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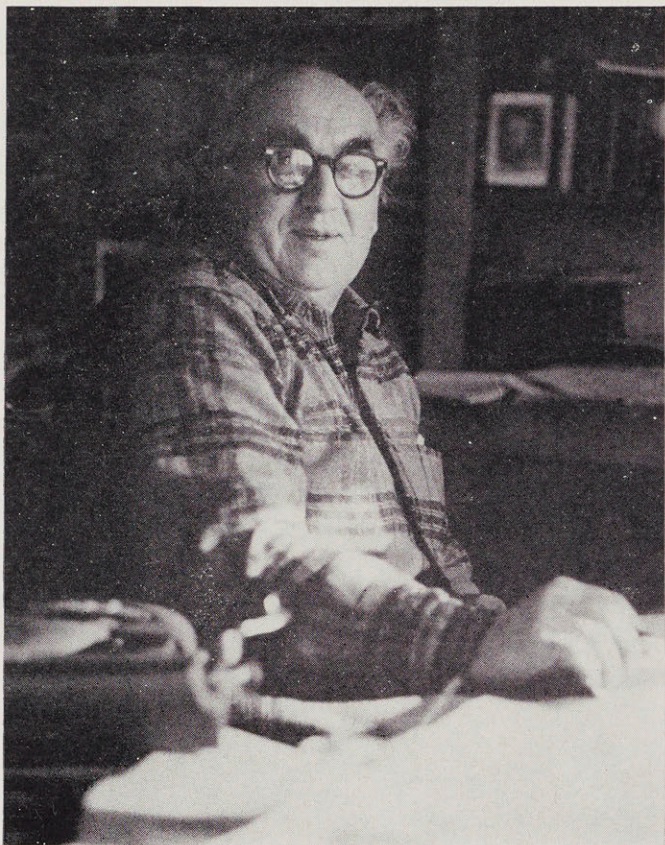
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"Are We Going Deaf?"

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INTERVIEW WITH
Academician Zhivko D. Angeluscheff, M.D.
Hearing and Speech Center
City Hospital, New York

By KENNETH M. SWEZEY



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To Dr. N. Wiener
with the author's
Complement:

Zhivko Angelusheff.

Feb. 1961,

N.Y.C.

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... a scientific writer and unmatched populizer. He was a personal friend of Nicolas Tesla, the great inventor of AC electrical system, the backbone of our contemporary civilization. K. Swezey's contributed toward the complete edition of Tesla's works. In the last 32 years he published more than 2000 scientific articles.

DURING the summer of 1957, upon the invitation of the Museum "Nicola Tesla" in Belgrade, I visited Yugoslavia. During my trip I came across articles and interviews dealing with a product "Made in USA" that I'd hardly heard of in USA. "Borba" under the title *Ultrasonics — enemy of the pilot*, referred to a paper delivered to the 6th International Congress of Otolaryngology in Washington, D. C., May 1957. Other newspapers widely quoted another paper dealing with *Vibratory Energy and the Human Hearing*, presented to the 1st International Congress of Neurological Sciences, Brussels, July 1957. The papers were presented by Dr. Zhivko D. *Angeluscheff*, scientist and physician of New York, who was lecturing in Europe and touring at that time in Yugoslavia. He gave a lecture on the subject "Origin of Deafness in Modern Man" to the Members of the Academy of Sciences in Belgrade. I met members of the Academy who attended the lecture. They were excited and worried about the facts revealed to them by the scientist. Their excitement and worries affected me. I procured the said lectures, some previous publications and the most recent manuscript: *The Technical Progress and the Progressive Deafness of Man*, presented to the 11 World Health Assembly, World Health Organization in June 1958.

The Progressive Deafness of Man is a problem occupying the mind and efforts of medical science for almost a century. The problem is getting more and more serious and the medical profession is becoming more and more helpless. There is no remedy for it. The Progressive deafness is spreading by millions in USA and presents a problem of paramount social and medical importance.

"The problem is a big one. It does not have the appeal to the popular imagination which tuberculosis has, and yet, because of the millions affected, with all that implies of handicaps to the wage earner, no greater boon can be brought to mankind than to secure the knowledge by which deafness can not be cured but prevented. The farsighted Dr. Thomas *Jefferson Harris*, many years ago recognized the importance of the problem and appealed for a "nation wide research." Our society which provides the victims of this condition of impaired human health has remained deaf to his cry.

