CLAIMS

WHAT IS CLAIMED:

1. A method for controlling an arthropod in an environment comprising: providing Purified Hydrogen Peroxide Gas (PHPG) to said environment to prepare a PHPG containing environment having PHPG gas at a final concentration of at least 0.05 parts per million and maintaining said PHPG containing environment for a time period sufficient to control said arthropod.

2. The method of claim 1, wherein said controlling of said arthropod is selected from the group consisting of cessation of all activity, regurgitation of a recent meal, laying of an immature egg, laying of a mature egg, hatching of an immature egg, death of a nymph, searching for an exit from said PHPG containing environment, exiting from said PHPG containing environment, searching for a source of non PHPG air, locating to a source of non PHPG containing air, exhibiting frantic behavior, becoming disoriented, death of an arthropod egg, death of an arthropod pupae, death of an arthropod larva, and death a mature arthropod.

3. The method of claim 1, wherein said arthropod is a member of the phylogenetic class selected from the group consisting of *Insecta*, *Arachnida*, *Diplopoda,* and *Chilopoda*.

4. The method of claim 1, wherein said Purified Hydrogen Peroxide Gas (PHPG) comprises 0.015 parts per million (ppm) of ozone or less.

5. The method of claim 4, wherein said provided PHPG is substantially free of ozone, plasma species, and combinations thereof.

6. The method of claim 1, wherein said provided PHPG is prepared from ambient air having a relative humidity of between 5% and 99%.

7. The method of claim 1, wherein said providing of PHPG is maintained for a period of time until the PHPG concentration in said environment is at a level sufficient to control said arthropod.

8. The method of claim 7, wherein said PHPG containing environment comprises a PHPG concentration of between 0.05 parts-per-million (ppm) and 1.5 ppm.

9. The method of claim 7, wherein said PHPG containing environment comprises PHPG at a concentration that is less than 1.0 ppm.

10. The method of claim 9, wherein said PHPG containing environment comprises PHPG at a concentration that is higher than about 0.10 ppm, higher than about 0.20 ppm, higher than about 0.03ppm, higher than about 0.04 ppm, higher than about 0.05 ppm, higher than about 0.06 ppm, higher than about 0.07 ppm, higher than about 0.08 ppm, or higher than about 0.09 ppm.

11. The method of claim 7, wherein said period of time is less than about 10 days, less than about 7 days, less than about 5 days, less than about 4 days, less than about 3 days, less than about 2 days, less than about 24 hours, less than about 12 hours, less than about 6 hours, less than about 3 hours, less than about 2 hours, or at least 1 minute.

12. The method of claim 1, wherein said arthropod is a member of a phylogenetic order selected from the group consisting of *Collembola* (*e.g.,* spring tails), *Thysanura* (*e.g.,* silverfish, firebrats, bristletails), *Ephemeroptera* (*e.g.,* mayflies), *Odonata* (*e.g.,* dragonflies, damselflies), *Phasmida* (*e.g.,* walking sticks), *Orthoptera* (*e.g.,* crickets, katydids, grasshoppers), *Mantodea* (*e.g.,* praying mantis), *Blattaria* (*e.g.,* cockroaches), Isoptera (*e.g.,* termites), *Dermaptera* (*e.g.,* earwigs), *Plecoptera* (*e.g.,* stonefly), *Psocoptera* (*e.g.,* psocids "barklice"), *Phthiraptera* (*e.g.,* lice including *Mallophaga* and *Anoplura*), Hemiptera (*e.g.,* true bugs; waterbug, chinch bug, Reduviidae; stink bugs), *Homoptera* (*e.g.,* aphids, cicadas), *Thysanoptera* (*e.g.,* thrips), *Neuroptera* (*e.g.,* doodle bugs, antlions, lacewings), *Coleoptera* (*e.g.,* beetles, weevils), *Mecoptera* (*e.g.,* scorpion flies), *Siphonaptera* (*e.g.,* fleas), Diptera (*e.g.,* flies, mosquitos, midges), *Trichoptera* (*e.g.,* caddisflies), *Lepidoptera* (*e.g.,* bollworm, armyworms, cutworms, codling moth, clothes moth and cabbageworm including immature forms of "caterpillers"), *Hymenoptera* (*e.g.,* ants, bees, wasps, hornets, yellow jackets, sawflies), *Scorpionida* (*e.g.,* scorpions), *Uropygi* (*e.g.,* vinegaroon), and *Araneae* (*e.g.,* spiders, tarantula).

