

# Astronauts Experience the Dangers of De-ionized Air

By Guy Cramer

Just about all the air you breathe has some quantity of Aero-Ions. Ions are charged particles in the air (**between a few hundred to a few thousand per cubic centimeter**); some negatively charged (**Negative Ions**) and some positively charged (**Positive Ions**). With years of research around the world, Ion Scientists have determined over and over that an imbalance between the ratio between Positive and Negative Ions has a profound effect on both your mental and physical well being.

If you breathe large amounts of positive ions **without** an equal amount of negative ions, you will actually become lethargic and in some cases sick (**high positive ion concentrations in the air are associated with the full moon**). Air containing more **negative ions** and less positive ions has shown to be beneficial and without side effects. That is why **negative ion generators** are sold around the world. Russian studies show that almost all animals raised in deionized air died within a few weeks.

## Spacecraft, Submarines, and Hyperbaric Chambers: Lacking Ions

You breathe just over 1000 gallons of air in one hour. James B. Beal when working with **NASA** on required environments in space capsules discovered that "**The Human race was developed in ionized air. Nature used the ions in developing our biological processes.**" <sup>1</sup>

However, **NASA** has not used negative ion generators on board their spacecraft. This might be imposed on them due to the dangers of exposing high oxygen levels to a spark, negative ion generators produce high voltage electricity. A closed space capsule has a controlled environment in which the level of oxygen (found at 21% in normal air) can fluctuate to highly flammable levels if left unchecked. 100% oxygen is safe unless it is exposed to a spark or flame with any combustibles present and normal noncombustible materials at 21% oxygen become combustible in high oxygen and have been known to spontaneously combust under these conditions. Many of you might remember the 1967 Apollo 1 training accident in which all three astronauts perished in an oxygen fire on the training capsule.

*"Rapid bone loss suffered by all astronauts during extended space flight is a serious unresolved problem."*  
-- Corp. working with Canadian Space Agency

There are a number of man made environments that exclude all natural ionization: Submarines, spacecraft, and hyperbaric chambers.

Hyperbaric chambers were developed to treat scuba divers with the bends (surfacing too quickly will cause **nitrogen** bubbles to form in the blood). The hyperbaric chamber simulates the pressure experienced in deep water, by pressurizing the air inside the chamber to the same levels. The bends victim now back in a pressurized atmosphere, is supplied 100% pure oxygen to breathe in, which rids the blood of the excess nitrogen.

Over the past 30 years hyperbaric chambers have been used by hospitals to treat infection, carbon monoxide poisoning, and burns. Sports teams have begun to use them to speed up recovery time from injuries. Recently it has been discovered that many neurological disorders, from children with cerebral palsy to stroke victims, can be effectively treated with hyperbaric chamber treatments.

One easily recognized side effect of hyperbaric treatment was the increase of epileptic seizures. An epileptic seizure is caused by a polarity shift in the DC potential of the brain. An ion scientist can quickly point out that a polarity shift in the brain would be expected given the lack of ions, since ions are a form of electrical charge that the body and brain utilize.

The environmental ion findings by a few **NASA** scientists decades ago has somehow fallen through the cracks, which can be expected given the thousands of scientists and in the organization. However, the U.S. navy now uses negative ion generators on board the Nuclear Submarine fleet.

### **Has the lack of ions in spacecraft led to any problems with the overall health of the astronauts?**

The following quote from a company that works with the **Canadian Space Agency** hints at such a problem:

"Rapid bone loss suffered by all astronauts during extended space flight is a serious **unresolved** problem." [2](#)

Other **NASA** studies:

Studies on extended space flight from the Russian space stations and the American Skylab program, indicate not only a considerable loss in calcium from bone, (**up to 20% bone loss has been observed in post flight studies**) but also a **decrease in bone marrow of up to 1% per month**. These levels do not plateau as was expected over time, but continue at the same rate even after one year. [3](#)

A similar problem is beginning to occur with sports players who use the hyperbaric chamber for long periods of time, 30-60 minutes a day for months at a time. Broken and fractured bones and weak cartilage plague these players. Of course, because the teams use these chambers to reduce injury time, a player with one of these injuries is placed back in the chamber to improve recovery time!

