs and intoxicates parasites. The leaves and oil are both used as dewormers, but one subject reports no adverse effect from repeated consumption of dietary amounts of fennel seeds and another has reported no loss of worm benefits after consuming significant quantities of fennel.

**Garlic (Allium sativum)**. Garlic oil extract has shown anthelmintic effects against Schistosoma mansoni in mice [link] and allicin, the active principle of garlic extract, has also been shown to have anthelmintic properties, although one hookworm host has reported that taking a stabilized allicin extract for several weeks did not kill her worms. [Link] Alcoholic extracts of garlic have also shown 'moderate' anthelmintic activity against the human roundworm, Ascaris lumbricoides, in test tube studies. However, the exact amount of garlic needed to kill intestinal parasites in humans has not been established. Some sources suggest 1,000 - 4,000 mg per day, using concentrated garlic capsules or tablets, and fresh garlic is said to be more effective than capsules. While chewing three cloves of garlic each day is recommended by some online sources as a treatment for 'parasites' in humans, hookworms may in fact be able to withstand up to 21 grams (approximately 10 cloves) of garlic per day. So garlic may actually not be very effective as a killer of mature worms, and its main anthelmintic effect may be to reduce the viability of ova. Cooking may reduce its effect against parasite eggs and larvae, and neither cooked or raw garlic appears to have any adverse effect on the efficacy of a therapeutic hookworm colony.

**Ginger (Zingiber officinale)** contains a chemical called zingibain (aka, zingipain, or ginger protease) that has been claimed to dissolve some parasites and their eggs. One subject has reported that fresh ginger drinks depress the egg production of his worms and increase his symptoms, and another has reported that eating a LOT of ginger 6 weeks post-inoculation caused her side effects to disappear for a few days, but that these eventually returned. [Link] Someone else, who said that his favorite brand of ginger beer was "pretty spicy", so was probably made from raw, or only very briefly pasteurized, ginger juice, reported that, after going on a fairly significant binge of the stuff, his worms stopped producing eggs and their benefits diminished. Yet another worm host, who was putting at least a thumb-sized piece of fresh ginger in a smoothie every day, believes this was responsible for actually killing her hookworms. However, two subjects have reported eating lots of fresh ginger (mostly cooked) without any problems [link], and one subject reports that eating cooked ginger appears to have had no adverse effect on their worms [link, link] and one hookworm host says that she regularly takes dried ginger in 1g doses to help with migraines and has not noticed any problems with her worms. [Link]

**Holy basil (Ocimum tenuiflorum, also known as Ocimum sanctum, tulsi and tulasi/thulasi)** is claimed online to be antiparasitic. There is also evidence showing that its essential oil has potent anthelmintic activity against the research worm, C. elegans, [link] and it has shown some activity against the malaria parasite, [link] but this does not necessarily mean that it would harm therapeutic helminths. Eating the raw plant, or drinking tea made from it, may be harmless to human helminths, and one host of both hookworms and human whipworms has reported that she used to drink the tea and eat fresh leaves without issue. [Link] However, extracts, tinctures and concentrates of holy basil should be treated with caution.

**Horseradish** (Amoracia rusticana) has been claimed to be antiparasitic, and it does contain volatile oils, notably mustard oil, which has antibacterial properties and is used as an antiparasitic by some farmers, but evidence about the effects of its use by helminth hosts is lacking.

**Mustard**. This condiment is claimed to be effective against intestinal worms, including roundworms and threadworms and, in India, mustard oil is used as an antiparasitic by some farmers. However, its action is probably more as a laxative that helps to flush out worms rather than to kill them, and hookworms spend much of their time firmly attached to the gut mucosa. Reports about the use of mustard by helminth hosts are lacking.

**Oregano leaf (Origanum vulgare)**. One host of both hookworms and whipworms has reported that there was no immediate effect on his worms when he applied a heavy sprinkling of oregano leaf powder to his food a couple of times in a day. But then he was plunged into such a self-critical and depressed mood that he struggled to do any work for several days, before eventually regaining his usual mental balance. Oregano oil, which contains isomeric phenols (primarily carvacrol but also including thymol and limonene), can destroy a number of bacteria, fungi and viruses in dilutions as low as 1/50,000, and is also antiparasitic. It is reported to be effective against protozoan parasites in particular as well as roundworm larvae, and somewhat effective against tapeworms. In one study, 57 per cent of adults with intestinal parasites who were treated with 600 mg of oregano oil daily for six weeks experienced total eradication of their parasites. Several hosts of therapeutic helminths have reported adverse effects on their worms after ingesting oregano oil and, in at least two cases, it resulted in a total loss of worms. However, one subject, who took oil of wild oregano sublingually twice each day for 2 weeks had a stool test sometime after this that was positive for hookworms, but perhaps the sublingual route helped reduce the effect on the worms in this case. Some foods, particularly soft cheeses, may be coated with an antimicrobial film incorporating oregano oil to increase their lifespan, but the amount of oregano involved in this application is unlikely to be a serious threat to helminths.

