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Treatment of Air-sac Mites

**STERNOSTOMA
TRACHEACOLUM**

vs.

**CARBORYL
in LADY GOULDIAHS AND
CANARIES**

by Gordon J. Outhier, Aviculturist

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DEDICATION

Throughout the world there are individuals actively practicing their private hobby of aviculture without adequate scientific data. This lack of information is nowhere more apparent than in the field of avian medicine.

The commercial development of avian medicine is seen by the industry to have a low profit potential and thus not deserving of their capital investment. It is, therefore, left to the private sector to fill this gap by developing their own data, while reserving its use for the private aviculturist. Thus, those who have the most to gain may do so, while the industry who saw fit not to make the investment, will not make the profit.

It is with this in mind that this paper is being written and dedicated only to those who are interested in and practicing their private hobby of aviculture.

INTRODUCTION

In 1964 I began to notice many of my Canaries and Lady Gouldians had

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asthma. The obvious remedy was to breed this out of them. But while gathering information on how to do so, air-sac mites came into the picture.

During 1965 and 1966 all my Lady Gouldians and my best canaries died of these mites. Handicapped without a medical background and realizing the odds against success, I swore a personal vendetta to rid myself of these "Bugs".

The following chapters describe, in brief, much of what was learned during the next ten years. It is the result of nine basic studies plus an additional 14 sub-studies and experiments. An attempt is made to put forth useful information taken from a file over two reams thick, gathered at an expense in excess of \$5,000, after thousands of man hours of work and thousands of miles traveled.

DESCRIPTION STERNOSTOMA TRACHEACOLUM

These mites appear almost clear to dark red, depending upon how recently they last fed. As true blood suckers their appearance darkens as they gorge with the

blood of their host. Their size is such as to be the smallest speck visible to the naked eye, and then only when gorged and on a light background.

More specifically males have been studied at a length of 400 microns and a width of 200 microns with all eight (8) legs directed anteriorly or anterolaterally. Females were studied at a length of 590 microns and a width of 265 microns with a larger full abdomen and a radial arrangement of the legs. Both had lateral leg extension of 59 microns to 61 microns.

Very little is known about their life cycle. However, many of this family (*rhinonyssid*) are viviparous and go through larva, nymph and adult stages all within the same host. Their spread is associated with direct bill contact during the mating season and while feeding the young. It is also possible, although very improbable, these mites could be passed in the drinking water and even more improbable on common feeding areas.