Further research on astronauts provides the following:

Risk of **kidney stones** due to hypercalciuria, **lengthy recovery of lost bone mass** postflight and possible **increase in fracture potential**. 4

Only 11% of the astronauts tested regained the lost bone mass within 3 months of returning to Earth. 3

Many involved in aerospace medicine and biology expected that the lack of gravity could explain the bone loss. In space, both astronauts and cosmonauts have trained under loads to simulate gravity. **Despite the various attempts to load the skeleton, crewmembers continue to demonstrate bone loss**. 5

### O G Crystal Formation

Crystals formed in solution at 0 G tend to be **larger** and **more perfect** than those formed on Earth, yet the **bone mineral crystals** analyzed to date appear to be **smaller**. It is important to quantify the nature of the crystal structure of bone produced in microgravity. 5

Microgravity is a term that could be understood as weightlessness or 0 G.

### Bone Mineral Crystal Formation in 0 G

During crystal formation, the component **mineral ions** come together with the right orientation and form a stable nucleus on which other **ions** can be added. The mineralization process is complex and dynamic with many local and systemic regulators. Spaceflight experiments have suggested that mineral formed in low gravity has a **decreased crystal size** and is **configured imperfectly**. There is a general suggestion of an impaired mineralization process in microgravity. 5

Does the lack of air ions in these environments cause ion leeching or a depletion of ions throughout the body, blood, and bone?

A microgravity environment results in a decrease in bone formation rate and a net increase in the mobilization of calcium from bone. The increase in **calcium ions** in the blood triggers a reduction in parathyroid hormone secretion and a subsequent calcium excretion in the urine. 5

*' An organism receiving the cleanest type of air for breathing is condemned to serious illness if the air does not*

*contain at least a small quantity of air ions.'*

-- Ion Scientist Tchijewsky, after animals died in deionized air experiment

### Blood Cell Loss

From **NASA**:

Red blood cells are the most abundant of all the body cells. They are formed at a rate of 480,000,000 cells each minute in the bone marrow. Their major function is to carry oxygen from the lungs to the tissues of the body. So if the bone marrow decreases, red blood cells production can't take place. **Diets rich in calcium do not appear to solve the problem.** 3

The immune system is in charge of defending the body against diseases. Lymphocytes are one type of white blood cells that helps the body resist infections by recognizing harmful foreign substances, such as bacteria, and eliminating them.

Analysis of blood from crew members from Shuttle missions revealed decreases in the number of circulating lymphocytes, and post-flight studies showed that the lymphocytes were not as effective in responding to challenges. 3

Though it has been studied, **NASA** scientists have not discovered the reason for the increase of the destruction, or the decrease in the production of white blood cells. 3

Sports teams extensively using hyperbaric chamber treatment are discovering players suffering from abnormally high rates of health problems, at times more than 50% of the players.

### Genetic Code Breaker

From **NASA** on the astronauts:

Decline in protein synthesis appears to result from decreased translation of messenger RNA (mRNA). 5

Without proper mRNA translation, the proteins cannot create building blocks for more cells.

The above statement by **NASA** might not seem important on the surface, but all life as we know it needs RNA/DNA. If RNA and DNA need some form of ionization to exist, then the ability for life to develop elsewhere in our solar system, galaxy, and universe is limited to environments with some form of ionization.

### Russian Deionized Air Research

The Russian ion scientist Tchijewsky tried raising mice, rats, guinea pigs, and rabbits in totally deionized air. Within two weeks almost all of them had died. Despite the fact the autopsies proved they had died for a variety of reasons - fatty liver, kidney failure, heart degeneration, and, among other ills anemia - Tchijewsky concluded that the real cause of

death was the animals 'inability to utilize oxygen properly.' An organism receiving the cleanest type of air for breathing is condemned to serious illness if the air does not contain at least a small quantity of air ions." 6

Tchijewsky's colleague, D.A. Lapitsky, tried raising small animals in air depleted of oxygen. As they were about to die of suffocation he added negative ions and found that "animals already near death from asphyxiation began to feel better, sat up sniffed the air, and began to run around the chamber. Their respiration frequency increased. Switching off the ionizer again brought them to the verge of asphyxiation." Lapitsky decided the traditional belief that oxygen alone was the sole prerequisite for the creation and sustenance of life had "demonstrated to be false." Or as Tchijewsky had said, "Death of animals in [deionized] air must be attributed to the absence of aero ions of oxygen essential to the life activity of an organism." More simply put, without ions we couldn't absorb oxygen in the quantities needed to live. And the fewer ions there are, the lower the efficiency of our minds and bodies. 6

It is well recognized in ion science that our body under environmental stress, such as a high ratio of positive ions or low ion counts, triggers a brain hormone called serotonin. The serotonin in turn causes the adrenaline gland to become hyperactive. If the adrenaline gland remains hyperactive for long periods, it will eventually become exhausted.