**Thyme (Thymus vulgaris)**. This is also known as Common Thyme, Garden Thyme. Extracts of the leaves, flowering tops and stems are used to kill hookworms, roundworms, threadworms and skin parasites. However, these are unlikely to harm helminths when eaten in reasonable amounts as part of a normal diet. One helminth host has
eaten significant quantities of thyme without noticing any adverse effect on her hookworm or whipworm populations.

**Turmeric** (*Curcuma longa*), also known as *tumeric* or *curcumin*. Turmeric generally does not harm human helminths when eaten occasionally in normal dietary quantities in its natural, whole form, which only contains 3% of the active ingredient, *curcumin*. [Link, link] There has only been one report of food quantities of turmeric affecting hookworms [link] and the more usual response is exemplified by another hookworm host who was able to take 350 mg in a supplement daily for many months, as well as eating a reasonable amount in her diet, without any problems. There is much more chance of helminths being harmed when *curcumin* is taken medicinally as a standardised extract, and it has been reported that 300 mg of the extract has killed some types of parasites in test tube and animal studies, and that it may temporarily reduce the number of helminth eggs produced. One hookworm host believes that she may have lost her colony as a result of taking a *curcumin* supplement, although another hookworm host has reported experiencing a very enjoyable “bounce” after inoculating with only 5 larvae, in spite of taking 250 mg of *curcumin* daily. Yet another subject has reported taking 500 mg of *curcumin* daily for the first 5 days after inoculation without any apparent harm to her new colony of 30 NA larvae, although they may have been protected at this stage in their development because they would not yet have been feeding from their host’s blood. The effect of *curcumin* may depend to some extent on the strength of the individual host’s immune response, as well as on the form of *curcumin* used. Nano-emulsified *curcumin* appears to be more effective, therapeutically, so may also have an increased impact on helminths. Another high-potency form of *curcumin* is BCM-95, which has been shown to be 6.93 times more bioavailable than normal *curcumin*, and this product may have been responsible for a sudden return of disease symptoms for one hookworm host. The beneficial effect of *curcumin* can be increased 5- to 10-fold by adding ascorbic acid (vitamin C) so taking this vitamin along with *curcumin* might increase its adverse effect on helminths, but may also make it possible to use *curcumin* therapeutically in much smaller doses.

**Turmeric, Wild** (*Curcuma aromatica*). While alcoholic extracts of the rhizomes of wild turmeric have shown ‘moderate’ anthelmintic activity against the human roundworm, Ascaris lumbricoides, in test tube and animal studies, and that it may temporarily reduce the number of helminth eggs produced. One hookworm host believes that she may have lost her colony as a result of taking a *curcumin* supplement, although another hookworm host has reported experiencing a very enjoyable “bounce” after inoculating with only 5 larvae, in spite of taking 250 mg of *curcumin* daily. Yet another subject has reported taking 500 mg of *curcumin* daily for the first 5 days after inoculation without any apparent harm to her new colony of 30 NA larvae, although they may have been protected at this stage in their development because they would not yet have been feeding from their host’s blood. The effect of *curcumin* may depend to some extent on the strength of the individual host’s immune response, as well as on the form of *curcumin* used. Nano-emulsified *curcumin* appears to be more effective, therapeutically, so may also have an increased impact on helminths. Another high-potency form of *curcumin* is BCM-95, which has been shown to be 6.93 times more bioavailable than normal *curcumin*, and this product may have been responsible for a sudden return of disease symptoms for one hookworm host. The beneficial effect of *curcumin* can be increased 5- to 10-fold by adding ascorbic acid (vitamin C) so taking this vitamin along with *curcumin* might increase its adverse effect on helminths, but may also make it possible to use *curcumin* therapeutically in much smaller doses.