SYMPTOMS

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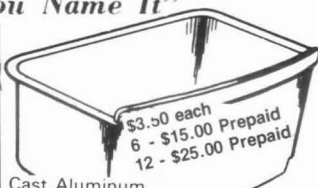
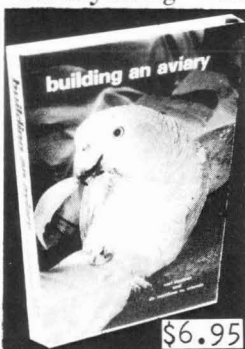
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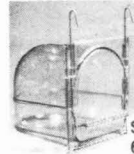
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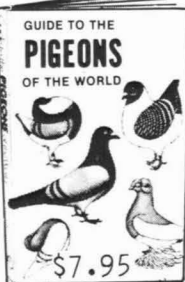
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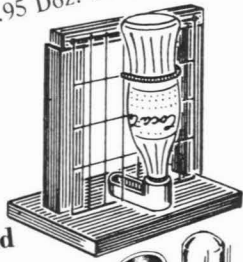
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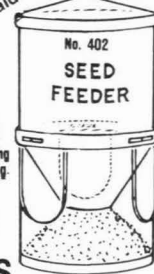
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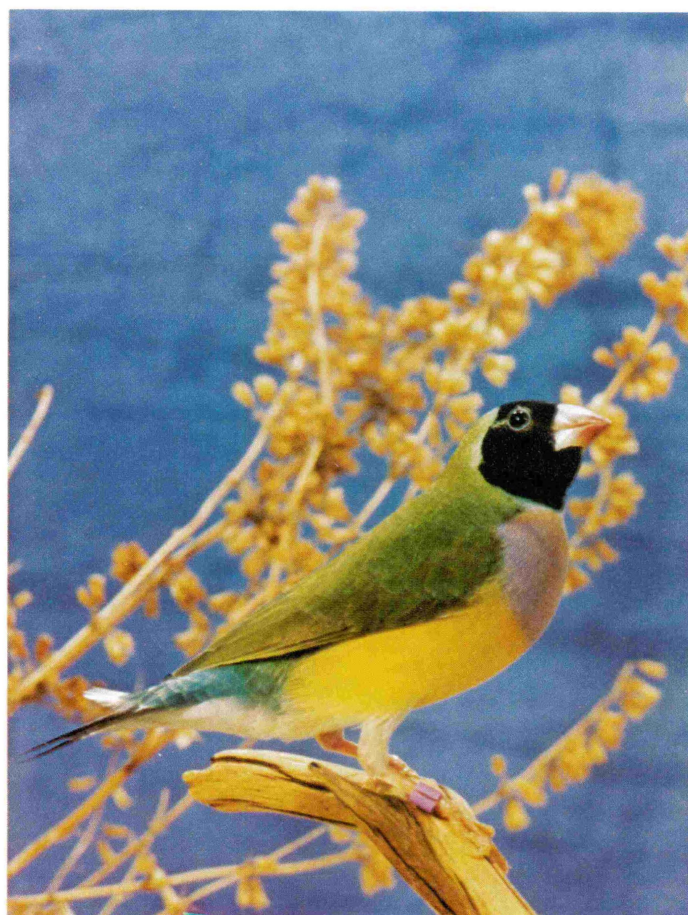
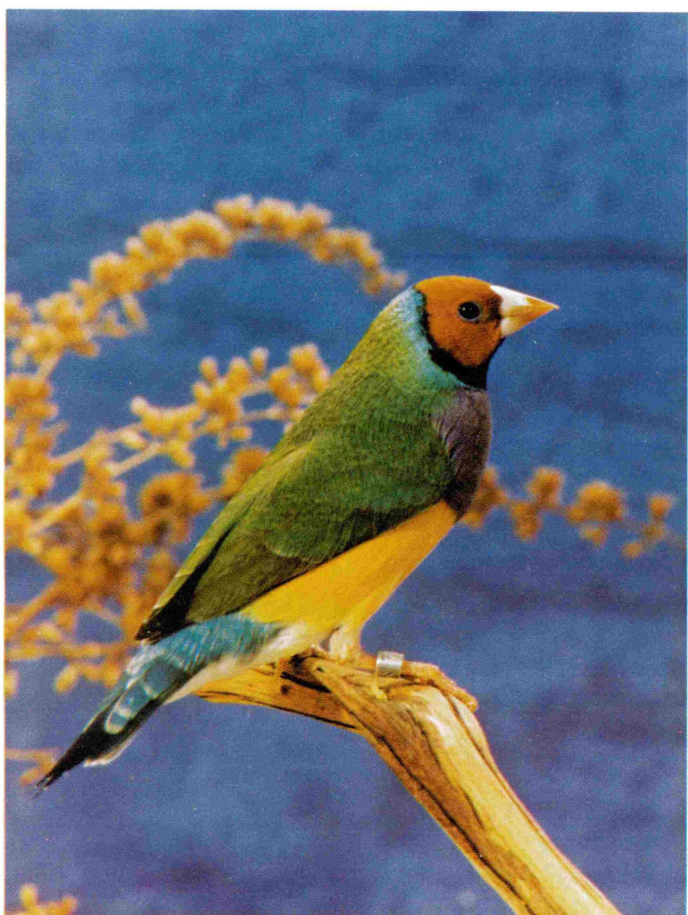
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The high mortality and low productivity traditionally associated with these extraordinarily beautiful Australian finches is often attributed to parasitic infestation. For detailed information on a new treatment for air sac mites in Lady Goulds and canaries, read the accompanying article. Photo A is a Red-headed Gouldian male, B is the Red-headed hen. Photo C is an Orange-headed Gould male and D is a Black-headed Gould hen.

will frequently wipe their bills and hold it open while breathing. The noise of air moving through the mite obstructed trachea can be heard as a wet asthmatic sound when the beak or chest is placed near the ear. This is due to the mucus formed around the mite. In more advanced cases, in cool, damp weather, or when the bird becomes more active, these symptoms can be heard several feet away.

