IMMUNITY GENERATION

Field of the Invention

This invention relates to immunity generation. The invention also relates to the treatment and/or prevention of allergies.

The invention also relates to the use of insects, including larval forms and other life forms, in the recycling of biological waste.

The invention further relates to the use of insects and their larvae as a food source.

Summary of the Invention

According to a first aspect of the present invention there is provided a method for the manufacture of a medicament for immunity generation and/or treatment and/or prevention of allergies, which method includes the use of insect tissues and/or larval forms and derivatives of insects.

According to a second aspect of the present invention there is provided a medicament for the provision of immunity to bacterial

and viral disease and/or allergies and/or tumours, said medicament comprising insect tissues and/or larval forms and derivatives of insects.

The medicament may be in a form which permits its ingestion, digestion and assimilation to provide immunity to bacterial and viral disease and/or allergies and/or tumours. The medicament may alternatively be in a form which permits its injection into the subject to which or whom the immunity is to be given. As a further alternative, the medicament may be in a form which permits its absorption transcutaneously.

The medicament may alternatively be in a form which is suitable for ingestion, digestion and assimilation by a nursing mother for provision of immunity to a baby being breast-fed.

The subject may be bird or an animal, including humans.

According to a third aspect of the present invention there is provided a method of recycling biological waste which includes the use of insects, including larval and other life forms, to produce either a medicament having immunity-generating properties or a food source which has immunity-generating properties.

The biological waste may be sewage, paper, vegetable and organic materials. Typical waste materials include animal offal and residue from the meat processing industry. They also include deceased diseased animals, such as those infected with BSE.

According to a fourth aspect of the present invention there is provided a method of producing a food source which includes the use of insects and their larvae which act as carriers providing immunity generation as well as protein, energy and biologically active beneficial compounds.

Such beneficial compounds include vitamins, omega 3 unsaturated fatty acids, trace elements, minerals and amino-acids, such as methionine, lysine, isoleucine and phenylalanine.

Description of the Preferred Embodiments

Certain species of insects and their larvae have adapted by evolution to become biological recyclers. In this role they have developed an ability to metabolise faecal matter, dead, decaying and diseased animal remains. This has necessitated an ability on their part to withstand bacterial and viral attack from the food on which they feed, and in this way they have developed a successful immune strategy.

For the success of the animal kingdom as a whole, it is imperative that disease should not become rampant and be spread from the ingestion of the animals which feed on them.

The ingestion and digestion of insects by higher animals of the food chain provide a pathway for the transfer of immunity up the food chain.

In the move towards a more concerned approach to our environment, we need to work more closely in tandem with it. This requires a greater understanding of the way of the natural world.

In our husbandry of animals for food, we must, as far as is possible, return to a feeding regime that is more like the original regime from which the animals have developed.

It has been observed that, in the nutrition of the human species, the feeding of simple food substitutes in the form of concentrates, although providing all the basic nutritional requirements, has led to problems in the digestive tract, and a diminution of the health of the individual as exhibited by, for example, the growth in numbers of alimentary tract cancers.

What the human animal requires is good wholesome food. To ensure this, we must examine and promote the well-being of the animals on which we feed.

In the natural environment the circuit of life succeeds and we must understand and promote this relationship. In the control of disease in man, we have ventured along the path of specific anti-bacterial, anti-viral drug protection. In contrast, the present invention is concerned with the development of an immune system that is initiated by charging it by the ingestion of foods in which immunity has been created naturally.

METHOD AND PROCEDURE

The insects to be used are grown on a substrate inoculated with the relevant bacteria or virus when pursuing specific immuniological responses. Relevant substrates would be used when biologically recycling, for example, sewage.

The insects to be used, if grown on a substrate of mixed bacteria, will provide a general raised level of anti-bacterial activity, providing general immunity to the recipient consumer. In the incidence of requiring specific immuno-response, then the particular bacteria in question will be used in the substrate. This will promote the particular lectins and induce peptides that are suitable for its control. Under the circumstances that not all of the bacteria are destroyed by the insect's immune system, the ingestion of the insect plus the residual bacteria will provide a means for the induction of the auto-immune system of the recipient consumer.

Presentation of the bacterial- and/or viral-resistant insects would be:-

1 whole and live, or
2 inactivated whole, or
3 homogenised whole, or
4 sectional preparation, or
5 pupated whole live, or
6 pupated whole inactivated.