**Herbs**

The majority of the herbs listed below have been reported, or claimed, to be antiparasitic, although clinical evidence for this effect is lacking in many cases. Furthermore, where they are indeed antiparasitic, herbs may be more effective against types of parasite other than helminths, although this is not to say that they may not also have some detrimental effect on helminths.

Where a herb is effective against helminths, quite large quantities may be required to dislodge or kill the worms, but consuming some of these herbs on a regular basis, or in the form of concentrates, extracts, tinctures and oils that are directed at the gastrointestinal tract may weaken therapeutic helminths, making them less effective.

Many of the herbs listed below are used to treat a number of conditions in addition to parasite infections, so might be encountered in a range of herbal remedies. It may therefore be advisable for any helminth host who contemplates taking any herbal remedy to check its ingredients against the list below and, where an ingredient appears to have antiparasitic properties, to seek an alternative, if possible.

When taking herbs, an additional risk arises from the fact that the majority of herbal products **contain unlisted ingredients**, in view of which it would seem wise to employ a cautious approach with all herbal products.

**Acacia.** Also known as *thorntree, whisting thorn*, or *wattle*. One example of this genus of shrubs and trees, *(Acacia mearnsii)*, previously known as *(Acacia molissima)* contains tannin extracts that have been found to have an anthelmintic effect on Haemonchus contortus and Trichostrongylus colubriformis in lambs.

**Albizia lebbeck.** Alcoholic extracts of the bark of Albizia lebbeck have shown ‘moderate’ anthelmintic activity against the human roundworm, Ascaris lumbricoides, in test tube studies, so extracts of the bark may also have an adverse effect on other helminths.

**Aloe vera.** This contains an antimicrobial agent, *saponin*, and the laxative chemical, *aloin*. Aloe is perhaps the best known laxative in history, and it may be this, rather than any actual anthelmintic property, that is the source of its reputation for expelling parasites. While extracts have been reported as showing inhibitory effects on two roundworm species, these only affected the hatching of eggs and the development of larval stages. One aloe-drinking helminth host has reported that his habit has had no obvious detrimental effect on his worms, and another hookworm host failed to notice any adverse effects after drinking pure aloe juice or gel daily for a week or two, or after drinking one of the 16oz sweetened/flavored drinks. [Link]
**Alpinia calcaratta.** Alcoholic extracts of the rhizomes of Alpinia calcaratta have shown ‘moderate’ anthelmintic activity against the human roundworm, Ascaris lumbricoides, in test tube studies so extracts of the rhizomes may also have an adverse effect on other helminths.

**Alpinia galanga.** Alcoholic extracts of the rhizomes of Alpinia galanga have shown ‘good’ anthelmintic activity against the human roundworm, Ascaris lumbricoides, in test tube studies so extracts of these rhizomes may also have an adverse effect on other helminths.

**Andrographis paniculata.** Alcoholic extracts of Andrographis paniculata have shown ‘good’ anthelmintic activity against the human roundworm, Ascaris lumbricoides, on test tube studies so these extracts may also have an adverse effect on other helminths.

**Anise (Pimpinella anisum).** Also known as aniseed. Anise oil may have modest antiparasitic effects and has been recommended by some practitioners as a treatment for mild intestinal parasite infections, but there have not been any reports about this from helminth hosts.

**Arecoline.** This odourless oily liquid derived from the areca nut, fruit of the areca palm (Areca catechu), has long been used medicinally as an anthelmintic.

**Ashwagandha** (Withania somnifera). Also known as Indian ginseng, poison gooseberry, and winter cherry. A user of Applied Kinesiology has reported a negative response when testing ashwagandha in an HT user, but no other adverse reports have come to light so far.

**Balmony (Chelone glabra)** A decoction or tincture prepared with all parts of the plant is said to be a highly effective remedy for parasites, including intestinal worms. It was used traditionally by Native Americans to expel worms and is used today in proprietary parasite cleansing preparations.

**Barberry (Berberis vulgaris)** contains berberine.

**Beleric** (Terminalia bellirica/Terminalia bellerica). Also known as bastard myrobalan or Bahera. This herb is said to be anthelmintic, but this reputation may be due more to its laxative properties than any actual worm-killing potential.

**Berberine** is an amebicide which, in concentrated form, has been shown to kill various parasites such as tapeworms and giardia and to have anti adhesive effects which prevent pathogens from adhering to intestinal mucosal cells.

**Bidens alba** has been reported as not being a problem for helminths.

**Bitter cumin** (Centratherum anthelminticum). As its Latin name suggests, the seeds of this member of the daisy family are considered anthelmintic.

