

# Current Comments®

EUGENE GARFIELD

INSTITUTE FOR SCIENTIFIC INFORMATION®  
3501 MARKET ST., PHILADELPHIA, PA 19104

## Tinnitus: Some Sound Advice

Number 33

August 19, 1991

There is an old music-hall joke that applies to tinnitus, an affliction suffered by many millions of people the world over. The joke: "I've got bells in my ears, so I went to the doctor."

"Did he do you any good?"

"Yes, I can hear them much better now."<sup>1</sup>

The joke is not likely to bring belly laughs to tinnitus sufferers, but perhaps wry smiles. For no two people seem to be afflicted in the same way from this "noises" disorder, and doctors are limited in their ability to treat the symptoms. As reported more than 12 years ago, I myself suffer from this disorder.<sup>2</sup> The ringing comes and goes. It is like a leaking steam valve—a constantly hissing whistle. Others have described noises such as running water; the sea, as through a shell; a high-pitched scream; a swarm of bees; the sound of Ping-Pong balls; birds; heartbeats; an air-raid warning; and a large truck, among others.

I first met Morris Rubinoff, the author of the following essay, about 25 years ago. He asked me to organize and teach a course on information retrieval at the Moore School of Electrical Engineering. Since then, we've kept in touch periodically. He is now professor emeritus of computer sciences at the University of Pennsylvania, Philadelphia. I was surprised to learn recently that he also suffers from tinnitus. As he vividly points out, the disorder can be serious enough to cause some victims to contemplate or commit suicide.

### Fifty Million Americans May Suffer

It is estimated that somewhere between 35 and 50 million Americans experience vary-



*Morris Rubinoff*

ing degrees of tinnitus sometime during their lives. Six percent of them suffer to such a degree that the condition is best described as debilitating. It is difficult to pinpoint the exact number of tinnitus sufferers because most do not seek formal treatment. The American Tinnitus Association (ATA) reports that 77 percent of tinnitus patients have constant noise in their ears.

The term tinnitus is derived from the Latin *tinnire*, meaning to ring or tinkle like a bell.<sup>3</sup> It probably is most often thought of as a modern malady brought on by the noise and pace of modern living. However, there is ample evidence that the disorder was known in ancient Egypt, Mesopotamia, and Greece. Whether tinnitus is a distinct disease or a symptom of some other condition has been debated for centuries. We recognize today that it is primarily a symptom of a wide

variety of usually microscopic abnormalities affecting the mechanism of hearing.

Historically, treatment for tinnitus has been based on the assumption that the disorder is primarily psychological rather than medical. The Babylonians sang incantations, begging the "ghost" causing the tinnitus to leave the patient's ear. The Greeks of Anaxagoras's day (circa 500 BC) believed that tinnitus was caused by an upset of the "humors." They treated the disorder with purgatives or applied oils to the outer part of the ear.<sup>1</sup> Later, the Greeks turned to surgery, thinking the disorder was caused by air trapped within the ear.

### No Known Cure

Today there is still no known cure for most sufferers of tinnitus. The medical profession has focused attention on finding symptomatic relief—methodologies that relieve the effects of the condition on the patient.<sup>4</sup>

Interestingly, a German doctor in Düsseldorf, Hans Greuel, recently has reported a new approach to treating tinnitus called "biomental therapy." He claims that the treatment has achieved lasting cures in 90 percent of some 2,000 patients.<sup>5</sup> Greuel maintains that "conscientious, driven people who exhaust themselves by setting very high standards for themselves are more likely than others to suffer tinnitus and related problems."

Greuel is the author of *Up to the Ears: Sudden Deafness, Vertigo, Tinnitus*.<sup>6</sup> He believes there is a clear link between constant stress and the ailment. His treatment includes a variety of procedures aimed at lessening stress, including biofeedback and hypnosis.

In fact, he maintains that many patients first experience ear problems on vacations, which, for some work-centered persons, can be highly stressful because they are faced with unstructured time. I can't confirm this hypothesis. In my case, the ringing is precipitated by excessive noise levels.<sup>7</sup>

Greuel's research has recently won the support of the German government, which has backed a one-year project that will involve patients who have previously not responded to conventional medical treatment. The German medical journal *Deutsches Arzteblatt* has recommended Greuel's treatment.<sup>5</sup>

There are two basic types of tinnitus: subjective and objective. Subjective tinnitus can only be heard by the sufferer; the objective variant can be heard with a stethoscope. There are at least nine types of subjective tinnitus.