In a search for more authentic information on the matter of deafness I asked the noted scientist to grant me an interview.

I visited the Academician in his summer residence "Panguy," a strange name reflecting the remote myth and history of Macedonia.

"You have been a specialist on Hearing for more than 34 years. You studied Physics and Biology prior to Medicine, if I am not mistaken?"

"Are you trying to reveal my age, Mr. *Swezey*? My answer is 'yes.'" Smiling he added "anticipating your questions, I'll tell you that my place of birth is the Balkans, my religion: the Man; my origin Slavic. Height and weight are not pertinent to your problem, so I won't reveal them." We were laughing.

"When did you first encounter the problem you have worked on so much?"

"As a student, from the auditorium of Physics, I was thrown into a very noisy surrounding—the battlefield of the 1st World War! There I met with the problem of acoustics. As a chief of an Acoustical Detachment of the Bulgarian Army, I was ordered to the front in Macedonia with the assignment to 'discover' the hidden cannons of the enemy, and this solely by the sound, the only thing they could not camouflage.

"How was such a thing possible? It is quite intriguing!"

"Intriguing and difficult. It was an ingenious idea of a Bulgarian engineer which was accepted by the German General Staff and quickly put into service in the armed forces. If the sound of a cannon is heard from three topographic observation posts, you can read the differences in the time of hearing the sound between each two of the posts. These differences in the time correspond to differences in distance. The hyperbole is a curve in which the difference in distance point to both focuses is a constant—this is the principle involved. You have a curve on which your acoustic source is situated with precise difference in time in respect to both focuses (observation). The other two focuses will provide you with the difference of time of the same sound source. You have the point of a second hyperbole—the secante. The crossing of both is the source of sound! That you are correct can be proved."

"How?"

"You order any cannon under your command to shoot at a point on the map. The detonation of your own directed shrapnel is your own sound-source. The difference of time in hearing it has to coincide with that previously recorded. You cover the area with heavy bombardment and there will be no more 'enemy' source of sound."

"Interesting, indeed. So, you have been on the acoustical job for more than 40 years?"

"Almost, but as a hobby. First I am a physician and my concern is the problem of *human hearing*. Why man hears and why he is becoming deaf, is the most fascinating enigma that has been occupying my mind for decades."

"Can you answer it?"

"No! Not yet. We do not know how we hear? This endowment is given to man by the law of Nature for his survival. The tragic thing is that man is becoming a victim through his own fault, and is destroying his most precious resources."

"When did you conceive the idea that the ultrasonic frequencies are damaging the human hearing?"

"As a young doctor in Berlin, Germany, I tried to approach the problem in many ways. The progressive deafness due to otosclerosis is characterized by formation of new bone at the oval window, which fixes the stapes and leads to this condition. It has been pertinent to assume that a faulty metabolism of bone is responsible for the condition. I injected calcium phosphorus into experimental animals, fractured their bones and watched the healing of the fractures. The calcium went in and out, nothing happened. This approach was a failure. Later in Paris, France, I eagerly observed the results of the new operation—s.c. Fenestration. First conceived and executed in 1897, by *von Passow*, a teacher of mine. This proved to be a failure also because of obliteration of the artificial window. Later and with greater success it was carried on by the father of modern fenestration: *Gunnar Holmgren* of Sweden. He, himself, stated "no method has as yet been devised which safely guaranteed a permanent fistiula." I resented the idea that such a method must possess more than an opening of an artificial window while neglecting the basic metabolic process, the biological factor creating this condition. From the beginning, the philosophy of my medical credo has been that medical science is real only when it can make surgery unnecessary. Thus the purely surgical approach seemed to me like the ritual performance of the medicine man. I couldn't accept the idea that the sole artificial window upon the bony labyrinth would be the proper solution of the problem. Without overcoming the factor causing the bony fixation, there will not be a real solution. There will be too much play on chances. What causes the bony fixation at the oval window? I was searching. A first bright ray upon my