In the feeding of the insects as a food form it will be optimal to provide and present a food which does not need additional

antioxidants and preservatives, as this tends to defeat the philosophy behind the concept.

The extraction of specific anti-viral and anti-bacterial activity from the insects will necessitate chemical and physical extraction processes, involving the use of stabilisers, solvents, reactants and various separation techniques.

INSECT SOURCE

The immune response adaptability will be shown particularly amongst carrion and detritus feeders. The viability of the process is largely dependant on the ability to produce readily, large quantities and volumes of the insects of the species that are listed below. It is believed that flies, in their larval form, **maggots,** are the most suitable, as they have a short life span and high fecundity. Also, they have a natural inactivated inert phase - the pupa stage.

SPECIES

TRUE FLIES

Muscidae

I. **House flies**

common house fly	Musca domestica
common house fly	Faffia Canicularis
lesser house fly	
green cluster fly	Dasyphora Cyanella

II.	**Blow flies**	**Calliphoridae**
	blue bottle	Calliphora Erythrocephalia
		Calliphora Vomitoria
	green bottle	Lucilia Sericata
		Lucilia Caesar
	flesh fly	Sarcophaga Camaria
III.	seaweed fly	Coelopidae
		Coelopa Fridda
IV.	fruit flies	Drosophilia
V.	crane flies	Tipulidae
VI.	mosquitoes	Culicidae
		Andphelline
VII.	soldier flies	Stratiomyidae
VIII.	horseflies	Tabanidae
IX.	robber flies	Asilidae
X.	hover flies	Syrphidae
		Tephritidae
XI.	louse flies	Hippoboscidae

	Tachinidae
XII. sewage flies	Diptera
2 cave crickets	Rhaphidophoridae
3 cockroaches	Dictyptera
4 earwigs	Dermaptera
5 ground beetles	Carabidae
burying beetles	Silphidae
rove beetles	Staphylinidae
scarabs and chafers	Scrabaeidae
click beetles	Elateridae
larder beetle	Dermestidae
church tard beetle	
6 centipedes	Chilopoda
millipedes	Diplopodia
7 harvestmen	Opillionis
8	Series Schizophora
9 moths and butterflies	Lepidoptera
	Superfamily Hesperioidea

Superfamily Papillonoidea

Superfamily Micropterigoidea

Superfamily Eriocranioidea

Superfamily Hepialoidea

Superfamily Nepticuloidea/Stigmelloidea

Superfamily Incurvaroidea

Superfamily Cossoidea

Superfamily Zygaenoidea

Superfamily Pterophoroidea

Superfarnily Pyraloidea

Superfamily Tortricoidea

Superfamily Sesioidea

Superfamily Tineoidea

Superfamily Alucitoidea

Superfamily Noctuoidea

Superfamily Geometroidea

Superfamily Sphingoidea

Superfamily Bombycoidea

Caddis Flies Order Trichoptera

Bees Wasps Ants: Order Hymenoptera:

Superfamily Evanioidies

Superfamily Ichneumonoidea

Superfamily Cynipoidea

Superfamily Chalcidoidea

Superfamily Proctotrupoidea

Superfamily Ceraphronoidea

Superfamily Chrysidoidea

Superfamily Scholioidea

The Ants:

Superfamily Formicoidea

The True Wasps:

Superfamily Vespoidea

Superfamily Pompiloidea

Superfamily Sphecoidea

The Bees:

Superfamily Apoidea

Snails: cochlea

Worms: lumbricus terrestris

Slugs

DISEASES THAT COULD BE INCORPORATED INTO THIS PROCEDURE

Anthrax	Bacillus Antharis
Botulism	Clostridium Botulinum
Cholera	Vibrio Cholerae
Diptheria	Coryne Bacterium Diptheriae