### Support Organizations and Research Centers

Since writing my original essay on tinnitus in 1979, a number of support organizations have materialized. One, in Philadelphia, is the Delaware Valley Tinnitus Association (DVTA) with offices at 4040 Market Street and a membership of about 1,000. Another is the Baltimore Tinnitus Center. Nationally, there is the ATA, P.O. Box 5, Portland, Oregon 97207.

Tinnitus research in the US is coordinated by the recently established (1988) 13th institute of the National Institutes of Health, Bethesda, Maryland, called the National Institute on Deafness and Other Communication Disorders (NIDCD). In Britain, the Royal National Institute for the Deaf in London has treated a large number of tinnitus sufferers and done considerable research on the subject.

Although Rubinoff is not a physician, he has been on the Board of Directors of the DVTA since its beginning in 1986. Presently chairman of its Outreach Committee, he was chairman of the first DVTA regional conference on tinnitus, held in Philadelphia in 1987.

The author of many scientific papers in the communications field and a distinguished professor, Rubinoff's career has included serving on the boards of several corporations, as well as being president of his

own company. He is widely known for his contributions to transistor circuit logic. He earned his doctorate at the University of Toronto, Ontario, Canada.

In the essay that follows, Rubinoff, driven by a desire to help others benefit from his experience, offers some valuable tips on the management of tinnitus. The first lesson is to learn how to live with the affliction. Be-

fore trying any of the suggestions for relief, however, we caution you to consult your physician first.

\* \* \* \* \*

*My thanks to Paul R. Ryan for his help in the preparation of this introduction and the editing of the following essay.*

---

#### REFERENCES

1. Sheppard L & Hawkrigde A. *Tinnitus: learning to live with it*. Bath, England: Ashgrove Press, 1989. 150 p.
  2. Garfield E. Tinnitus, anyone? *Current Contents* (30):5-8, 23 July 1979. (Reprinted in: *Essays of an information scientist*. Philadelphia: ISI Press, 1981. Vol. 4. p. 225-8.)
  3. Tinnitus. *Mayo Clinic Health Letter* 8(10), 1990. (Newsletter.)
  4. McFadden D. *Tinnitus: facts, theories, and treatment*. Washington, DC: National Academy Press, 1982. 150 p.
  5. Greuel H. New no-drug cure for tinnitus. *Health Confidential* March 1991. p. 6.
  6. ----- . *Up to the ears: sudden deafness, vertigo, tinnitus*. New York: VDG, 1990.
  7. Garfield E. Quiet restaurants and noisy discos—there's a time and a place. *Current Contents* (44):5-8, 29 October 1979. (Reprinted in: *Op. cit.*, p. 305-8.)
- 

## Some Tips for Managing Tinnitus

By Morris Rubinoff

In August 1985, a cordless telephone rang in my right ear. It cost me most of my high-frequency hearing and introduced a ringing that never goes away. In October 1986, I had heart surgery and three months later, the ringing in my right ear got louder, my left ear began to roar, and the top of my head started to hiss. Never stopping, 24 hours a day, these three noises were so bad that I seriously considered suicide. I was suffering from a terrible case of tinnitus, and the never-ending suffering just made me want to die.

But then, I got lucky. I read a notice in the local paper that a Delaware Valley Tinnitus Association (DVTA) was being formed in Philadelphia, with its first meeting to be held in March 1987. Attending the meeting,

I was surprised by the large number of tinnitus sufferers who were there. I learned that tinnitus was very common. Almost 20 percent of Americans suffer from it, many very seriously. But, more important, I learned that things can be done to reduce the suffering. I listened, I chatted, and I read the literature; today I live a normal life. My ears and head still ring, but I don't hear it. I have my tinnitus under control.

In gratitude for what the DVTA did for me (and for many, many other tinnitus sufferers), I prepared the following report. I hope it will help other sufferers manage their tinnitus.

The report is based on talks at DVTA meetings, material in the association's library, my own experience, and a number of

pamphlets and papers in professional journals, including a comprehensive study-summary entitled "Tinnitus management"<sup>1</sup> and an excellent review.<sup>2</sup>

### Not a Disease, but a Symptom

Tinnitus is not a disease; it is a symptom, a "pain," caused by a disease or an injury. There are many causes of tinnitus: a physical injury to the ear or head, ear damage from loud noises, ear tumor, otosclerosis, viral infection, pressure on nerves in the head, faulty blood circulation, surgery, etc. Moreover, many ear injuries are permanent. And tinnitus sometimes continues after the disease that caused it is cured.