sceptical mind came, through experimental findings on organic tissue treated with ultrasound! I took the new path, followed the literature eagerly and reached a new concept: 'The solution to the problem of progressive deafness—its cause, prevention and cure—is to be found through study of the biological effects of sound, (i.e., ultrasound) waves on the human ear.' I was ready with my manuscript: "Biological problems in Otosclerosis." But where should I send it for publication? In the U.S.A. the biological problem in relation to ultrasonics at that time was almost completely alien. To be or not to be! I sent it to the most qualified man for his judgment, Prof. Gunnar *Holmgren*, President of Academy of Sciences of Sweden. His telegram of acceptance of the manuscript was the first encouragement . . . "your article is the most important work published on the question of otosclerosis for a very long time." He himself started experiments based on the concept. His sudden death disrupted the research. Prof. H. H. *Naumann* of University of Wuerzburg, Germany, in his experiments confirmed the concept, and proved that "small ultrasonic dosage stimulates ossification and bony deposits." Prof. William *Boyd*, the renowned pathologist of Canada wrote: "I need hardly say that I found your article intensely interesting, largely because it introduced a thought which was entirely new to me, namely, the effect of ultrasound on mesenchymal tissues, particularly those of the ear.

" . . . I have always found, that one of the best things that can happen to one from the scientific stand-point is to glimpse a vista of new concepts. You have certainly done this for me."

"Do you attribute this vista of new concepts involving ultrasound and physical principles to your previous background? You have been specialist on ear and hearing for more than 34 years?"

"That is correct."

"You mentioned that Man has become his own victim and through his fault is destroying his hearing. What do you mean by this?"

"Man, pursuing technical progress, creates man-made devices and with them he has produced new dangers."

"But this is done unknowingly?"

"Not purposely, of course, but persistingly and with disregard for his own health and purpose. Millions of dollars have been spent for research on how to make the machines *bigger, stronger, speedier*, and almost nothing on research to protect man's precious organ of Hearing!"

"This thought of yours, doctor, impressed the people who listened to you in Belgrade. Why does not man realize the menace he is exposed to? Do you have some explanation?"

"The faulty trend of our technological development. The role of science in our culture has been not properly explained to the people. Gerard Piel has expertly described this occurrence by saying that "Technology has subordinated science, and scientists have failed to explain the true role of science in our culture." The U. S. A. is living in an almost religious trance in deifying the *machine*. This is an ill omen! "The cult of the machine, "to use Faulkner's expression," should not doom the man!"

The Man in his elevation of purpose, his creative spirit, his effort to penetrate and understand Nature, his ingenuity in accomplishing this should be the object of veneration, not the gadget!" The *concern of man and his destiny must always be the chief interest of the technical efforts*. Never forget it among your diagrams and equations." These words of *Einstein's* should be the slogan of all technicians today. The late Frederick Soddy was more emphatic in his warning: "Politicians and technicians are rushing into experiments without the faintest idea of what the result may be!" Haven't they brought all the dangers of Strotonium to worry us?

Civilized man today is losing his sense of "warning." Conditioned by history, our society considers the man as the most inexpensive of all commodities. The measurement of values being not the *man* but the *cost*. This would explain the impasse we are running into. The claim that our society is spending a great deal on education, and thus on the amelioration of the standard of man, should also be scrutinized.

Once in the radio program 'Do You Know?', which I like to listen to the chairman asked a man who was supposed to know. '. . . All these cars, lights, noises, aren't they wearing the people?' The professor answered: '. . . Such environment is rather stimulating!' If the amount spent on education is to give people such kind of 'knowledge,' man will never know what he should know. Have you heard of the existence of a plan to "educate the suffering township to the necessity of noise?" (N.Y.T. Feb. 1955.) You will agree that people educated under such a plan, will never object to the roaring of the jets over their homes. Such education will preclude the knowledge, that *sleep* and *rest* are basic pre-requisites for *health*. The rather 'stimulating' will continue and make more nervous wrecks. No drugs, no tranquilizers will be of avail, where only rest is needed.

The modern technology, ignoring the man (the human being) has failed to protect his hearing. Defeated by the *noise*, the technocrats are trying to adopt the noise as a legitimate member of our life."