**Bitter melon** (Momordica charantia) is used as a folk medicine to treat gastrointestinal diseases, and extracts have shown activity against the nematode worm C. elegans in test tube studies.

**Black walnut** (Juglans nigra). Also known as eastern black walnut. This nut has been claimed to be one of the best overall dewormers for humans, killing both the adult and developmental stages of at least 100 parasites. However, according to the American Cancer Society, available scientific evidence does not support claims that the hulls of the black walnut remove intestinal parasites. Although this nut has a strong flavour, it is actually quite rare, as its shell is hard and difficult to remove. It is therefore only likely to be encountered in expensive baked goods. Most commercially available walnuts are hybrids of the English walnut.

**Boswellia** is a fragrant resin, extracts of which are used in pharmacology, particularly as anti-inflammatories. There have been no suggestions that boswellia might be a problem for helminths, and its anti-inflammatory action could be supportive of the beneficial effects that helminths produce, as demonstrated in Crohn’s disease in this study.

**Calamus/Sweet Flag** (Acorus calamus) The bitter element in sweetflag, acorin, is claimed to have anthelmintic properties, and the standardised rhizome extract of A. calamus has been shown to have significant dose-dependent effects against the rat tapeworm, Hymenolepis diminuta, so may also harm other helminths. [Link]

**Castor oil.** This will not kill helminths, though it may help to expel worms after eradication, and this is probably the reason for its antiparasitic reputation and it’s use in para-cleanse products.

**Cat’s Claw** is a common name for several plants but it appears to be applied particularly to two species - *Uncaria tomentosa* (samento), most commonly used in the US, and *Uncaria guianensis*, typically used in Europe. Medicines made from the root and bark of these species have been claimed online to facilitate the elimination of intestinal parasites, but WebMD states that there is insufficient evidence for its effectiveness against parasites, and there have been no reports so far from helminth hosts about these species causing problems for their worms.
**Chaga mushroom** (*Inonotus obliquus*). This fungus is claimed, in several places online, to be effective against intestinal parasites, and it has been used for this purpose in the traditional folk medicine of Russia and Eastern Europe. One hookworm host thinks this may have caused the failure of several inoculations.

**Chaparral** (*Larrea tridentata*). Some cultures customarily bathe with chaparral annually to eliminate skin parasites, but use of the leaves of *Larrea* species is not advised, due to the possibility of damage to the liver and kidneys.

**Cinnamomum verum**. This was previously known as *C. zeylanicum* and also referred to as "true cinnamon", *Ceylon cinnamon* or *Sri Lanka cinnamon*. Alcoholic extracts of the bark of *C. verum* have shown 'good' anthelmintic activity against the human roundworm, Ascaris lumbricoides, in test tube studies so extracts of the bark may also have an adverse effect on other helminths. The spice, *cinnamon* is typically derived from related species within the genus, Cinnamomum.

**Citrus decumana**. Alcoholic extracts of the rind of *Citrus decumana* have shown 'good' anthelmintic activity against the human roundworm, *Ascaris lumbricoides*, in test tube studies, so extracts of the rind may also have an adverse effect on other helminths. *Citrus decumana* is a relative of the common *grapefruit* (*Citrus paradisi*) and, while commercially available forms of *grapefruit seed extract* have a potential to harm human helminths (due to the typical addition of synthetic adulterants), there is no evidence that the flesh of the grapefruit has any adverse effect on helminths.

**Crocus sativus**. Also known as autumn crocus and saffron crocus, this plant is best known for the spice *saffron*, which is produced from parts of the plant's flowers. Two important bioactive compounds of *Crocus sativus* (*crocin* and *safranal*), and some semi-synthetic derivatives of safranal, have been found to be effective against some types of parasite (*Helicobacter pylori*, the malaria parasite, *Plasmodium*, and *Leishmania*). However, there have been no reports about their possible effects on therapeutic helminths.

**Curled/Curly Mint** - (*Mentha spicata* variety crispii/*Mentha crispa*/*Mentha crispata*). This cultivar of *Spearmint* (*Mentha spicata*), and close relative of *Peppermint* (*Mentha piperita*), may be effective against giardia and amoeba infections, and may have anthelmintic properties. It is listed on one website under, “herbs that your health care provider might consider using to treat intestinal parasites.”