Since no one knows the mechanism that causes round-the-clock tinnitus noises, there is no known way to provide relief through a direct attack on the noise generator(s) in the head. And because tinnitus has many causes, no one approach to relief works for all sufferers. In this report, I have organized the approaches to relief into four categories: changes in life-style (and attitude); recommended (safe) first steps that every sufferer should try; therapies without side effects that help in changing life-style; and drugs and other approaches (with possible side effects) that work for some.

The safer methods should be tried first. In particular, anything that contributes to better health also will help to relieve tinnitus; my personal emphasis has been on proper diet and exercise. However, most of the approaches described below have been able to help a small percentage of sufferers; it is estimated that about 25 percent of tinnitus victims have been helped by these approaches. Hopefully, something here may work for you.<sup>3-6</sup>

### Relief Through Changes in Life-Style

Tinnitus is partly psychological. If you listen for tinnitus, you'll hear it. So don't listen! Mental activity diverts the mind from

tinnitus noises. Socialize, take up painting, play card or board games, start a project or a hobby, get a (part-time) job if you're retired, etc. (I play bridge and pinochle and Scrabble. When I concentrate on playing, I don't hear my tinnitus.) Become active in a support group, such as the DVTA; not only does it keep you mentally active, but you can exchange notes with other sufferers and get advice and guidance on relief. To help fall asleep, find something to think about; planning the next step in a project is a good approach. Some sufferers use radio music or an audio "masking" cassette tape (preferably with an earphone so your spouse is not disturbed). It works for some; it doesn't work for all.

Physical activity might include walking or swimming. These are "aerobic" exercises that are good for your general health and hence for your tinnitus. They also are good for tinnitus because they increase blood flow to the head, thus feeding the nerves involved in hearing, together with proper diet, helping to keep arteries and veins open (no new deposits of plaque and maybe even removal of old deposits). Deep-breathing also helps by bringing more oxygen into the lungs.

A positive attitude is very important. Anxiety, worry, and depression are psychological stresses that are bad for your general health, aggravating tinnitus as well. Learn to concentrate on happy thoughts; it's good stress therapy. Support from family and friends is very useful here, as is a support group such as the DVTA.

For some sufferers, noise aggravates tinnitus. We each find out soon enough what noises are most bothersome.

Proper diet is well understood nowadays. It means a diet low in fats, cholesterol, sugar, salt (sodium), caffeine, chocolate, alcohol, chemical additives, etc. The Pritikin diet is a good example; get the *Consumer Guide* from Thompson Kitchens, Inc.,<sup>7</sup> or read the Pritikin book.<sup>8</sup> Or read Jane Brody's book<sup>9</sup> for equally good diet information and more than 350 good recipes.

Indigestion may aggravate tinnitus for some sufferers. Try to drink eight, eight-ounce glasses of liquid every day. Psyllium mucilloid (Metamucil, Konsyl, etc.) is a safe mild laxative, but some people are allergic to it<sup>10</sup>.... Acid can be neutralized with calcium carbonate (Tums, etc.) or aluminum hydroxide/magnesium hydroxide tablets (Gaviscon, Maalox, etc. [but don't take with tetracycline<sup>10</sup>]).... Stomach gas is reduced by simethicone (Mylanta and Maalox Plus are simethicone plus aluminum hydroxide/magnesium hydroxide).

Regular aerobic exercise has been recommended for years for prevention of heart disease. For example, walking for 30 to 40 minutes at a vigorous pace at least four times a week, or bicycling, treadmill, swimming (but watch out for water in the ears), jogging, folk dancing, etc. (A 40-minute walk usually reduces my tinnitus noises; it is interesting that the noise relief doesn't come until an hour or so after walking.) Experts advise muscle-toning "warm-up" exercises before aerobics and similar "cool-down" exercises afterward.

Diet and exercise help to maintain your weight; you should definitely avoid being very overweight, but don't get too thin either.