Food Poisoning	Staphylococcus
	Bacillus Cerens
	Clostridium Perfringens
	Salmonella Typhimurium
Gas Gangrene	Clostridium Perfringens
	Clostridium Novyi
	Clostridium Septicum
Gonnorrhoea	Neisseria Gonorrhoea
Leprosy	Mycocbacterium Leprae
Meningitis	Neisseria Meninigitidis
	Haemophilus Influenzae
	Streptoccus Pneumonial
	Listeria Monocytogenes
Bubonic Plague	Yersinia Pestis
Pneumonia	Streptococcus Pneumoniae
	Haemophilus Influenzae
	Klebsiella Pneumoniae
	Mycoplasm Pneumoniae
Q Fever	Coxiella Burneth
Scarlet Fever	Streptococcus Pyogenes
Syphilis	Treponema Palliduni
Tetanus	Clostridium Tetani
Trachoma	Chlamydia Trachomatis
Tuberculosis	Mycobacterium Tuberculosis
	Mycobacterium Bovis
Typhoid	Salmonella Typhi
Typhus	Rickettsia Prowazekit
Measles	

German measles	Rubella
Chicken-pox	Varicella
Shingles	Herpes Zoster
Common Cold	Acute Coryza
Hepatitis	
Bee Virus	
Influenza	
Encephalitis	
Mumps	
Whooping Cough	Burdetella Pertussis
Small-pox	Variola
Rabies	Hydrophobia

BACTERIAL FAMILIES COVERED BY THE PROCEDURE

Escheria

Salmonella

Arizona Proteus Klebsiella Shicella

Pasteurellayersina Francisella

Bruella

Actinobacillus

Haemophilus Mora & Ella Bordatella

Spharophorus

Staphyloccus

Streptococcus

Pneumococcus

Corynebacterium

Erysipelothrix

Listeria

Bacillus

Clostridium

Mycobacterium

Actinomyces

Nocardia

Pseudomanas

Campylobacter

Leptospira

Borrelia Treponema Spirillum

Mycoplasma Achoeplasma

USES AND APPLICATIONS

USES

A. Immunological Transfer:

1) Transfer of bacterial and viral immunity through ingestion, digestion and assimilation of insects, including their larval forms,, in their whole form or processed to recipient.

2)Transfer of bacterial or viral immunity through inoculation of active extracts from the tissues of insects and their larvae to the recipient.

B. As Protein and Organic Recyclers

Substrates:-

1. Sewage Waste.

2. Organic waste from abattoirs, meat processing plants (cattle, sheep, pigs, poultry and including diseased animals, fish and shellfish, e.g. crabs, mussels, whelks and scallops).
3. Vegetable waste, from the food industry and manufacturers including brewing.
4. Wood pulp waste.
5. Household waste.
6. Seaweed.

The invention thus provides a method of eliminating the need for landfill or incineration in that insects can be introduced into land containing waste materials so as to enrich the soil and provide a slow release of nitrogen compounds.

C <u>Animal Nutrition</u>

Provision through suitable substrates of:

1) Protein Source

2) Lysine, Methionine & Isolucene in particular, as well as other amino acids.

3) Vitamin Source:-

B_1 Anevrin

B_2 Riboflavin

B_3 Niacin

B_5

B_6

B_{12}

Folic acid

Pantothenic

Biotin

C

D

E

K

4) DMAE

5) Various Fatty Acids

Saturated but in particular unsaturated:-

RAC

Palmitoleic

Oleic

Linoleic

Arichidonic Acid

Nervonic Acid

Ximenyic

myomycin

Long Chain Fatty Acids

Omega 3 unsaturated Fatty Acids

With the correct choice of insects, it will be possible to reduce oxidised unsaturated fatty acids and thus eliminate unsuitable rancid flavoured fatty acids from the food chain, returning the fatty acids to their prior double bond unsaturated state.

The procedure will also enable 'fishy tastes' to be eliminated, when feeding insects fed on fish waste to chickens. An important application of the present invention is thus the feeding of insects to chickens to generate innate immunity in the chickens, with the

result that the eggs from the chickens are of improved quality. In addition, the innate immunity generated in the chickens can be transferred to the consumers of both the chickens and the eggs laid by the chickens.

Insects living in soil digest and assimilate plant protein including that which has been attacked by fungi. It is accordingly possible to feed the insects on specifically chosen plant protein to produce a desired innate immune response. In addition, the anti-bacterial agents in the slime of worms migrates to the skin of a worm for transfer to the soil, and hence may be absorbed by plant roots and, in this way, promote the health of the plants, providing a feedback mechanism between species members (plants) after one has succumbed to disease promoting a strengthening of the plant population (as with the animal kingdom).

The biological and digestion processes of the insect larvae will also degrade BSE proteins into their component amino aids.