Infested individuals often become very lethargic, puffed, and demonstrate obvious signs of labored breathing. On occasion a moderate or severe case will, when excited, bend its head back while doing back flips on the cage floor. This is due to a strong oxygen demand and an attempt to clear the airways for sufficient air passage. Panic then sets in, which further increases oxygen demand along with an increased, heart beat. Death will soon result unless the bird quickly becomes calm and relaxed.

Resistance varies widely among individuals. Some die in the nest while others live for years. Although the mites keep the birds in a weakened condition, the death rate is low. The open sores left by the feeding mites are the entry points of secondary infections. These infections of bronchopneumonia, bronchietasis, streptococcus and other pathogenic organisms along with pulmonary emphysema are the main cause of death.

SPECIES INFESTED

The most common and troublesome infestations are found in canaries and Lady Goldian finches. Many other birds throughout the world have been shown to have *St. tracheacolum*.

Domrow, of Australia, has found no less than four wild species of Australian birds, in the Queensland district alone, to carry *St. tracheacolum*. Other researchers have found them in sparrow, bunting, tanagers, warblers, wagtails, starlings, blackbirds, orioles, meadowlarks, budgerigars and some small finches. Generally, these latter findings are believed to be of little significance, except in isolated cases of crowded aviaries and then only in the very small finches, i.e. Cordon Bleu, Red ear, Orange check wax bills, and Parrot finches.

During autopsy and with the use of an ordinary dissecting microscope these mites can most easily be found in the trachea. Here some experimenters have found over 100 mites. Other findings can be made on the heart and liver due to the air-sacs adjacent to these organs. Upon close examination mites may be found in all air ways and air-sacs including the hollow bone structure. The common name "air-sac mite" is

truly accurate.

In canaries and Gouldians the problem is acute and very widespread. Several knowledgeable veterinarians have told me they almost never see a flock without an infestation of *St. tracheacolum*, and further, they doubt if many exist. The few exceptions could be credited to an improperly sampled flock and/or improperly examined individuals.

At this point it must be remembered that we are speaking of just one mite and its hosts. There are thousands of species of mites which live inside their host. Each requires a specific environment ranging from other insects to reptiles, mammals and birds.

CURES – SYMPTOMATIC OR REAL

In the past 10 years many "cures" have been advanced. After proper investigation most have fallen short of a true cure. Some of the more popular treatments are worth discussion.

Malathion has been used in two basic forms. The most common is to place the bird in an environment of 5% to 10% dust for a few minutes. Thus, the powder is inhaled.

Inhaling Malathion does alleviate the audible symptoms emanating from the trachea. However, recent research has shown that very little gets into the blood stream. Thus, the mites residing deeper in the air-sacs are little affected. The addition of carriers is too dangerous to the bird for practical use. Even if Malathion were to be administered orally, it is doubtful that effective blood levels could be reached.

In one case, fogged malathion seems to have removed the mites. However, this is true after repeated and continued use in very high concentrations. It is generally believed this treatment is too dangerous for general use by most aviculturists.

Pyrethrum powders and aerosol sprays have been widely used in the same manner as malathion, but in very low percentages. This chemical is designed to breakdown the insects protective wax covering. It seems to have a level of effectiveness on the symptoms as it works in the trachea. However, here again the blood level is very low. The mites in the deep air-sacs are not affected and the bird remains infested.

Various "Pest Strips" have been used both in open aviaries and in small enclosed cages. These are made of a solid material which slowly releases insecticides to be inhaled by the host. While the pest strips are effective on most insects, they are very ineffective on internal parasitic mites due to the low blood level.

Most recently Sulfaquinoxaline (S.Q.) showed strong possibilities of cure. It was

administered in the water at .005% for 90 days. Some experimenters used considerably stronger solution, up to .2%. The best we can say is that this metabolic inhibitor does get into the blood stream. However, aviculturists have reported no improvement in canaries and Gouldians.

In summary, it seems that these treatments are effective only on the general clinical symptoms. They do little toward long term control, much less cure, as their effects are local rather than through the blood stream. At this point there was still the need to find a substance with high lethal effects on insects and relatively low toxicity in birds and then to devise a method of administering this substance to effect the death of the *St. tracheocolum* but not of its host.