An American Speech and Hearing Association (ASHA) article states, "Virtually all [tinnitus] sufferers need to be told briefly what is known and what is not known, and that tinnitus is common. Emotional stability is a problem; the support/education group approach to coping is advised."<sup>1</sup> Hence, the importance of organizations, such as DVTA, for providing both support and education (information) on a group "self-help" basis in addition to membership meetings and literature. Counselors specializing in "cognitive-behavioral modification" can help you to identify patterns in your life-style that are bad for your tinnitus; they can help you to think differently about your tinnitus and obtain dramatic relief.<sup>11-13</sup>

Fatigue is physical stress. Getting overtired increases tinnitus noises. Try to relax

or take a nap in the afternoon or early evening when you feel tired.

I have sinus problems. Others have allergy problems. On some humid days, I get a headache and my tinnitus gets worse. Other sufferers in DVTA also report tinnitus worsening when it's humid. So stay indoors in a dry, dehumidified (air-conditioned) environment.

If your tinnitus gets worse, what did you do differently? Did you eat something special or did you leave something out of your diet? Did you start or stop a medicine? Did you get into an argument or get quietly angry and upset? Were you exposed to noise? Was there a change in the weather; did the air get very humid? Or polluted? Have you forgotten to exercise or done the wrong type of exercise? You are the one who is best able to discover what affects your tinnitus; keep alert to your environment.

### Recommended First Steps

You have probably had a complete ear, nose, and throat examination. If not, then get one. The tinnitus may have an obvious cause, such as wax or a foreign object in the outer ear or a middle-ear infection. If nothing obvious is found, then get evaluated by an audiologist. You should be tested for hearing loss and for tinnitus pitch and loudness; you might also be given an electronystagmogram to check the balance portion of the inner ear, an electrical conduction test through the eighth nerve, and/or a CAT scan for acoustic neuromas (nerve tumors) or central nervous system (CNS) conditions.<sup>14</sup>

Try wearing a hearing aid, masker, or both.<sup>15</sup> Get a money-back trial period (at least 30 days) since it may not work. The hearing aid helps you hear better and reduces stress. The masker creates an "acceptable" outside noise to drown out ("mask") the tinnitus noise. Some, but not all, DVTA members are helped by maskers.

Background sounds can be used for masking. Radio talk or music works for many; audio cassettes with a variety of masking sounds are also available. (In my case, when the background sound is turned off, the tinnitus is temporarily worse than before.)

Check for food and/or drug sensitivities, a process known as "withdrawal of causal agents."<sup>1</sup> There are many such "agents," including alcohol, caffeine, salt, sugar, spices, tobacco, salicylates (e.g., aspirin), ibuprofen (Motrin and Advil), Valium, and mycin drugs. One DVTA member is sensitive to all yeast products; he found the sensitivity by fasting for several days (distilled water only) and then adding items to his diet one or a few at a time. Professionals use a "RAST" test, plus a four-day rotation diet. Or you may use your own test schedule.

### Therapy

Stress therapy helps sufferers to relieve their anxiety, keep cheerful, and learn to cope. There are three main forms of stress: psychological, physical, and psychosocial (dealings with other people). Therapy treats them all.

Stress is bad for your physical and mental health. Blue Cross recommends exercise as "the #1 stress reliever."<sup>16</sup> Stress-relieving exercises, including proper deep breathing, relaxes all the muscles of the body.

Reject anger and negative thoughts. Thinking positively about happy events relieves mental stress.... Helping someone else is an excellent way to relieve stress, whether as a volunteer or helping a friend or neighbor.... Take time to relax at least once a day. This is where a hobby or pleasant music can help. Learn to control your stress instead of letting your stress control you.

Biofeedback is intended to provide control of a harmful habit over which the sufferer had no previous conscious control and which might be causing stress and aggravating his/her tinnitus.<sup>17</sup> Hypnotherapy sometimes increases tolerance to tinnitus.

### Medical Treatments

Please note that the following described treatments are all clinical in nature, not double-blind tests. Successes may have been psychological rather than medical. Before trying any of the following treatments, always consult your physician first. Serious side effects might be involved.

Abraham Shulman, State University of New York, reports successful tinnitus control using electrical currents with electrodes placed on both mastoids.<sup>18</sup> He uses 2 to 3 milliampere current at a 60 kHz sine-wave carrier frequency modulated with frequencies slowly varying between 200 Hz and 20 kHz. Treatment starts with one hour daily and can increase to as much as five hours daily for a while. He claims that (temporary) relief occurs with about 60 percent of his patients. The instrument itself, however, has been taken off the market and is no longer available for home use. Shulman suspects that suppression is achieved only when the tinnitus source is the cochlea. One DVTA member reports relief for about an hour after each session.