13. The method of claim 1, wherein said arthropod is a member of the phylogenetic order *Thysanura* (*e.g.,* silverfish, firebrats, bristletails).

14. The method of claim 1, wherein said arthropod is a member of the phylogenetic order *Orthoptera* (*e.g.,* crickets, katydids, grasshoppers).

15. The method of claim 1, wherein said arthropod is a member of the phylogenetic order *Blattaria* (*e.g.,* cockroaches).

16. The method of claim 1, wherein said arthropod is a member of the phylogenetic order *Isoptera* (*e.g.,* termites).

17. The method of claim 1, wherein said arthropod is a member of the phylogenetic order *Phthiraptera* (*e.g.,* lice).

18. The method of claim 1, wherein said arthropod is a member of the phylogenetic order *Hemiptera* (*e.g.,* true bugs, waterbugs, chinch bugs, *Reduviidae*; stink bugs).

19. The method of claim 1, wherein said arthropod is a member of the phylogenetic order *Homoptera* (*e.g.,* aphids, cicadas).

20. The method of claim 1, wherein said arthropod is a member of the phylogenetic order *Coleoptera* (*e.g.,* beetles, weevels).

21. The method of claim 1, wherein said arthropod is a member of the phylogenetic order *Siphonaptera* (*e.g.,* fleas).

22. The method of claim 1, wherein said arthropod is a member of the phylogenetic order *Diptera* (*e.g.,* flies, mosquitos, midges).

23. The method of claim 1, wherein said arthropod is a member of the phylogenetic order *Lepidoptera* (*e.g.,* bollworm, armyworms, cutworms, codling moth, clothes moth and cabbageworm).

24. The method of claim 1, wherein said arthropod is a member of the phylogenetic order *Hymenoptera* (*e.g.,* ants, bees, wasps, hornets, yellow jackets, sawflies).

25. The method of claim 1, wherein said arthropod is a member of a phylogenetic class selected from the group consisting of *Chilopoda* (*e.g.,* centipedes) and *Diplopoda* (*e.g.,* millipedes); *Isopoda* (*e.g.,* sow bug, pill bugs, scud), *Opiliones* (*e.g.,* harvest bugs; "daddy longlegs").

26. The method of claim 1, wherein said arthropod further comprises one or more populations of arthropods.

27. The method of claim 1, wherein said arthropod is a member of the order *Araneae* (*e.g.,* spiders, tarantula).

28. The method of claim 1, wherein said arthropod is selected from the group consisting of: an ant (*Formicidae*), waterbug (*Nepomorpha*), a palmetto bug (*Battidae*), Florida woods cockroach (*Eurycotis floridana*), a bed bug (*Cimex spp.*), an assassin bug (*Reduviidae*), a hornet (*Vespinae*), a wasp (*Vespidae*), a mud dauber (*Apoidea*), a yellow jacket (*Vespinae*), an aphid (*Aphididae*), a caterpillar (*Lepidoptera* larva), a cut worm (*Noctuidae* larva), an earwig (*Dermaptera*), a termite (*Termitoidae*), a fly (*Musca spp.*), a gypsy moth larvae or adult (*Lymantria spp.*), a Japanese beetle (*Popillia spp.*), a carpet beetle (*Bostrichoidea*), a leafhopper (*Cicadellidae*), a millipede (*Diplopoda*), a red spider mite (*Tetranychinae*), a webworm (*Crambini*), a whitefly (*Aleyrodidae*), a firebrat (*Lepsima spp.*), a non-biting gnat (*Sylvicola spp.*), a pillbug (*Isopoda*) , a boxelder bug (*Contarinia spp.*), a centipede (*Hemiscolopendra spp.*), a cricket (*Oecanthus spp., Gryllidea spp., Gryllus spp.,* and *Daihinia spp.*), a flea (*Siphonaptera, Pulicidae spp.*), a fruit fly (*Acalyptratae*), a gnat (*Bibionomorpha*), a ground beetle (*Harpalitae*), a mosquito (*Culicidae*), a louse (*Phthiraptera*, *Anoplura*, *Mallophaga*), a scorpion (*Scorpiones*), a silverfish (*Zygentoma*), a sowbug (*Oniscidae*), a stink bug (*Pentatomidae*), a tick (*Ixodidae, Ixodes spp.* and *Rhipicephalus spp.*), and including eggs and larval forms of each.