**NASA** has discovered that in astronaut's urinary, cortisol levels are elevated, suggesting that the blood levels may also be elevated. 1

Cortisol is released by the adrenaline gland. These elevated levels would be attributed to the hyperactive adrenaline gland.

Greater than normal levels of cortisone may indicate:

- adrenal tumor
- Cushing's syndrome
- ectopic ACTH-producing tumors 7

Cushing's syndrome Symptoms:

moon face (round, red and full), buffalo hump (a collection of fat between the shoulders), central obesity with protruding abdomen and thin extremities, weight gain, weakness, backache, headache, acne or superficial skin infections, thirst, increased urination, purple striations on the skin of the abdomen, thighs and breasts, mental changes, impotence or cessation of menses.

Additional symptoms that may be associated with this disease: weight gain (unintentional), red skin spots, skin blushing/flushing, muscle atrophy, fatigue, bone pain or tenderness, high blood pressure. 8

*In natural air the decay rate of bacteria is 23%, in air treated with negative ions this rate goes up to 78%.*

The incidence of all types of Cushing's syndrome is 2 out of 10,000 people. 8

It has been determined that when the adrenaline gland becomes exhausted it often leads to tumor development with the adrenaline gland. 9

Another quote from **NASA**:

One intriguing line of evidence suggests that the highly athletic individual may present no advantage in withstanding the effects of weightlessness, and may even be at a disadvantage compared with an average, healthy individual. 3

The athletic individual is constantly using adrenaline, an average healthy non-athletic individual would have much more of an adrenaline reserve to cope with the lack of ions in the air of the spacecraft leading to the above findings.

Again we find a similarity with the athletes using the hyperbaric chamber. A short term increase in productivity when hyperbaric treatments start (attributed to hyperactive adrenaline production), which quickly turns into poor performance (attributed to a weakened or exhausted adrenaline gland). This poor performance is turned around in months when a player is traded from a team using a hyperbaric chamber. However, some players continue with weak showings years after being traded, never to return to pre-hyperbaric levels of play.

*For every one day lost among the group of people working in negative ion enriched air, there were sixteen lost among the people working in normal air.*

Swiss bank study of over 600 employees

### Serotonin side effects

Once the adrenaline gland has become exhausted, the body then must deal with the excess serotonin, without adrenaline to balance the serotonin side effects, the serotonin becomes a major antagonist to both man and animal.

Recent popular antidepressants work by triggering more serotonin in the brain and body.

On the other hand, ion science has discovered that this same neuro-hormone: serotonin, is the cause of many of the problems?

As stated prior in this article, serotonin triggers adrenaline which probably accounts for the initial antidepressant effect. Once the adrenaline gland is exhausted, usually in just a few short months, the serotonin side effects begin to show up.

*Bank employees went from an error rate of 2.5% before negative ion generators were installed, to an error rate of 0.5% while working in negative*

Lists of side effects from recent serotonin triggering antidepressants are as follows:

*ion enriched air.*  
South Africa bank with  
90 employees

Anxiety, nervousness, tremors, sweating, dizziness, lightheadedness, dry mouth, upset or irritated stomach, appetite loss, nausea, vomiting, diarrhea, stomach gas, rash and itching.

Less common side effects include changes in sex drive, impotence, abnormal dreams, difficulty concentrating, acne, hair loss, dry skin, chest pains, allergy, runny nose, bronchitis, abnormal heart rhythms, bleeding, blood pressure changes, headaches, fainting when rising suddenly from a sitting position, bone pain, bursitis, twitching, breast pain, fibrocystic disease of the breast, cystitis, urinary pain, double vision, eye or ear pain, conjunctivitis, anemia, swelling, low blood sugar, and low thyroid activity.