"But aren't there so many efforts, so many products on the market, for architectural use in combating the noise?"

"That is correct. There is even a Journal dedicated to the purpose. But all efforts are contaminated by the technocratic trend of thought. During my lecturing tour in Europe I visited Florence. I visited Fiosole. People were pouring into the old Roman amphitheater, technicians were busy installing a loudspeaker on the stage. I asked my companion, a British sculptor to go on the stage and address me from there in his natural voice. He spoke and I could understand every word from first to last. I asked myself, why are these people going to install a loudspeaker?"

"Did you answer your question, Doctor?"

"I tried. Loudspeakers are a commodity on the market and very much advertised. This is one of the reasons. The second one and perhaps more convincing, is that we, people living with loudspeakers and vibrating commodities are getting somewhat hard of hearing in payment for being civilized. Our modern life conditions us to such infirmity. The people of the U. S. A., with little exaggeration live not on the *earth*, but on *vibrating* commodities and gadgets. Man has become *machine-bound*!

The alarm clock in the mornings with its vibrations wakes him up. He uses a vibrating gadget to shave. During his breakfast he is exposed to the vibration of the radio. He descends to the ground by the means of a vibrating elevator. But, he won't stay on the ground; he starts the motor of his car and proceeds to his daily work. In his work he uses the telephone many times daily. The U. S. A. contains over 50 million telephones, which are used 188 million times daily, 365 days per year. In the evening he listens to TV (over 60% of American homes have one or two TV sets) or radio of which U. S. A. has 42 million. The number of sound amplifiers is estimated at over 250 millions, with Hi Fi achieving amplifications by up to 90 watts! All these sound amplifying devices are mostly based on *transistors*, employing quartz, germanium or similar sources of ultrasonic energy. "A gadget employing 'Solion' is subjectively not perceived by man. He doesn't hear it, but in time it can destroy his auditory nervous system bringing on deafness" (N.Y.T. 6/23/57). Ingenious gadgets are not innocuous! Exposure of the gentle organ of cochlea to the impact of vibration of the silent range is very hazardous!"

"Couldn't this peril be circumvented by using another standard of frequencies, less hazardous?"

"This is a very appropriate question, Mr. Swezey. I think it is feasible. The problem is technological and requires a controlling authority.

Natural evolution across millions of years did manage to create a perfect organ of hearing. For different species the absolute threshold even within the same frequencies is different. The Pyrrula bird will present a threshold of 10^{-11} and the Amiurus fish 10^{-17} for 100 c/s and all will convert with man to 10^{-16} for 2000 c/s. Natural selection made further subdivisions. The primitive man could interpret vibrations as sound from 16 c/s up to 32,000 c/s. Civilized man will hardly perceive 16,000 c/s. The dog registers up to 35,000 c/s, the mouse up to 95,000 c/s, the bat up to 120,000 c/s. Frequencies above these ranges are *objectively* present, but *subjectively* not perceived—they are the *ultrasonics*.

Man, by law of nature is capable of hearing eleven octaves, a tremendous possibility for receiving acoustical stimuli! The world of insects is far richer. *Chavasse P*, the eminent French scientist amazed an international gathering with his presentation of the ultrasonic spectra, to which our ear is deaf, displayed by insects and crickets. In the game of love the male flies to the female at a call of 80,000 c/s. How poor man is on frequencies for such a lofty purpose! To be impartial, maybe this was the intention of nature, to use a whispering voice for the same design? A minute force, like the trembling leaves (0.0011 bar) for a passionate desire!

What is going to be your approach to such a dilemma? You cannot take the *machine*—culprit, as a starting point! You have to accept the *biological capacity of the human ear*! 1 micro-watt of whisper to 10 micro-watts of speaking voice and the frequencies range from 16-32,000 c/s. Everything within the biological range of the human ear will be of no harm to it.

The human ear can hear a whispering voice in given conditions at a distance of 250 feet. In the Cathedral of Girgenti in Sicily, a whisper from the confessional corner was carried 250 feet away in an area, where young worshippers liked to crowd. Secrets of the penitents whispered in confession, and never intended for the public, due to the acoustical principle involved in the architecture, became publicly known. A scandal in 1824 put an end to the corner of the mysterious acoustical phenomenon. Nobody bothered to study the laws of these architectural acoustics.