**Desmodium triflorum**. Alcoholic extracts of *Desmodium triflorum* have shown 'good' anthelmintic activity against the human roundworm, *Ascaris lumbricoides*, in test tube studies, so it's extracts may also have an adverse effect on other helminths, possibly due to it containing a significant amount of a powerful psychedelic substance which might cause hookworms to lose their grip and be expelled.

**Echinacea**. This is not a single plant but a genus containing several different species. In the case of medicinal products labelled as echinacea, these are likely to have been obtained from one or more of the following sources: *E. purpurea*, *E. angustifolia* or *E. pallida*. Such products may also be either extracts, or the expressed juice of, different plant organs (e.g., roots and leaves) resulting in different products having very different chemical compositions. However, there have been no reports of human helminths being harmed by taking any echinacea products. As the plant organs (e.g., roots and leaves) resulting in different products having very different chemical compositions.

**Epazote**. See Wormseed.

**Erba ruggine** (*Ceterach officinarum*) is listed on one website under, “Herbals that may kill and expel worms.”

**Frankincense** (*olfibanum*). This aromatic resin is used in incense and perfumes, and is obtained from trees in the Boswellia genus. There have been no reports about it having any effect on helminths.

**Gentian root**. The root and underground stem of *Gentiana lutea* (yellow gentian) are said to assist in expelling 'harmful organisms'. One subject has reported that taking a form of gentian in large quantity on a daily basis for sinus inflammation was responsible for the loss of his whipworms, although possibly not his hookworms.

**Ginkgo biloba**. There has been one hint that ginkgo may have caused a mild reduction in hookworm benefits, but this was by no means certain, and two other helminth hosts have reported taking ginkgo regularly with no apparent adverse effect on their worms. (Also see Anticoagulants.)

**Goldenseal** (*Hydrastis canadensis*). This contains berberine.

**Goldenthread/Chinese goldthread** (*Coptis chinensis*) contains berberine.

**Goosefoot** (*Chenopodium ambrosioides*) is widely used to deworm animals, and the Japanese make a dewormer tea with the leaves. Goosefoot oil is a highly efficient anthelmintic, and extremely toxic. Human consumption of this herb has often produced strong side effects such as nausea and headaches, and even death in some cases.
**Hagenia** (*Hagenia abyssinica*). Also known as African redwood, brayera, cusso, hagienia, and kousso, hagienia has been used as a treatment for the pork tapeworm (*Taenia solium*), but is often only partially effective in this case.

**Haritaki** (*Terminalia chebula*). Also known as Yellow Myrobalan, Chebulic Myrobalan, Kadukkai, Silikha, Himmej, Karakkaya and A-ru-ra. The fruits are reportedly anthelmintic, but this reputation may be due more to its laxative properties than any actual worm-killing potential.

**Hydnocarpus wightiana**. Alcoholic extracts of the seeds have shown 'good' anthelmintic activity against the human roundworm, Ascaris lumbricoides, in test tube studies, so extracts of the seeds may also have an adverse effect on other helminths.

**Hyssop** (*Hyssopus officinalis*). The leaf contains an essential oil with antiseptic properties that has been claimed to have anthelmintic effects, but, if eaten as a herb, hyssop is unlikely to harm helminths.

**Ipecac, syrup of**. Alkaloids in ipecac, including emetine, are reported to kill several types of parasite, particularly amoebae, but also pinworms and tapeworms, although the amounts needed to produce these effects in humans are generally high and can lead to severe side effects. Emetine and the somewhat safer form, Dehydroemetine, are usually reserved for rare cases of people infected with amoebae who are not cured by using anti-amoeba drugs.

**Juniper** (*Juniperus communis*) is a very effective natural antibiotic which is also said to have deworming properties, notably against liver fluke, and is used to treat worm infestations in animals. Juniper is also used as the primary flavouring in gin, but there have been no reports of any harm coming to helminths as a result of drinking gin.

**Kaempferia galanga**. Alcoholic extracts of the rhizomes have shown 'good' anthelmintic activity against the human roundworm, Ascaris lumbricoides, in test tube studies, so extracts of the rhizomes may also have an adverse effect on other helminths.

**Kava/kava-kava** (*Piper methysticum*). According to this report, the active ingredients in Kava tea (kavalactones) can create mild sedation without disrupting cognitive function, and can act as a muscle relaxant, with higher doses having an effect similar to that of a local anaesthetic. If Kava tea were to "relax" hookworms, this might conceivably create mild sedation without disrupting cognitive function, and can act as a muscle relaxant, with higher doses having an effect similar to that of a local anaesthetic. If Kava tea were to "relax" hookworms, this might conceivably affect their ability to keep their grip on their host's mucosa, which might lead to them being expelled, especially if the drink is taken in quantity or at higher strength.