In addition, many other side effects affecting virtually every body system have been reported. They are too numerous to mention. 10

### **Positive ions also have a serotonin triggering effect**

Side effects from positive ion winds (such as the Chinook wind in Calgary and the Santa Ana winds in southern California) compiled by a Swiss meteorological report in 1974 are as follows:

*Studies in Geneva showed an increase in traffic accidents, over 50% higher during times of high positive ion ratios.*

Physical side effects: Body pains, sick headaches, dizziness, twitching of the eyes, nausea, fatigue, faintness, disorders in saline (salt) budget with fluctuations in electrolytical metabolism (calcium and magnesium; critical for alcoholics), water accumulation, respiratory difficulties, allergies, asthma, heart and circulatory disorders (heart attacks approx. 50% higher) low blood pressure, slowing down in reaction time, more sensitivity to pain, inflammations, bleeding embolisms of the lungs, and thrombosis.

Psychological side effects: Emotional unbalance, irritation, vital disinclination, compulsion to meditate, exhaustion, apathy, disinclination or listlessness toward work (poor school achievement), insecurity, anxiety, depression (especially after age forty to fifty); rate of attempted suicide about 20% higher, larger number of admittance's to clinics in drug cases. 11

### **True Antidepressants**

Negative ion generators have proven to be a much better antidepressant, since the negative ions allow the body and brain to convert excess serotonin into a harmless chemical (known as 5-HIAA) 416. Negative ions also allow the body to build up adrenaline reserves and have no adverse side effects. Depressed people tend to notice an immediate effect with antidepressants because of the hyperactivity of the adrenaline

gland. With negative ions, because there is no obvious immediate effect, many people think that they aren't doing anything. Negative ions should be considered an effective long-term antidepressant. They are not an absolute cure to depression. They do counteract many of the problems associated with depression. On the other hand if we use the short term serotonin triggering antidepressant medication, relief will come, but only for a short while, in the long term this medication contributes to the reason behind much of the depression in the first place.

### **High REM mode in sleep indicates lack of ions in spacecraft**

From the **Journal of the British Interplanetary Society:**

Since Gemini-8 it has been known that REM sleep rather than the more normal slow sleep prevails in space. 12

REM sleep stands for Rapid Eye Movement. If you wake someone up when they are in this sleep state they can often recall what they were just dreaming about.

Under normal conditions on earth, when we fall asleep we enter into the first of four phases of non-REM sleep. This first phase usually takes up only 5% of sleep and represents the brain going from 10 Hz (pulses per second) down to 7hz. The second phase represents 40%-50% of sleep and indicates 4-5 Hz. The third and fourth phase are associated with slow 1-3 Hz and make-up about 20% of sleep. This leaves the brain about 20-25% of sleep in the REM mode which is displayed by higher speed brain waves. 13

The brain usually follows a cycle from stage 1-4 and then into REM for a few minutes. Your brain will then bounce back to stage 2 and every 45 minutes go back into REM with longer duration's in this stage each time. The first 1/3 of the night is spent in stage 2,3, and 4 with some REM. The second 1/3 of the night is spent between the slow stages of 3,4 and REM. The majority of the last 1/3 is spent in REM with some stage 2. 13

In 1969 a French researcher, Dr. Jouvet, injected people with a synthetic form of serotonin to examine the effect on sleep. This serotonin overdose often caused horrifying nightmares. 14 REM is associated with both dreams and nightmares. 15

As we know serotonin is triggered due to positive ions or lack of ions. Negative ions neutralize the serotonin and has been shown to stop these nightmares, 14 but they also keep the brain at higher frequency (8-12 Hz). 16 The Russians had to issue an official warning about leaving negative ion generators on at night, due to the problem of keeping the people too alert and awake to sleep. 17

In space, astronauts and cosmonauts spend most of the time sleeping in REM mode. This same effect is seen in infants and young children. 18 The reason most children up to age four experience more REM is that their brains, even when alert, are in what we would consider for an adult, sleep or brain damage. Their young brains can only achieve 5-7 Hz maximum when awake. 19

Once we understand that even though REM displays higher Hz (frequency), it generally indicates slower brain wave patterns (1-3 Hz) have been achieved prior to REM. To achieve REM the brain must slow right down first. Slower brain wave patterns indicate lack of negative ions in the air.