29. The method of claim 12, wherein said arthropod is a member of the order *Araneae* selected from the group consisting of cellar spider, wolf spider, and tarantula.

30. The method of claim 12, wherein said arthropod is a member of the phylogenetic class *Formicidae* selected from the group consisting of a fire ant, a pharaoh ant, a harvester ant, an argentine ant, a carpenter ant, a crazy ant, a ghost ant, and an odorous ant.

31. The method of claim 12, wherein said arthropod is a member of the phylogenetic order *Hymenoptera* selected from the group consisting of an ant, a hornet, a mud dauber, a wasp, and a yellow jacket.

32. The method of claim 1, wherein said PHPG is provided to said environment by a PHPG generating device that is a stand-alone device or is a component of a climate control system.

33. A method of treating an animal for an arthropod parasite comprising placing an animal in a PHPG containing environment for a period of time.

34. The method of claim 33, wherein said animal is a domestic pet selected from the group consisting of a cat, a dog, and a rodent.

35. The method of claim 34, wherein said arthropod is selected from the group consisting of ticks, fleas, and lice.

36. The method of claim 33, wherein said animal is a livestock animal selected from the group consisting of cattle, sheep, pigs, chickens, and geese.

37. The method of claim 36, wherein said arthropod is a member of the phylogenetic class *Mallophaga* (chewing lice).

38. The method of claim 37, wherein said *Mallophaga* is selected from the group consisting of *Bovicola ovis* (sheep biting louse), *Menacanthus stramineus* (chicken body louse), and *Menopon gallinea* (common hen louse).

39. A method for controlling at least one insect or arachnid population in an environment, the method comprising: (a) generating a gas comprising near-ideal gas Purified Hydrogen Peroxide Gas (PHPG) that is substantially non-hydrated and substantially free of ozone, plasma species, and optionally organic species; (b) directing the PHPG into the environment such that the hydrogen peroxide gas acts to control said at least one insect or arachnid population in the environment.

40. A method of termite control comprising treating a termite infested house with PHPG.

41. A method of controlling arthropods in a greenhouse comprising providing PHPG to a green house.

42. A method of treating a houseplant for the control of an arthropod comprising placing an arthropod infested plant in a PHPG containing environment.

43. A method for controlling an arthropod in an agricultural product during shipping comprising:

providing Purified Hydrogen Peroxide Gas (PHPG) at a concentration of at least 0.05 parts per million to a shipping container containing said agricultural product to prepare a PHPG containing shipping container;

shipping said PHPG containing shipping container; and

maintaining said PHPG concentration during said shipping, wherein said arthropod is controlled.

44. The method of claim 43, wherein said agricultural product is selected from the group consisting of a fruit, a vegetable, a nut, a meat, and a live animal.

45. A method for controlling an arthropod in a food processing facility comprising providing Purified Hydrogen Peroxide Gas (PHPG) at a concentration of at least 0.05 parts per million to a food processing facility.

46. The method of claim 45, wherein said food processing facility is selected from the group consisting of a restaurant, a food distribution center, a food packaging plant, a rendering plant, an abattoir, a fish cannery, and a grocery store.

47. The method of claim 45, wherein said PHPG is provided at a concentration selected from the group of at least 0.1 ppm, 0.25 ppm, 0.5 ppm., 1.0 ppm, and more than 1.0 ppm.