**Lemongrass** (*Cymbopogon citratus*) essential oil has shown anthelmintic activity against earthworms. However, one individual has consumed lemongrass tea without adverse effect on her hookworm or whipworm colonies.

**Liquorice/licorice**, the root of *Glycyrrhiza glabra*. One hookworm host has reported taking "lots" of deglycyrrhizinated liquorice (DGL) with no ill effect on his worms. Liquorice extracts may be useful as an adjunctive therapy for psoriasis, for colitis and possibly other autoimmune diseases, but excessive consumption of liquorice containing glycyrrhizin/glycyrrhizic acid may not be wise. The World Health Organization's recommended daily maximum for liquorice is 2 mg/kg.

**Lippia nodiflora**. Alcoholic extracts of this have shown 'good' anthelmintic activity against the human roundworm, Ascaris lumbricoides, in test tube studies, so these extracts may also have an adverse effect on other worms.

**Male fern** (*Dryopteris filix mas*). Also once known as worm fern! The rhizomes and young shoots (fiddleheads) of the male fern have antiparasitic properties and the root has been used to treat tapeworms. However, this herb is seldom used today due to its side effects (e.g. headaches and nausea) and because large doses are extremely poisonous and may induce liver damage. The North American equivalent of the male fern is the evergreen marginal shield-fern (*Dryopteris marginalis*).

**Milk Thistle** (*Silybum marianum*). Also known as cardus marianus, blessed milk thistle, Marian Thistle, Mary Thistle, Saint Mary's Thistle, Mediterranean milk thistle, variegated thistle and Scotch thistle. There have been no adverse reports about this herb from worm hosts, and there are no reasons to believe that it might harm human helminths.

**Morinda citrifolia**. Alcoholic extracts of the tender leaves of *M. citrifolia* have shown 'good' anthelmintic activity against the human roundworm, Ascaris lumbricoides, in test tube studies, so the same extracts may also have an adverse effect on other helminths.

**Mugwort** (*Artemisia vulgaris*). Also known as Moxa, Common Wormwood, Traveler's Herb and Felon Herb, and a relative of wormwood (*Artemisia Absinthium*), mugwort is said to make short work of roundworms, pinworms and tapeworms.

**Myrrh**. This has antiparasitic effects against various schistosome species and the liver fluke, Fasciola hepatica.
Neem (Azadirachta indica). Ayurvedic medicine holds that Neem is the best herb for treating worms and other parasites and that a simple decoction of Neem leaves can kill all parasites present in the intestines. Neem extract has also been shown to be more effective against rodent helminths than standard chemotherapy with albendazole or mebendazole.

Noni (Morinda citrifolia, also known as great morinda, Indian mulberry, beach mulberry and cheese fruit). A test tube study found that noni helps to eliminate the roundworm, Ascaris lumbricoides, but, so far, no helminth hosts have reported using this.

Olive leaf extract (Olea europaea). Known as 'nature's antibiotic', this extract contains a component called oleuropein that is able to degrade pathological microorganisms of all kinds, and inhibit or kill many types of intestinal parasites including flatworms, hookworms, roundworms and tapeworms. Two subjects have reported losing their helminths after taking this.

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Oroxyllum indicum (also known as broken bones plant, Indian calosanthes, Indian trumpet flower, kampong, midnight horror and tree of Damocles). The bark extract of O. indicum produces concentration-dependent effects against both larval and adult H. diminuta worms so may also affect other helminths.

Palmarosa (Cymbopogon martinii). Also known as Indian geranium, gingergrass and rosha or rosha grass. This may kill helminths.

Passion flower (Passiflora). This will not harm helminths.

Pau D'arco (Handroanthus). Also known as poui and ipê. The root bark has antiparasitic effects.

Pomegranate (Punica granatum). The rind of the pomegranate fruit is a traditional remedy for intestinal parasites, and alcoholic extracts of the rind have shown 'moderate' anthelmintic activity against the human roundworm, Ascaris lumbricoides, in test tube studies, so these same extracts may have an adverse effect on other helminths. However, pomegranate seeds eaten in normal dietary amounts should not harm human helminths.

Quassia (Picrasma excelsa) has, anecdotally, been used successfully to treat threadworms and roundworms, as well as giardiasis, especially when used as an enema. It is a favoured botanical anthelminthic because of its low toxicity.