The procedure will also provide a source of trace elements and minerals, including
Se Selenium, Fe Iron, Mn Manganese, I Iodine, Ca Calcium, S Sulphur, K Potassium, Na Sodium, P Phosphorus and Cu Copper

APPLICATIONS

1) Control of disease in man by boosting the innate immunity system and aiding the induction of the auto-immune system.

2) Control of disease in animals and fish. Thus, for poultry, protection can be obtained against avian infectious encephalomyelitis, avian listeriosis, avian plague, avian TB, avian bumblefoot, cage layer fatigue, coccidiosis, E coli, favus, fowl cholera, fowl paralysis, fowl typhoid, gapes, haemorrhagic disease, moniliasis, Newcastle disease, pullet disease, pullorum disease, salmonellosis, synovitis, toxic fat syndrome, gumboro, bronchitis, nephrosis, liver/kidney syndrome, Marek's disease and infestation with trichostrongylus axei. The invention is also applicable to the following swine diseases, i.e. dysentry, swine erysipeala, African swine fever, swine influenza, swine plague, swine pox and SVD. For cattle, protection can be obtained against actinacillosis, actinomycosis, anthrax, foot and mouth disease, brucellosis, coccidosis, pleuro-pneumonia, bovine encephalomyelitis, cattle plague, blouwildebeesoog, cerebrocortical necrosis, clostrial entiritis, Johne's disease, rabies, salmonellosis, skinTB, tick-borne fever, tuberculosis, viral entiritis, virus infections of cows' teats, vulvo-vaginitismastitis, polioencephalomalacia, parasitic gastroentiritis, milk fever, red water, hypocupraemia, hypomagnesaemic disease, infectious ophthalmic disease, part-parturient haemoglobinuria, mucormycosis, mucosaldis and pyelonephritis.

3) As a food base in chickens. When given whole to chickens in a free-range environment, it provides a mode of feeding which promotes foraging and scratching. This also promotes grass and

natural vegetation consumption, lessens aggressive behaviour, by satisfying basic pecking response, eliminating the need for beak cutting.

4) It can also serve as a growth promoter, a means of prevention of allergies and a means for preventing or inhibiting the development and growth of tumours.

5) As a food form, it enriches the eggs that are produced from chickens. With correct use of the substrate for insects, an egg can be produced which contains:

a) Omega 3 unsaturated fatty acids, but without the fatty taste, and.

b) Other biologically beneficial compounds. See Above.

It can also produce an egg of lower cholesterol levels, benefiting man, the consumer.

6) As a food source for game and fowl and pheasant, grouse and partridge, particularly in their early development.

Further Applications:

In the recycling of man-made fibres and carbon polymers.

In a marine environment, molluscs can be fed on decaying waste for the generation of an innate immune response in the molluscs, which innate immunity can then be transferred to fish and to those who feed on fish.

Claims:-

1. A method for the manufacture of a medicament for immunity generation and/or treatment and/or prevention of allergies, which method includes the use of insect tissues and/or larval forms and derivatives of insects.

2. A medicament for the provision of immunity to bacterial and viral disease and/or allergies and/or tumours, said medicament comprising insect tissues and/or larval forms and derivatives of insects.

3. A medicament as claimed in Claim 2, which is in a form which permits its ingestion, digestion and assimilation.

4. A medicament as claimed in Claim 2, which is in a form which permits its injection into the subject to which or whom the immunity is to be given.

5. A medicament as claimed in Claim 2, which is in a form which permits its absorption transcutaneously.

6. A method of recycling biological waste which includes the use of insects, including larval and other life forms, to produce either a medicament having immunity-generating properties or a food source which has immunity-generating properties.

7. A method as claimed in Claim 6, in which the biological waste is or includes sewage.

8. A method as claimed in Claim 6, in which the biological waste is or includes animal offal.

9. A method as claimed in Claim 6, in which the recycling of the biological waste material is effected on land which is enriched by the recycling process.

10. A method of producing a food source which includes the use of insects and their larvae which act as carriers providing immunity generation as well as protein, energy and biologically active beneficial materials.

11. A method of raising chickens, which includes feeding the chickens on the food source produced by the method of Claim 10.

12. A method of promoting the growth of plants in soil and increasing the resistance of the plants to fungal attack, which includes the addition of the end product of the method of Claim 6 to the soil.