48. The method of claim 45, wherein said PHPG is provided continuously.

CLAIMS

1. A method for controlling an arthropod in an environment comprising: providing Purified Hydrogen Peroxide Gas (PHPG) comprising 0.015 ppm or less ozone to said environment to prepare a PHPG containing environment having non-hydrated PHPG gas at a final concentration of between 0.05 parts per million to 5.0 ppm and maintaining said PHPG containing environment for a time period sufficient to control said arthropod.

2. The method of claim 1, wherein said controlling of said arthropod is selected from the group consisting of cessation of all activity, regurgitation of a recent meal, laying of an immature egg, laying of a mature egg, hatching of an immature egg, death of a nymph, searching for an exit from said PHPG containing environment, exiting from said PHPG containing environment, searching for a source of non PHPG air, locating to a source of non PHPG containing air, exhibiting frantic behavior, becoming disoriented, death of an arthropod egg, death of an arthropod pupae, death of an arthropod larva, and death a mature arthropod.

3. The method of claim 1, wherein said arthropod is a member of the phylogenetic class selected from the group consisting of *Insecta*, *Arachnida*, *Diplopoda,* and *Chilopoda*.

4. The method of claim 1, wherein said provided PHPG is substantially free of ozone, plasma species, and combinations thereof.

5. The method of claim 1, wherein said provided PHPG is prepared from ambient air having a relative humidity of between 5% and 99%.

6. The method of claim 1, wherein said providing of PHPG is maintained for a period of time until the PHPG concentration in said environment is at a level sufficient to control said arthropod.

7. The method of claim 6, wherein said PHPG containing environment comprises a PHPG concentration of between 0.05 parts-per-million (ppm) and 1.5 ppm.

8. The method of claim 6, wherein said PHPG containing environment comprises PHPG at a concentration that is less than 1.0 ppm.

9. The method of claim 8, wherein said PHPG containing environment comprises PHPG at a concentration that is higher than 0.10 ppm, higher than 0.20 ppm, higher than 0.03ppm, higher than 0.04 ppm, higher than 0.05 ppm, higher than 0.06 ppm, higher than 0.07 ppm, higher than 0.08 ppm, or higher than 0.09 ppm.

10. The method of claim 6, wherein said period of time is less than 10 days, less than 7 days, less than 5 days, less than 4 days, less than 3 days, less than 2 days, less than 24 hours, less than 12 hours, less than 6 hours, less than 3 hours, less than 2 hours, or at least 1 minute.

11. The method of claim 1, wherein said arthropod is a member of a phylogenetic order selected from the group consisting of *Collembola* (*e.g.*, spring tails), *Thysanura* (*e.g.*, silverfish, firebrats, bristletails), *Ephemeroptera* (*e.g.*, mayflies), *Odonata* (*e.g.*, dragonflies, damselflies), *Phasmida* (*e.g.*, walking sticks), *Orthoptera* (*e.g.*, crickets, katydids, grasshoppers), *Mantodea* (*e.g.*, praying mantis), *Blattaria* (*e.g.*, cockroaches), Isoptera (*e.g.*, termites), *Dermaptera* (*e.g.*, earwigs), *Plecoptera* (*e.g.*, stonefly), *Psocoptera* (*e.g.*, psocids "barklice"), *Phthiraptera* (*e.g.*, lice including *Mallophaga* and *Anoplura*), Hemiptera (*e.g.*, true bugs; waterbug, chinch bug, Reduviidae; stink bugs), *Homoptera* (*e.g.*, aphids, cicadas), *Thysanoptera* (*e.g.*, thrips), *Neuroptera* (*e.g.*, doodle bugs, antlions, lacewings), *Coleoptera* (*e.g.*, beetles, weevils), *Mecoptera* (*e.g.*, scorpion flies), *Siphonaptera* (*e.g.*, fleas), Diptera (*e.g.*, flies, mosquitos, midges), *Trichoptera* (*e.g.*, caddisflies), *Lepidoptera* (*e.g.*, bollworm, armyworms, cutworms, codling moth, clothes moth and cabbageworm including immature forms of "caterpillers"), *Hymenoptera* (*e.g.*, ants, bees, wasps, hornets, yellow jackets, sawflies), *Scorpionida* (*e.g.*, scorpions), *Uropygi* (*e.g.*, vinegaroon), and *Araneae* (*e.g.*, spiders, tarantula).