Rhodiola rosea. A hookworm host has reported regularly taking rhodiola without any adverse effect on his colony.

Rosemary has been reported not to be a problem for helminths.

Sage (Salvia officinalis) was used traditionally as a treatment for intestinal worms and some forms of sage are still often included as an ingredient in modern proprietary antiparasitic remedies. However, the use of sage leaves as a culinary herb may not pose a problem for helminths, but there has not yet been sufficient feedback to be certain about this. Sage oil is likely to be much more of a problem for helminths, and one helminth provider cautions against the use of any concentrated form of sage.

Santonin is extracted from the dry buds of the desert plant Eurasian wormwood (Artemisia cina). It acts against most parasites except Echinococcus, and is used to treat roundworms.

Saw palmetto (Serenoa repens). Also known simply as Serenoa, or Sabal serrulatum. One individual has reported an inability to maintain a hookworm colony while taking this herb, but had success once the herb was discontinued.

Shilajit. One hookworm host has taken this without any apparent adverse effect on his colony. [Link]
Slippery elm (ulmus rubra). This is listed on at least one website as a herb that may be helpful in treating various types of parasitic worms, including hookworms, but the only report so far was from a hookworm host who said that she used a small amount of slippery elm powder on a few occasions without noticeably affecting her worms.

Southernwood (Artemisia abrotanum) This European flowering plant has demonstrated effects against some helminths. It is also known as old man, boy's love, oldman wormwood, lover's plant, applering, garderobe, Our Lord's wood, maid's ruin, garden sagebrush, European sage, sitherwood and lemon plant.

Spondias (Spondias mombin or Spondias purpurea var. lutea) This tropical fruit, which is also known as hog plums, Spanish plums, libas in Bikol, golden apples and mombins, may have anthelmintic effects.

St. John's Wort (Hypericum perforatum). Some of the chemical constituents of hypericum might conceivably have an adverse effect on helminths if taken in isolation (e.g., hyperforin has demonstrated some antibiotic properties, and hypericin has shown both antibacterial and antiviral activity), but the whole, powdered herb is unlikely to present a serious risk to human helminths.

Sweet Annie (Artemisia annua). Also known as sweet wormwood, sweet sagewort and annual wormwood. Both the herb and the pure form of its active ingredient, the sesquiterpene lactone, artemisinin, have been used traditionally to treat malaria and intestinal parasites. Artemisinin is a potent anthelmintic and has been shown to be effective against schistosomes.

Tancosan. This herbal combination product is unlikely to be a problem at the recommended dosage, and this has been confirmed by one helminth host who has used Tancosan for over a 2 year period without any obvious adverse effect on her worms.

Tansy (Tanacetum vulgare) is highly toxic to internal parasites and, for centuries, tansy tea has been prescribed by herbalists to expel worms.

Tea tree oil (Melaleuca alternifolia) has been claimed to kill intestinal worms, including roundworms, tapeworms and hookworms, though evidence for this is lacking. There are, however, hints that the use of tea tree products might have effects on those who are hosting helminths.

Tephrosia purpurea. Alcoholic extracts of T. purpurea have shown 'good' anthelmintic activity against the human roundworm, Ascaris lumbricoides, in test tube studies, so these extracts may also have an adverse effect on other helminths.

Thymol, a monoterpenic phenol found in oil of thyme and oregano oil, has antimicrobial and antifungal properties and is said to be highly effective against hookworms. It can also be toxic and has caused fatalities in children.

Usnea are lichen species with powerful antibiotic and antifungal properties. Usnea florida extract has been found to have a dose-dependent anthelmintic effect against the nematode worm, Trichinella spiralis.

Uva-ursi. (Arctostaphylos uva-ursi). One of several related species referred to as bearberry, uva-ursi contains the glycoside arbutin, which has antimicrobial properties. There are claims online that uva-ursi is also anthelmintic, but, so far, there have been no reports of its effect on therapeutic helminths.

Vasaka (Justicia adhatoda). Also known as Malabar Nut, Adulsa, Adhatoda and Vasa. From the same family as Adhatoda zeylanica. The leaves (which contain vasicine), an alkaloid with significant antimicrobial activity), root, bark, fruit, and flowers are all said to help in removing intestinal parasites.