At Gibraltar, at a particular spot, a conversation (of 10 microwatts) is carried 10 miles away, across the straights to the African shore and is clearly understood. In all these cases the *human ear* records the *human voice*. No loudspeakers or amplifiers are needed.

I ask you now: Why haven't the acoustical architects of today studied and followed the laws of natural amplification of sound?

For the most part they couldn't do it. Had they not been at the bottom of the mental trap of the electro-acoustical concept, which ignores the human factor *a priori*, they would have looked for another more appropriate solution.

Douglas *McFarlan*, one of the fervent pioneers of protecting the human ear in U. S. A., tried in vain to warn the aviation authorities that it was essential to human hearing to abandon the 4,000 c/s as a communication signal. He was completely disregarded. He didn't even receive the courtesy of an answer to his letter! I don't think it was lack of courteous behavior on the part of those gentlemen. It was rather their mental trap. They acted after their pattern. In a personal letter *McFarlan* wrote: ". . . Sooner or later the world wakes up to truths it for years has been inattentive to! You and I will be dead and gone by the time our warnings catch on; in the meantime much damage is done; and there is much financial, economic and human waste. . . ."

Being conditioned by such a mental trap, the technocrats of today are forced into monstrous performances."

"What do you mean by this Doctor?"

"I consider a monstrosity the employment of three amplifiers each of 300 watts for amplifying the human voice for purpose of entertainment. This is a notorious electrocution of the gentle structures of the cochlea in the human ear!

The technicians of antiquity knew better how to entertain the people safely. The amphitheater of Dionysus at Philippi, the capital of Philip of Macedon, has a capacity of 15,000 listeners (many times greater than that of Radio City and equivalent to Madison Square Garden in this City). The dropping of a dime upon the stage of the theater of Dionysus is heard distinctly in the last row. No single watt was used to carry those classic performances.

One should realize that 10^{-16} microwatts/sqcm, an infinitesimal quantity, is needed to initiate migration of ions in the nerve and elicit the sensation of *hearing in man!* 10 microwatts of the human speaking voice is quite a taxation to the nerves. One tenth of a watt (0.1 wtt/sqcm) is capable of disrupting the cells in the organic tissue, to kill bacteria and stimulate the bone to grow. Medical science would hardly employ of 0.1 watt upon vital human organs without endangering them. *Three times three hundred watts* are proudly employed by the technical science. At this point, we the medical men, disagree with them and very much so!

Vibratory energy in general, and especially of high frequency with its impact upon biological structure, has deleterious effect upon its function. Man does not realize that the impact of waves above the threshold of subjective perception, is a hidden factor, very much like x-rays and ultraviolet light waves, of tremendous importance in our daily life.

The technically minded scientists are displaying amazing confidence in proposing to solve the problem with their "coils." The phylogenetic fact of the hearing organ is ignored. The Cochlea is a 'mystery' to them, it is an obsolete prejudice of the medical profession. Nature, if I am permitted to amplify their attitude, made a great mistake in not consulting them before creating this nonsensical thing called Cochlea. Alas, not only the cochlea. Very recently the Labyrinth also was declared a "vestige" and is to "be knocked out." The spaceman doesn't need a labyrinth. It is a quite a gloomy picture which our colleagues of the technical department advance. They ignore the most simple fact, that technique even the most ingenious cannot be a substitute for biology.

Any technical method, not supporting the biological trend is doomed to failure. The chemical reactions in the living tissue caused by vibratory energy are intricate and we know very little of them. Laboratory experiments indicate that many biological features, especially of the nervous system, undergo profound changes on exposure to the vibratory energy. The blood plasma loses its essential ascorbic acid. This occurrence inhibits the function of the adrenal glands (low blood pressure, allergy) resulting in a disbalance of the function of the pituitary gland of adrenocortical hormones. The nervous system becomes depleted in its potassium electrolytes, most essential for the function of the nervous system. Deprived of its potassium the nerve is not capable of receiving and responding to the incoming stimuli. The organs of sense are inhibited. The human body, in such a condition, is reduced to poor functioning—with muscle fatigue, lowered blood pressure, blurred vision and deficient hearing. This is the living condition of the pilot. After a couple of thousands of flying hours, the hearing apparatus suffers *irreversible* changes, the perceptive power fails and the hearing is reduced a few octaves.