This high ratio of REM sleep in spacecraft displays evidence for a deionized environment.

### **Air Quality**

Very poor athletic performance has plagued those sports teams that use hyperbaric chamber treatment for long-term injuries or just to boost general health of the players. Many unresolved health problems have been experienced by in the space programs, until now **NASA** suspected the lack of gravity in Spacecraft was the culprit.

Until the aerospace and medical fields recognize the importance of air ions and the benefits of negative ions in the air we breathe, long duration space flights and hyperbaric medicine may never reach their full potential.

Without ions in the air both the **healthy** and **sick** are affected in the same way. In certain cases such as hyperbaric medicine, one must weigh the long-term side effects of zero ions with the ability to treat burns, the bends, massive infections...

**Important Note:** This information does not conclusively prove that lack of ions is the only problem in space capsules. There appears to be a correlation of similar unresolved problems in both the hyperbaric chamber and manned spacecraft. Considering the large numbers of people associated with each, and the lack of atmospheric ions in both applications, along with what is presently known about the biological effects of air ions, we can now work to resolve these problems.

Recognizing the problems of **deionized air** is one thing; solving such a problem is quite another. The U.S. Navy uses electronic negative ion generators on their nuclear submarines. A number of failsafe mechanisms might be in place to insure that oxygen levels do not go higher than 29% (dangerous levels around a flame or spark) without shutting down the negative ion generators. However, in hyperbaric chambers where 100% oxygen is used most of the time and on space capsules, where 100% oxygen is used by astronauts prior to any space walk **20** such a system would not be feasible.

*Negative ions  
decrease pilot  
fatigue and  
increase reaction  
times of pilots  
U.S. Air force study*

### **Passive Negative Ion Generator™:**

The worlds first passive negative ion generator was created specifically to counter-measure these environments, which lack any ions and where a normal negative ion

generator would not be safe to use. Safety features included in the research and development of the generator:

- The generator must not produce a spark or corona discharge found in most negative ion generators on the market. (This would ignite the oxygen)
- The generator must not produce any abnormal levels of ozone, due to the proximity of the generator to the head in some applications. Ozone is a byproduct of spark or corona discharge (Ozone can be lethal in even small quantities)
- The generator must not produce any electromagnetic energy, due to the side effects associated with close proximity to the head. (All generators on the market produce large electromagnetic, high-energy frequencies.)

Taking this into account, I discovered a way to produce enough continuous negative ions from the passive negative ion generator without a power source, without ozone production and with no spark or corona discharge. The patent process is now moving forward on the passive negative ion generator.

Research on this Passive Negative Ion Generator began in 1993 when the problem of deionized air within hyperbaric chambers first came to my attention. Development began in 1996 with prototype development. Since that time more research and applications have come to light.

The Passive Negative Ion Generator is not intended to replace current negative ion generators. It will however, fill a giant gap in which current generators cannot be used, such as:

- 100% pure oxygen and other hazardous environments, in which a spark or corona discharge could cause ignition.
- Very close proximity to the body and head.
- Large applications where initial cost and a constant power supply becomes cost prohibitive.

**Potential Applications for the Passive Negative Ion Generator:**

Hyperbaric Chambers

Spacecraft

Submarines

Military pilot oxygen masks

Medical oxygen masks

Military soldiers helmets

Airliner passenger air vents (300+ for a 747)

All Phone mouth pieces; (home, business, portable, cellular, headsets)

Computer monitors

Air vents in cockpits of all aircraft

Air vents in all types of automobiles and trucks

Sports helmets

Face guards

Baseball hats  
Bike helmets  
Motorcycle helmet air vents  
Auto racing helmet air vents  
Building air-conditioning out vents (sick building syndrome)  
Heater vents  
Furnace vents  
Surgical masks  
Dust masks  
Gas masks  
Respirators  
Scuba respirators  
Research submarines,  
Space suit respirator vents  
Fire fighter helmets  
Fire fighter respirators...