For tinnitus believed to be caused by accumulation of fluid in the cells of the ear or by blood vessel damage in the hearing system, Shulman reported short-term relief with antihistamines and vasodilators in about 10 percent of 172 cases.<sup>19</sup> He used Chlor-Trimeton, 8 mg., once or twice daily; chlorpheniramine maleate is available under many brand names.

A later coauthored paper<sup>20</sup> reports (temporary) tinnitus relief for 30 percent of the patients (3 out of 10) using another antihistamine, dexchlorpheniramine (Polaramine), but only 10 percent again with Chlor-Trimeton and none with meclizine (Bonine).

Under a local doctor's prescription (Max Ronis), two DVTA members are using diphenhydramine with some success. This is an antihistamine sold under about 50 brand names, including Benadryl. The latter is also antiemetic and antispasmodic; drowsiness, dizziness, dry mouth, nausea, and ner-

vousness may occur.<sup>10</sup> Hismanal (astemizole), available in Canada, but not in the US, is an antihistamine with no known side effects.

Some nasal medicines combine decongestants and antihistamines. Avoid decongestants; they are vasoconstrictors that narrow the blood vessels and limit blood flow in the head.

Benzodiazepines slow down the action of the nervous system. R. Lechtenberg and Shulman report<sup>20</sup> that for subjective tinnitus 69 percent of their test patients got (partial) relief with clonazepam (Clonopin), 0.5 mg., three times daily, and 52 percent with oxazepam (Serax), 30 mg. daily, but little help with carbamazepine (Tegretol), diazepam (Valium), and flurazepam (Dalmane). Note that these drugs have significant side effects and they all reduce mental alertness.<sup>10</sup>

Vasodilators expand and widen the arteries and veins. Shulman<sup>6</sup> used Arlidin, 6 mg. once daily and/or two/three times to relieve tinnitus. He cautions that a heart disease condition is a significant factor against using vasodilators. Side reactions include palpitations, tremor in the extremities, and nervousness<sup>10</sup>.... Two other vasodilators are Isoxsuprine HCl and Nicobid (nicotinic acid, niacin).... A friend currently uses four Isoxsuprine tablets per day, 20 mg. each, to suppress tinnitus; the drug is normally used for symptomatic relief in peripheral and cerebral vascular disorders; side effects can be mild tachycardia, palpitation, or tremor, and nausea may occur<sup>10</sup>.... Nicobid was once used widely—however, it enlarges blood vessels, primarily in the skin area, and has numerous side effects, including gastrointestinal disorders. A DVTA member got successful tinnitus noise suppression using Nicobid, but it gave him serious stomach problems after six months; his doctor has discontinued it without an alternate tinnitus remedy.<sup>1,6</sup>

Results from surgery have been unpredictable and rates of success have been low.<sup>1</sup> One operation places a plastic separator between the "eighth nerve" in the head and an

artery that often presses against the nerve; I have not seen a report of the success rate for tinnitus relief. A DVTA member has had the "ninth and tenth nerves cut" with results to be determined.

A doctor at Northwestern University Medical School reports successful treatment of tinnitus using treatment with 600 mg. daily of zinc sulfate. Note that doses larger than 220 mg. daily can be harmful to the liver.<sup>21</sup>

### Tinnitus Noises Still a Mystery

No one knows how the ear and the brain create tinnitus noises. There are theories, such as change in "the reflex pathway from hair cell to auditory cortex and back" (ear to brain and back to ear) by J.J. Shea and J.R. Emmett;<sup>22</sup> deterioration of the hair cells on the cochlea;<sup>23</sup> deterioration of the auditory pathways;<sup>23</sup> hair cells in the ear being locked into phase; the sound of blood circulating through partially blocked arteries in the head; CNS disorders; faulty redirection of sound to the center of the head ("deafferentation of the auditory pathway, leading to the secondary neuronal hyperactivity of more central fibres,"<sup>24</sup> etc.). There also are mechanical causes of tinnitus, e.g., a faulty temporomandibular joint, an artery rubbing against the auditory (eighth) nerve, etc. Each of these is a possible noise generator for different tinnitus sufferers.