The human, living in the midst of such vibrations, is exposed to their injurious effects. These result from a complexity of waves *fundamentals* and *harmonics* which in their higher orders are of ultrasonic range. They produce kinetic (living) energy of tremendous penetrating impact. Possessing a large spectrum of frequencies they are capable of setting elements of vibrations up to their optimum and put them in *resonance*.

"The big vibration that results when a small force is applied repeatedly" . . . to quote you Mr. *Swezey* in your magnificent illustration of the phenomenon of resonance, will make any of your readers comprehend this. They'll understand why the marching column of soldiers over the bridge of Neva River in St. Petersburg made the solid structure crumble. The small physical force repeated in the cadance of the steps brought the structural elements in *resonance* and its disruptive power.

The best example of resonance, of course, which I have quoted many times, you know better than I. This is the earthquake 1896 in Manhattan, manufactured by *Nikolas Tesla* with his tiny vibrator.

At this point I would like to appeal to your exquisite capability of simplifying complex phenomena. It is not easy to make understandable the fact 'Big' and 'Strong' are not a priory the key to the explanation of disruptive phenomena.

Minute sustained vibrations taking place in biological structures, can disrupt the biological elements and function to a state of *irreversibility*. I said minute and used to illustrate this in the following way. Eight million inhabitants of New York, speaking at once would produce a vocal power of an intensity hardly enough to light a lamp of 60 watts. One voice of these eight million would indeed represent a very small amount of energy. But even such infinitesimal energy of one singing voice by its harmonics (ultrasonics) is capable of shattering a goblet to pieces. This empiric knowledge, that not intensity, but rather *frequencies* are of preponderant importance was known to antiquity and has been explained in words of wisdom: "Gutta cavat lapidem no vis sed seape cadendam" . . . ("The drop grooves the stone not by force (intensity), but by frequent falling (frequencies).")

The minute ultrasonic waves can shake structures and by the attendance resonance disrupt them and bring them to an irreversible condition.

What is going on in the nerve of hearing exposed to vibratory energy?

A nerve in a perfusion fluid exposed to vibratory energy looses its intracellular potassium. A dog receives systemically radioactive phosphorus ($\text{Na}_2 \text{HP}^{32}\text{O}_4$). One hour thereafter, the isotope is 25% less in the labyrinthin fluid, compared to the blood serum. This indicates that the hearing organ possesses a barrier of protection. This barrier of protection is destroyed on exposure to vibratory energy of an electric bell for 15 minutes only! The animal exposed to ultrasonics for 12-18 hours dies spontaneously. Within this range, we find all gradations of pathology. The enzyme activity is disrupted, protein being decomposed, amino-acids dis-

appear and potassium is depleted. Being the most important electrolyte for carrying impulses the nerve function is impaired. If the impairment is carried to the limit by sustained exposure to vibratory energy it results in paralysis and anesthesia. The sensory nerve ceases to *respond to incoming vibrations and is practically 'deaf.'*

The ear—a most precious organ of man—is in danger!

The organ of hearing has been of concern to man. *Montaigne*, the French philosopher, in his "Essais" invokes a dramatic picture of his conviction." The fruitful and natural exercise of our mind, in my opinion, is conversation and that is the reason why if I were, in this moment, forced to choose, I would rather consent, I believe, to lose my sight than my hearing or speech."

The spoken word, the melody of joy and sorrow, the lofty emotions which mould man to human are perceived and conveyed by the ear. Nature has endowed man with an organ, a tremendous source of emotional and spiritual richness. Obsessed by frenzy, man destroys his natural gifts by driving somewhere, without knowing where and what for. In this "progress," he is promoting the *progressive deafness of man*. It is hardly conceivable that Nature will compromise on man's terms of co-existence."

"Is there no hope or remedy?"