## **Conclusion**

The Passive Negative Ion Generator **may**:

Enhance **hyperbaric chambers** with the ability to effectively treat Sport Injuries, infection, carbon monoxide poisoning, burns and crush syndrome, but also neurological disorders thought to be irreversible until recent studies show neurological regeneration is possible in human brains.<sup>21</sup> Hyperbaric chamber treatments appear to stimulate this regeneration from SPECT scans done before and after treatment, <sup>22</sup> alleviating problems to those that suffer from: Cerebral Palsy, Strokes, Parkinson's disease, Alzheimer's disease, Multiple Sclerosis, Coma's...

**Allow long duration manned space flights with fewer health problems.**

**Further osteoporosis research and treatment.**

**Possibly keep cancer growth in check**, (serotonin is known to promote cancer growth, many times faster than normal levels, negative ions have a neutralizing effect on serotonin)

**Heighten endurance, balance and reaction time with athletes** (Russian studies suggest an endurance level 10 times higher, 3 times the balance and twice the reaction time can be achieved when training with negative ions),

**Reduced stress, depression, and anxiety** (Responsible for up to 90% of Doctors visits)

**Reduce harmful bacteria levels in the air.** (In natural air the decay rate of bacteria is 23%, in air treated with negative ions this rate goes up to 78%. Russian studies show 10,000 ions per cubic centimeter **completely exterminate** the most common disease-

carrying bacteria.<sup>23</sup> This might explain why hospitals in Russia require negative ion generators.)

**Decrease pilot fatigue and increase reaction times of pilots,** (discovered in a U.S. Air force study). <sup>24</sup>

**Treat hyperthyroid** (A leading Israel ion scientist found that over a 5 year period treating more than 500 people, negative ionization cured over 45% of the cases)

**Reduce Asthma, bronchitis, and hay fever** (two Oxford University statisticians conducted a study among 100 victims of asthma, bronchitis, and hay fever chosen at random, from a list of people who had purchased negative ion generators in the hope that it would help their problems. In the end their report was based on interviews with only 74 of the 100. They found that 18 of 24 asthmatics; 13 of 17 bronchitis sufferers; 11 of 12 hay fever victims; and 6 of 10 people afflicted with nasal catarrh reported that negative ion generators had noticeably improved their condition. A few claimed the generator had cured them.) <sup>25</sup>

**Reduce strokes, aneurysms, and heart attacks** (Our red blood cells take the chemical makeup of the air we breath such as oxygen, the white blood cells take the ion charge from the air we breath. White blood cells are normally negatively charged and repel each other. When the white blood cells take on some positive charge, the white blood cells cease to repel each other and coagulate, leading to clots.) <sup>26</sup>

**Reduce sick days, provide healthier work places and homes.** (Much of the Sick Building Syndrome can be attributed to positive ion overdose from air conditioners, heaters, computer monitors, synthetic carpets, furniture...). <sup>27</sup> In a Swiss Bank two groups of more than 300 people in each group, was tested with and without Negative Ion Generators. After several months the ratio of days lost due to respiratory illness-colds, flu, laryngitis... by both groups was measured. **For every one day lost** among the group of people working **in negative ion enriched air, there were sixteen lost** among the people working **in normal air.** <sup>28</sup>

**Fewer mistakes** (A South Africa bank with 91 operators processing over \$200,000,000 per day in checks and vouchers **went from an error rate of 2.5% before negative ion generators were installed, to an error rate of 0.5% while working in negative ion enriched air.**) <sup>29</sup>

**Reduce Auto accidents** (Studies in Geneva in 1972 showed an increase in traffic accidents by over 50% higher during times of high positive ion ratios. Hungarian scientists also noted accidents went from a peak of 1.6 per hour to 2.6 during times high positive ion concentrations.) <sup>30</sup>

Russian scientists told to devise the best possible artificial environment for space capsules, found that any enclosed compartment with "conditioned" air, is likely to **be low**

**in total ion count**, that such ions as did exist were most likely to be **positive ions** and that prolonged stay in such environments is "**likely to be detrimental.**" 31

---

**This material is ©1999, by Guy Cramer, All Rights Reserved.  
This material cannot be reproduced in any form without the expressed written permission of the Author. Whole Copies may be printed for personal use; no changes are to be made to the content, names or references.**