12. The method of claim 1, wherein said arthropod is a member of the phylogenetic order *Thysanura* (*e.g.*, silverfish, firebrats, bristletails).

13. The method of claim 1, wherein said arthropod is a member of the phylogenetic order *Orthoptera* (*e.g.*, crickets, katydids, grasshoppers).

14. The method of claim 1, wherein said arthropod is a member of the phylogenetic order *Blattaria* (*e.g.*, cockroaches).

15. The method of claim 1, wherein said arthropod is a member of the phylogenetic order *Isoptera* (*e.g.,* termites).

16. The method of claim 1, wherein said arthropod is a member of the phylogenetic order *Phthiraptera* (*e.g.,* lice).

17. The method of claim 1, wherein said arthropod is a member of the phylogenetic order *Hemiptera* (*e.g.,* true bugs, waterbugs, chinch bugs, *Reduviidae*; stink bugs).

18. The method of claim 1, wherein said arthropod is a member of the phylogenetic order *Homoptera* (*e.g.,* aphids, cicadas).

19. The method of claim 1, wherein said arthropod is a member of the phylogenetic order *Coleoptera* (*e.g.,* beetles, weevels).

20. The method of claim 1, wherein said arthropod is a member of the phylogenetic order *Siphonaptera* (*e.g.,* fleas).

21. The method of claim 1, wherein said arthropod is a member of the phylogenetic order *Diptera* (*e.g.,* flies, mosquitos, midges).

22. The method of claim 1, wherein said arthropod is a member of the phylogenetic order *Lepidoptera* (*e.g.,* bollworm, armyworms, cutworms, codling moth, clothes moth and cabbageworm).

23. The method of claim 1, wherein said arthropod is a member of the phylogenetic order *Hymenoptera* (*e.g.,* ants, bees, wasps, hornets, yellow jackets, sawflies).

24. The method of claim 1, wherein said arthropod is a member of a phylogenetic class selected from the group consisting of *Chilopoda* (*e.g.,* centipedes) and *Diplopoda* (*e.g.,* millipedes); *Isopoda* (*e.g.,* sow bug, pill bugs, scud), *Opiliones* (*e.g.,* harvest bugs; “daddy longlegs”).

25. The method of claim 1, wherein said arthropod further comprises one or more populations of arthropods.

26. The method of claim 1, wherein said arthropod is a member of the order *Araneae* (*e.g.*, spiders, tarantula).

27. The method of claim 1, wherein said arthropod is selected from the group consisting of: an ant (*Formicidae*), waterbug (*Nepomorpha*), a palmetto bug (*Battidae*), Florida woods cockroach (*Eurycotis floridana*), a bed bug (*Cimex spp.*), an assassin bug (*Reduviidae*), a hornet (*Vespinae*), a wasp (*Vespidae*), a mud dauber (*Apoidea*), a yellow jacket (*Vespinae*), an aphid (*Aphididae*), a caterpillar (*Lepidoptera* larva), a cut worm (*Noctuidae* larva), an earwig (*Dermaptera*), a termite (*Termitoidae*), a fly (*Musca spp.*), a gypsy moth larvae or adult (*Lymantria spp.*), a Japanese beetle (*Popillia spp.*), a carpet beetle (*Bostrichoidea*), a leafhopper (*Cicadellidae*), a millipede (*Diplopoda*), a red spider mite (*Tetranychinae*), a webworm (*Crambini*), a whitefly (*Aleyrodidae*), a firebrat (*Lepsima spp.*), a non-biting gnat (*Sylvicola spp.*), a pillbug (*Isopoda*) , a boxelder bug (*Contarinia spp.*), a centipede (*Hemiscolopendra spp.*), a cricket (*Oecanthus spp., Gryllidea spp., Gryllus spp.,* and *Daihinia spp.*), a flea (*Siphonaptera, Pulicidae spp.*), a fruit fly (*Acalyptratae*), a gnat (*Bibionomorpha*), a ground beetle (*Harpalitae*), a mosquito (*Culicidae*), a louse (*Phthiraptera, Anoplura, Mallophaga*), a scorpion (*Scorpiones*), a silverfish (*Zygentoma*), a sowbug (*Oniscidae*), a stink bug (*Pentatomidae*), a tick (*Ixodidae, Ixodes spp.* and *Rhipicephalus spp.*), and including eggs and larval forms of each.