CARBORYL vs. STERNOSTOMA TRACHEACOLUM IN CANARIES

The last of a long 12 year battle with *Sternostoma tracheacolum* is in sight. Having tried all the above remedies, and many others, my latest experiments seem very promising. For the purposes of the paper it isn't necessary to detail the setbacks. However, the successes are worth discussion.

In June of 1975 I was able to obtain "Bug Master 80" from a pen pal in Australia. (See appendix III for description.) Using as a starting point a paper published in the Australian Veterinary Journal by M.D. Murray, and with the help of others, a formula for the treatment of canaries was worked out. On September 1975 my entire flock was treated. The clinical symptoms were gone and after posting 5% of the flock no mites were found.

The results were so promising the experiment was expanded to over 2,500 canaries among 35 owners. No canaries died during treatment except those already in extremely critical condition. All owners except 5 (4 of whose birds were infected with other than mites and one who treated in shifts due to breeding) believed their birds were cured.

Many owners had some of the birds posted and now 10% of my birds have been posted. All birds posted showed no mites. Although these findings are not pure, they are extremely promising. It is believed by many that a cure has been found.

Having treated my birds prior to the Spring '76 breeding season, I'm very pleased with the results. As testimony to their new found health, my hens raised an average of 9 babies each which is the best they have ever done.

I believe, as do many knowledgeable

vets, that almost every canary flock has air-sacs mites. This isn't much problem when cage breeding is done. So most breeders can get by without treating while many are unaware of the problem. However colony breeding of a dozen hens with two males in a 5 x 5 x 6 aviary requires the parents to really work and they must be in near perfect health. There is competition for space and food while still maintaining enough energy to feed their babies. A bird whose air-ways are obstructed, whose lung efficiency is low while supporting hundreds of mites and is in a weakened condition while fighting off secondary infections, can not survive for long, much less breed well.

All birds were treated in the following manner: 50 g. of niger seed was mixed very well with 6 drops of cooking oil. Then .24 grs. Carbaryl 80% W.W. was added and again mixed very well. This mixture was made fresh for each treatment and fed for 24 hours. All treatments began between 10 a.m. and 2 p.m. while terminating 24 hours later. For more details see appendix I.

As the experiments progressed, the importance of two procedures became very apparent. First their regular feed must be removed nearly simultaneously with the offering of the treated seed. This removes the possibility of the birds gorging and thus an overdose could result. Secondly, all sources of food and potential sources, must be removed so they are forced to eat the Carbaryl treated seed. In aviaries with dirt floors and plants, plastic had to be used to cover everything.

The procedure was repeated 10 days later. However, I would now recommend that the entire procedure be repeated once more, each 10 days apart. This triple treatment procedure further increases the potential for total cure and will not harm the birds.

As yet this procedure can not be guaranteed as a complete cure. It is, at the very least, a very simply administered and effective control.

My pen pals in Australia have also noted an occasional and unexplained reoccurrence in individual birds. This can possibly be explained. The mites in the hollow bone structure would be surviving in a much less hospitable environment as the blood supply is very low. Here their metabolic rate and reproduction would be very slow and their presence of little consequence. At the same time their exposure to the Carbaryl would be too low. If they were to migrate out into a more favorable environment, their population would explode and quickly reinfest the bird.

This explanation is further enhanced as 4 of the previously referred to uncured

cases were kept almost exclusively in small cages and were treated in those same cages. This gives rise to the relationship between exercise and over-all metabolic rate as it relates to circulation and the exposure of the mite to the Carbaryl.

In conclusion, it can be said this treatment is a cure in 95% of the cases. Through continued use as a control it might become a 100% cure. Since no mites have been found in any autopsy, the level of infestation would be too low to be passed from bird to bird while those in the hollow bone structure can not be spread. After several generations of use as a control and with selective breeding, it is strongly believed, that all newborn chicks could be free of mites.

CARBARYL vs. *STERNOSTOMA* *TRACHEACOLUM* in LADY GOULDIA

While treating 2,500 canaries, as previously discussed, the experiment was expanded to include Lady Gouldians. Fifteen flocks containing 420 birds were treated with Carbaryl. Here the setbacks were more numerous than with canaries, but the successes are very encouraging and worth discussion.