The ear is a complex organ.<sup>25</sup> There is the tympanic membrane (ear drum), the upper vestibular canal and the lower tympanic canal at the oval window, the oval window itself, the perilymph (fluid that fills these canals), the cochlear duct (another canal) and its fluid (the endolymph), the three ossicles or ear bones (hammer [malleus], anvil [incus], and stirrup [stapes]), the basilar membrane, the cochlea, the organ of Corti, the semicircular canals, the Eustachian tube, the acoustic nerve, etc., etc. Damage to any

of these can cause tinnitus. A very common source of tinnitus is loud noise that destroys some of the delicate hair cells on the organ of Corti; there are about 13,400 outer hair cells in three to five rows, and some 3,400 inner cells in a single row along the basilar membrane.

Shulman classifies tinnitus into nine different "types": auditory, nonauditory, middle ear, cochlear, vestibular, cervical, central, subclinical, and contralateral.<sup>14</sup> He identifies the type by putting the patient through a large number of tests. The identification of the tinnitus type and its site of

lesion is his basis for tinnitus treatment and control.

Research to discover the mechanism or mechanisms responsible for tinnitus is long past due; as C.J. Unice, founder of the American Tinnitus Association, said in 1979: "We need to do the basic electrophysiological research necessary to develop a treatment directed at the core of the problem instead of treating symptoms." DVTA members and supporters should actively encourage such research and call for government and private support to finance it.

©1991 ISI

---

#### REFERENCES

1. Bentler R & Tyler R. Tinnitus management. *ASHA* 29:27-30, 1987.
2. Self help for hard of hearing people. *SHHH information series #4. Tinnitus (ear and head noises)*. Bethesda, MD: SHHH, 7 p.
3. American Tinnitus Association. *Information about tinnitus (head noises)*. Portland, OR: ATA. (Brochure.)
4. ----- *Coping with the stress of tinnitus*. Portland, OR: ATA. (Brochure.)
5. American Academy of Otolaryngology—Head and Neck Surgery. *Doctor, what causes the noise in my ear?* Washington, DC. 1982. (Brochure.)
6. Stone R. Tinnitus! No matter how you pronounce it, it's a very widespread problem. *SHHH*. July-August: 7-9, 1981.
7. Thompson Kitchens. *Consumer guide to new Pritikin foods and the Pritikin lifestyle*. Springfield, IL: Thompson Kitchens. (Brochure.)
8. Pritikin N & McGrady P M. *The Pritikin program for diet and exercise*. New York: Grosset & Dunlap, 1979. 425 p.
9. Brody J. *The good food book*. New York: Norton, 1985. 700 p.
10. *Physician's desk reference*. Oradell, NJ: Medical Economics, 1986. 2,016 p.
11. Sweetow R W. Cognitive-behavioral modification in tinnitus management. *Hear. Instruments* 35:14-5; 52, 1984.
12. ----- *Cognitive aspects of tinnitus patient management*. *Ear Hearing* 7:390-6, 1986.
13. Clark J G. Tinnitus: the counseling imperative. *Hear. J.* October: 23-5, 1985.
14. Shulman A. Medical audiological evaluations of the tinnitus patient. *Semin. Hear.* 8:7-14, 1987.
15. Vernon J. The history of masking as applied to tinnitus. *J. Laryngol. Otol.* 4(Supp.):143-8, 1981.
16. Blue Cross of Greater Philadelphia. *Stress*. Philadelphia: BCGP, 1984. (Brochure.)
17. Walsh W W & Gerley P P. Thermal biofeedback and the treatment of tinnitus. *Laryngoscope* 95:987-9, 1985.
18. Shulman A, Tonndorf J & Goldstein B. Electrical tinnitus control. *Acta Oto-laryngol.* 99:318-25, 1985.
19. Shulman A. Vasodilator-antihistamine therapy and tinnitus control. *J. Laryngol. Otol.* 4(Supp.):123-9, 1981.
20. Lechtenberg R & Shulman A. Benzodiazepines in the treatment of tinnitus. *J. Laryngol. Otol.* 9(Supp.):271-6, 1984.
21. *Healthwise* 6(5), 1984. (Newsletter.)
22. Emmett J R & Shea J J. Medical treatment of tinnitus. *Proceedings of the Second International Tinnitus Seminar*. 10-11 June 1983. New York, NY. p.264-70.
23. Shea J J. Medical treatment of tinnitus. *Amer. J. Otol.* 5:476, 1984.
24. Donaldson L. Tegretol: a double blind trial in tinnitus. *J. Laryngol. Otol.* 9:47-51, 1981.
25. Freese A S. *You and your hearing: how to protect it, preserve it, and restore it*. New York: Scribner, 1980. 184 p.