28. The method of claim 11, wherein said arthropod is a member of the order *Araneae* selected from the group consisting of cellar spider, wolf spider, and tarantula.

29. The method of claim 11, wherein said arthropod is a member of the phylogenetic class *Formicidae* selected from the group consisting of a fire ant, a pharaoh ant, a harvester ant, an argentine ant, a carpenter ant, a crazy ant, a ghost ant, and an odorous ant.

30. The method of claim 11, wherein said arthropod is a member of the phylogenetic order *Hymenoptera* selected from the group consisting of an ant, a hornet, a mud dauber, a wasp, and a yellow jacket.

31. The method of claim 1, wherein said PHPG is provided to said environment by a PHPG generating device that is a stand-alone device or is a component of a climate control system.

32. Purified Hydrogen Peroxide Gas (PHPG) for use in the treatment of an animal for an arthropod parasite in an environment comprising providing PHPG to said environment to prepare a PHPG containing environment having PHPG gas at a final concentration of at least 0.05 parts per million (ppm) to 5.0 ppm and having less than 0.015 ppm ozone and maintaining said PHPG placing an animal in a PHPG containing environment for a period of time.

33. The Purified Hydrogen Peroxide Gas (PHPG) for use in the treatment of an animal for an arthropod parasite in an environment of claim 32, wherein said animal is a domestic pet selected from the group consisting of a cat, a dog, and a rodent.

34. The method of claim 33, wherein said arthropod is selected from the group consisting of ticks, fleas, and lice.

35. The method of claim 32, wherein said animal is a livestock animal selected from the group consisting of cattle, sheep, pigs, chickens, and geese.

36. The method of claim 35, wherein said arthropod is a member of the phylogenetic class *Mallophaga* (chewing lice).

37. The method of claim 36, wherein said *Mallophaga* is selected from the group consisting of *Bovicola ovis* (sheep biting louse), *Menacanthus stramineus* (chicken body louse), and *Menopon gallinea* (common hen louse).

38. A method for controlling at least one insect or arachnid population in an environment, the method comprising: (a) generating a gas comprising near-ideal gas Purified Hydrogen Peroxide Gas (PHPG) that is substantially non-hydrated and substantially free of ozone, plasma species, and optionally organic species; (b) directing the PHPG into the environment such that the hydrogen peroxide gas acts to control said at least one insect or arachnid population in the environment.

39. A method of termite control comprising treating a termite infested house with PHPG.

40. A method of controlling arthropods in a greenhouse comprising providing PHPG to a green house.

41. A method of treating a houseplant for the control of an arthropod comprising placing an arthropod infested plant in a PHPG containing environment.

42. A method for controlling an arthropod in an agricultural product during shipping comprising:

providing Purified Hydrogen Peroxide Gas (PHPG) at a concentration of at least 0.05 parts per million to a shipping container containing said agricultural product to prepare a PHPG containing shipping container;

shipping said PHPG containing shipping container; and

maintaining said PHPG concentration during said shipping, wherein said arthropod is controlled.

43. The method of claim 42, wherein said agricultural product is selected from the group consisting of a fruit, a vegetable, a nut, and a meat.

44. A method for controlling an arthropod in a food processing facility comprising providing Purified Hydrogen Peroxide Gas (PHPG) at a concentration of at least 0.05 parts per million to a food processing facility.

45. The method of claim 44, wherein said food processing facility is selected from the group consisting of a restaurant, a food distribution center, a food packaging plant, a rendering plant, an abattoir, a fish cannery, and a grocery store.

46. The method of claim 44, wherein said PHPG is provided at a concentration selected from the group of at least 0.1 ppm, 0.25 ppm, 0.5 ppm., 1.0 ppm, and more than 1.0 ppm.

47. The method of claim 44, wherein said PHPG is provided continuously.