The first conclusion came in the form of a 10% death rate during treatment. Lady Gouldians are far more sensitive to Carbaryl than canaries, due to their lower percentage of fat. The Carbaryl is stored in the fatty tissue and released more slowly than assimilated. When the saturation point is reached the excess Carbaryl overdoses the individual with toxic symptoms resulting and death can follow. Due to the value of these birds, it was necessary to reduce the amount of Carbaryl, to .04 grs. per 50 g. of small white millet. M.D. Murray had previously considered this level to be safe.

As the experiments progressed, the importance of several procedures became very apparent. First of all the treated seed must be substituted for regular feed almost simultaneously. A prolonged period without feed could result in gorging and thus an overdose.

Secondly, all sources or potential sources of feed must be removed. In some aviaries this meant covering all plants and the floor with plastic. The birds must have no other choice but to eat the treated seed to assure adequate Carbaryl intake.

Lastly, some flocks seem to be more sensitive to stress than others. It is, therefore, best to treat in a familiar environment. Adding further stress to the stress of treatment could result in death.

Of the 15 flocks treated, 12 owners reported a cure. Previously described

symptoms were gone, the demure of the flock was much improved and the breeding activity was up as high as 3 fold in some cases. A few birds were posted within 4 months of treatment and not one *St. tracheacolum* was found. However, within these 12 flocks there seemed to be about a 10% recidivism 6 to 12 months later. It is believed that the reasons for this are much the same as previously discussed from the hollow bone structure resulting in their population explosion.

To the above explanation must be added the fact the Gouldians, particularly certain individuals, seem to be much more finicky about what and how they eat. Hence a higher percent may not receive adequate intake of Carbaryl.

Also, the dose rate is only 1/6th that of canaries, making all these above variables even more acute. The M.D. Murray experiments showed this dose to be safe while reducing the average mite count in the trachea from 116 to 2.8, with many individuals clean. However, the current study showed better results with improved techniques.

Two of the failure flocks and the Murray experiment have one thing in common. All the birds were kept in small cages. Successfully treated flocks were in large aviaries. Thus, as in canaries the metabolic rate and circulation as it relates to exposing the mite to Carbaryl may be a factor.

As to the third failure flock, several of the birds were posted and no *St. tracheacolum* were found. An infestation of a yet unidentified mite was found. Having been kept in close proximity to many species of hook bills, these mites could have been almost anything. It's unfortunate this entire flock was sold to several new owners and a follow-up study was impossible.

In order to affect a cure all birds should be treated with .04 g. Carbaryl to 50 g. of small white millet following the directions found in the appendix. Treating prior to breeding would be best while treating nesting pairs should be avoided. Continue to watch for recurring symptoms. Retreat these isolated individuals and their entire family group which have been together since the last treatment. If the recidivism seems to encompass more than a few individuals, retreat the whole flock.

In the most stubborn of infestations it would be possible to either increase the amount of Carbaryl to seed ration and/or lengthen the exposure time. However, this is not recommended and should only be attempted by the most experienced breeder with the time to constantly and closely observe the birds during treatment. The overdose which could result will show



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itself in the much reduced demure of the flock with individuals going to the floor. Basic signs of drunkenness will also become apparent.

During this study many birds were overdosed on purpose and recovered. They were offered regular seed with the more seriously affected being placed on heat and in just a few hours, or over night, all recovered and were put back into the aviary to finish the treatment. Those which did not show the adverse overdose symptoms continued on the Carbaryl.

In conclusion, it would seem that this treatment will cure 90% of the birds. Through continued use and culling of stubborn infestations, all mites should be removed after several generations.

APPENDIX I THE AUTHOR'S AIR-SAC TREATMENT FOR CANARIES

1. Use ½ cup niger seed.
2. Add 5 drops of any cooking oil.
3. Shake gently in about a 1 to 2 cup container for more than 2 minutes.
4. Fill the inside half of a #“0” capsule, by Lilly, with Carbaryl 80WW and add to the niger seed. This equals about .24 grs.
5. Shake again for at least 2 minutes.
6. Feed for 24 hours to 10 to 12 canaries. Start and stop treatment between 10 a.m. and 2 p.m.
7. No other feed or potential feed may be present during treatment. This is an absolute must.
8. Mix all ½ cups separately, then put together, to treat more than 10 to 12 birds.
9. Throw away all unused treated seed.
10. Treat 3 times, 10 days apart.
11. Remove and replace regular feed with treated feed simultaneously.
12. Do not add any stress to the birds from a week prior to a week after treatment, such as moving them, changing regular diet, giving other medication, etc.
13. The Lilly #“0” size capsule is approximately 7/8” x 5/16”.
14. All directions must be followed exactly.