Vitex agnus-castus. Also known as vitex, chaste tree, chasteberry, Abraham's balm, lilac chastetree and monk's pepper. One hookworm host has taken 1000 mg of dried vitex agnus castus each day for many months without any noticeable ill effect on her worms. [Link]

White walnut (Juglans cinerea). Also known as Butternut. This nut has been used to expel rather than kill worms, although both root bark and leaves have been used in combination with an equal amount of Mugwort to treat worms in children.

Wild rue (Peganum harmala). Also known as Esfand, Syrian rue, African rue and harmal. Its powdered seeds were used traditionally to expel tapeworms.

Wood betony (Stachys officinalis). Also known as betony, purple betony, bishopwort, or bishop's wort. A tea made from this may kill helminths.

Wood sorrel (Oxalis) has been reported as not being a problem for worm hosts when eaten as a food.

Wormseed (Dysphania ambrosioides, formerly Chenopodium ambrosioides). Also known as epazote, goosefoot, Jesuit's Tea, Mexican Tea, Herba Sancti Mariae and paico. Wormseed is a traditional herbal remedy used in the...
tropics for expelling roundworms, hookworms and tapeworms. The oil, leaves or whole plants can be used, but one study found that the powdered herb did not effectively eradicate hookworms, roundworms, or whipworms.

**Wormwood** (*Artemisia Absinthium*). Also known as common wormwood, green ginger or grand wormwood, this herb was used traditionally as an anthelmintic. Other members of the genus, artemisia, that were traditionally used as anthelmintics include white wormwood (*Artemisia herba-alba*) and Eurasian wormwood (*Artemisia cinia*) - commonly known as santonica, Levant wormseed, and wormseed.

**Yerba mate** (also known as erva-mate). No adverse reports have appeared so far about the effect of this herb on human helminths, or of the beverage made from it, known as mate, maté, Chimarrão, cimarrón, Tererê or Tereré.

**Zingiber zerumbet**. Alcoholic extracts of the rhizomes of *Z. zerumbet* have shown ‘good’ anthelmintic activity against the human roundworm, *Ascaris lumbricoides*, in test tube studies, so these extracts may also have an adverse effect on other helminths.

### Miscellaneous

**Bee venom therapy** appears to be safe for worms. [Link]

**Diatomaceous earth.** This is made from the fossilized remains of tiny, aquatic organisms called diatoms which are mined from ancient sea beds and ground into a fine powder to produce food grade or medical grade diatomite. The finer grade diatomites are used as an insecticide and are also employed to deworm pets and humans. They are believed to work by dehydrating the organism, although the sharp edges of the particles may also be damaging to tiny creatures. A daily dose of one heaped teaspoon of diatomaceous earth has been claimed to be effective for human worm control, and one helminth provider has cautioned against its use while hosting worms.

**Clay** (e.g., bentonite, kaolin) is claimed by some sources to be a natural parasite preventive that inhibits the reproduction of organisms, and one helminth provider at one time advised against its use while hosting worms. However, it is now thought much less likely to harm the human hookworm and whipworm than it is tapeworms, and it may in fact not have any adverse effect at all on human hookworms and whipworms.

**Fasting.** This will not harm human helminths because they feed from their host’s blood (hookworms), or from their tissue (whipworms), rather than sharing what their host eats. This is in contrast to the rat tapeworm, *Hymenolepis diminuta* (HDC) which shares its host’s food as this passes along the intestine, and requires dietary carbohydrates to survive, so may be harmed by a prolonged fast.

**Fever.** Running a fever for several days will not harm helminths.

**Hyperbaric oxygen.** There have been no reports of any adverse effects from hyperbaric oxygen, in spite of many helminthic therapy subjects with autism having used it.

**Ketosis** is a metabolic state in which most of the body’s energy supply comes from ketone bodies in the blood. This state is often induced deliberately by fasting or the adoption of a low-carbohydrate diet as a intervention in various medical conditions. One commenter has suggested that ketosis should not be harmful to helminths because, like fungi, they have mitochondria so can metabolise fat and therefore utilise ketones as a food source, unlike bacteria and viruses which require carbohydrates to survive. [Link] For more on keptogenic diets, see [here](#).

**Rife machines.** These devices are claimed to be capable of killing or "devitalizing" worms when set to 2,400 Hz. Therefore, assuming that they are able to do what is claimed (and this is a contentious issue) it would seem sensible to avoid this particular frequency if using these machines.

**Steam.** Saunas, hot tubs and hot baths do not harm helminths because the body's core temperature remains relatively constant while the skin sweats.

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The following sections/entries were added or amended as part of the last update.

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