---

**References:**

- 1) Soyka, Fred "The Ion Effect"( Lester and Orpen Limited, 1977),p.23
- 2) OSTEO Flight System (OSTEO)  
<http://www.millennium-biologix.com/microst.htm>
- 3) Tango III : A Space Settlement Design  
<http://science.nas.nasa.gov/Services/Education/SpaceSettlement/Contest/Results/96/winner/cuatro.html>
- 4) Background of Bone Loss in Spaceflight  
<http://www.sf.med.va.gov/milliesite/background.html>  
(From: Chapter by V. Schneider et al. Space Physiology and Medicine, Lea and Febiger, Philadelphia, 1989 )
- 5) THE EFFECTS OF SPACE TRAVEL ON THE MUSCULOSKELETAL SYSTEM  
<http://www.nih.gov/niams/reports/sr.html>
- 6) Soyka, Fred "The Ion Effect"( Lester and Orpen Limited, 1977),p.57-58
- 7) Cortisol Level  
<http://www.healthanswers.com/database/ami/converted/003693.html>
- 8) Cushing's syndrome  
<http://www.healthanswers.com/database/ami/converted/000410.html>
- 9) Becker, Robert O., M.D., "Cross Currents" G.P. Putman's Sons, 1990, p. 196
- 10) The Pill Book (New and Revised 5<sup>th</sup> Edition), Text by Silverman, Harold M., Pharm. D. & Simon Gilbert I., Sc.D., Bantum Books, 1992, p. 358
- 11) Soyka, Fred "The Ion Effect"( Lester and Orpen Limited, 1977),p.145-146

- 12) Science on-board the Mir space station 1986-94  
[http://www.mcs.net/~rusaerog/mir/Mir\\_exp.html](http://www.mcs.net/~rusaerog/mir/Mir_exp.html)
- 13) Stages of sleep  
<http://bisleep.medsch.ucla.edu/discussions/clinicalP/messages/msgs00163.html>
- 14) Soyka, Fred "The Ion Effect"( Lester and Orpen Limited, 1977),p.62
- 15) NIGHTMARES  
[http://www.sju.edu/SLEEPING\\_THROUGH\\_THE\\_NIGHT/nightmares.htm](http://www.sju.edu/SLEEPING_THROUGH_THE_NIGHT/nightmares.htm)
- 16) Soyka, Fred "The Ion Effect"( Lester and Orpen Limited, 1977),p.50
- 17) Soyka, Fred "The Ion Effect"( Lester and Orpen Limited, 1977),p.158
- 18) The Neurobiology of Sleep  
<http://www.csa.com/sleepintro.html>
- 19) Solar Shock Wave  
<http://mypage.direct.ca/g/gcramer/solar.html>
- 20) Extravehicular Activity Mobility Units  
<http://www.spaceflight.nasa.gov/shuttle/reference/shutref/orbiter/eclss/emu.html>
- 21) Gerd Kempermann and Fred H. Gage "New Nerve Cells for the Adult Brain"  
(Scientific American, May 1999, Volume 280, Number 5) p.48-53
- 22) HyperStealth® Biotechnology Corp.  
<http://www.hyperstealth.com/>
- 23) Soyka, Fred "The Ion Effect"( Lester and Orpen Limited, 1977),p.87-88
- 24) Soyka, Fred "The Ion Effect"( Lester and Orpen Limited, 1977),p.150
- 25) Soyka, Fred "The Ion Effect"( Lester and Orpen Limited, 1977),p.41,47
- 26) Soyka, Fred "The Ion Effect"( Lester and Orpen Limited, 1977),p.69
- 27) Asthma and Ions  
<http://mypage.direct.ca/g/gcramer/asthma.html>
- 28) Soyka, Fred "The Ion Effect"( Lester and Orpen Limited, 1977),p.107
- 29) Soyka, Fred "The Ion Effect"( Lester and Orpen Limited, 1977),p.108
- 30) Soyka, Fred "The Ion Effect"( Lester and Orpen Limited, 1977),p.118-119

31) Soyka, Fred "The Ion Effect"( Lester and Orpen Limited, 1977),p.109

**This material is ©1999, by Guy Cramer, All Rights Reserved.**

**This material cannot be reproduced in any form without the expressed written permission of the Author. Whole Copies may be printed for personal use; no changes are to be made to the content, names or references.**