APPENDIX II THE AUTHOR'S AIR-SAC TREATMENT FOR LADY GOULDIA

1. Use 1/3 cup plus (more than level) of small white millet.
2. Add 5 drops of any cooking oil.
3. Shake gently in about a 1 to 2 cup container for more than 2 minutes.

4. Fill the inside half of #“5” capsule, by Lilly, with Carbaryl 80WW and add to the millet. This equals about .04 grs.
5. Shake again for at least 2 minutes.
6. Feed for 24 hours to 10 to 12 Gouldians. Start and stop treatment between 10 a.m. and 2 p.m.
7. No other feed or potential feed may be present during treatment. This is an absolute must.
8. Mix all 1/3 cups separately, then put together, to treat more than 10 to 12 birds.
9. Throw away all unused treated seed.
10. Treat 4 times, a week apart.
11. Remove and replace regular feed with treated feed simultaneously.
12. Do not add any stress to the birds from a week prior to a week after treatment, such as moving them, changing regular diet, giving other medication, etc.
13. The Lilly #“5” size capsule is approximately 7/16” x 3/16”.
14. All directions must be followed exactly.

APPENDIX III CARBARYL

a.k.a. Seven, 1-Naphthyl-N-Menthyl carbamate.

A cholinesterase inhibitor which is devoid of phosphorus. It has great anticholinesterase activity in insects than in mammals and is marked as an insecticide.

Union Carbide Chemical Co., in 1957, said absorption through the skin and lungs was minimal. However, a later study for the Environmental Protection Agency proved the reverse; “Carbaryl is an almost complete penetrant” of the skin, and “suggests a definite possibility of systemic toxicity if this substance is employed as a scabicide”.

There is some evidence that this compound is more toxic in humans than other mammals. A single oral dose of 2.8 mg/kg resulted in moderately severe poisoning in an adult.

The effect of this carbamate insecticide on cholinesterase is reversible. Thus, the hazard is not increased by daily exposure to amounts less than that required to produce immediate symptoms •

ACKNOWLEDGEMENTS

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Eddie Davis, Merchant, Australia.

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The impressive nutritive breakdown per cup of this seed "compound" is as follows:

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Fiber — Max. 10%
Ash — Max. 4%

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B1	0.50 Mgm	Lucine	38 Mgm	Copper	58 Mcgm
B2	0.75 Mgm	Lysine	50 Mgm	Iodine	8.8 Mcgm
B6	0.50 Mgm	Methionine	35 Mgm	Iron	2.9 Mgm
B12	0.003 Mgm	Phenylalanine	30 Mgm	Magnesium	9.5 Mgm
C	6.222 Mgm	Threonine	39 Mgm	Manganese	95 Mcgm
D3	85 I.U.	Tyrosine	44 Mgm	Phosphorus	180 Mgm
E	11.70 I.U.	Tryptophan	11 Mgm	Potassium Cl	56 Mgm
K	2.0 Mcgm	Arginine	40 Mgm	Sodium Cl	50 Mgm
Bioflavonoids	850 Mcgm	Alanine	36 Mgm	Zinc	345 Mcgm
Niacinamide	3.7 Mcgm	Cysteine HCl	8 Mgm	Cobalt	Trace
Biotin	3.1 Mcgm	Glycine	36 Mgm		
Asperidine Cmplx	7.5 Mcgm	Histidine	22 Mgm		
Rutin	4.2 Mcgm	Proline	46 Mgm		
Carotene	365 Mcgm	Serine	50 Mgm		
Choline	11.1 Mgm	Glutamic Acid	140 Mgm		
D. Pantothenic Acid	2.7 Mgm	Aspartic Acid	50 Mgm		
Folic Acid	139 Mcgm				
Inositol	11.4 Mgm				
Lecithin	1.67 Mgm				

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