"You are asking for remedy. It does not have to be discovered. It has always been there. It needs only to be restored! — to its natural right for the benefit of man: *rest and quietness!* It is no longer a medical problem, but a *social* one of paramount importance. The modern technique has failed to preserve the hearing capacity of man. The progressive deafness in our country is afflicting millions of people. Since this is not a painful condition, but rather submerges its victims into dullness and apathy, the social reaction has failed to keep up with the merits of its seriousness. The people do not realize that they are exposed to the danger of noise and are not protected against it.

During the rule of Elizabeth I of England, there was a strict law. Beating of wives during the night was prohibited. This judicial milestone was not the starting point of the emancipation to come. The beating of wives during the day was permitted. Medieval society was concerned with the noise. Noise is our concern too, but we are in a less fortunate position. There is not such a law today to silence noise and acoustic outbursts.

"I am in full agreement with you Doctor, that we live in too noisy surroundings.

“The immensity of the taxation of the human nervous system by the noise we are compelled to live in, you may judge by the following facts. The ear is a gate to the mind and emotions of man and conveys vibrations to the brain. Signals as weak as the ticking of a watch, or the humming of a mosquito provoke nerve activity, even during sleep, and can be recorded on an Encephalogram. Infinitesimal vibratory energy of 10^{-16} microwatts/sqcm ($1/10,000,000,000,000,000$) and low frequencies (05-10 c/s) of one-ten millionth of a volt are perceptible by nervous tissue! Confront these figures with the roaring of jets and amplified movies or TV performances!

The technocrats obsessed by megalomania are constructing monstrous ‘bigger’ and ‘stronger’ devices in complete disregard of human health. The suffering populace by sound instinct, I am certain, will recognize its precarious situation and will rebel.

I. P. Pavlov, the prominent Russian scientist at the beginning of this century stated: “Silence cures!” These words should be the battle cry of the popular movement driving toward the remedy of health!

Switzerland is privileged to be first in this effort, having suppressed the honking of automobile horns. The French Public Health Authorities have proclaimed . . . *noise* making machines as the “Public Enemy No. 1.” The Russian Society under the guidance of the Writer’s Union is organizing a popular movement against noise. New cities in virgin Siberia, feverish with constructive works outlaw the blowing of horns! Pallazzo di Vecchio of Florence has enforced a strict rule on night traffic! One is tempted to greet them: Bravo Firenze! Austria is unifying the efforts of physician and technicians in its effort to combat noise, which is found to be responsible for the lowering of work capacity, damaging the heart, the senses and nerves.

Germany, Britain, Japan, all industrial countries are faced with this nefarious problem. The efforts for the most part are directed toward camouflaging noise, not eliminating it. The U.S.A. the most technically advanced country and consequently the most plagued country has an unfortunate experience—the unavoidable destiny of all pioneers. This knowledge could be of great help to the ‘under-developed’ countries, to humanity. When the knowledge to build advanced machines is accompanied by the prescription for the protection of man—this will be achieved! Unfortunately *wisdom* from experience is lingering behind.

Four centuries ago "the wisest of all Frenchmen" Montaigne at the dawn of the Technical Age did profess the *wisdom* for protecting the human ear. The whole technical age was deaf to his advice.

— "It is Wise to be Wise in Time." —

"A handful of atomic material will drive a thousand factories or will destroy a city in a flash. A jet engine will take a plane from coast to coast in three hours. It can also cause profound deafness in three minutes, a deafness that is irreversible and permanent for lifetime. We are indeed in an age when enormous man-made forces can be released for both good and harm. Much of the dangers of these forces comes from the fact that they cannot be detected by the senses. The Japanese fishermen did not notice the atomic fall-out, the workers in the New Jersey factory who were painting luminous numbers on watch dials observed nothing. The early x-ray workers were conscious of no danger until their skin became sallow, and toes, hands and arms began to require amputation.

Supersonics are here, and more so than ever before, even though they are not sensed. High speed cutting tools, combustion engines, power transmissions, and electronic equipment of many sorts give frequency components that can undoubtedly damage humans. It is valuable, and timely, to have these dangers brought to our attention, for it is wise to be wise in time." (*D. McFarlan*).

With this warning let's approach this human problem of our time! Wisdom evolves from experience. It is time to evaluate our experience and put it to the proper benefit of MAN!
New York, 1960.

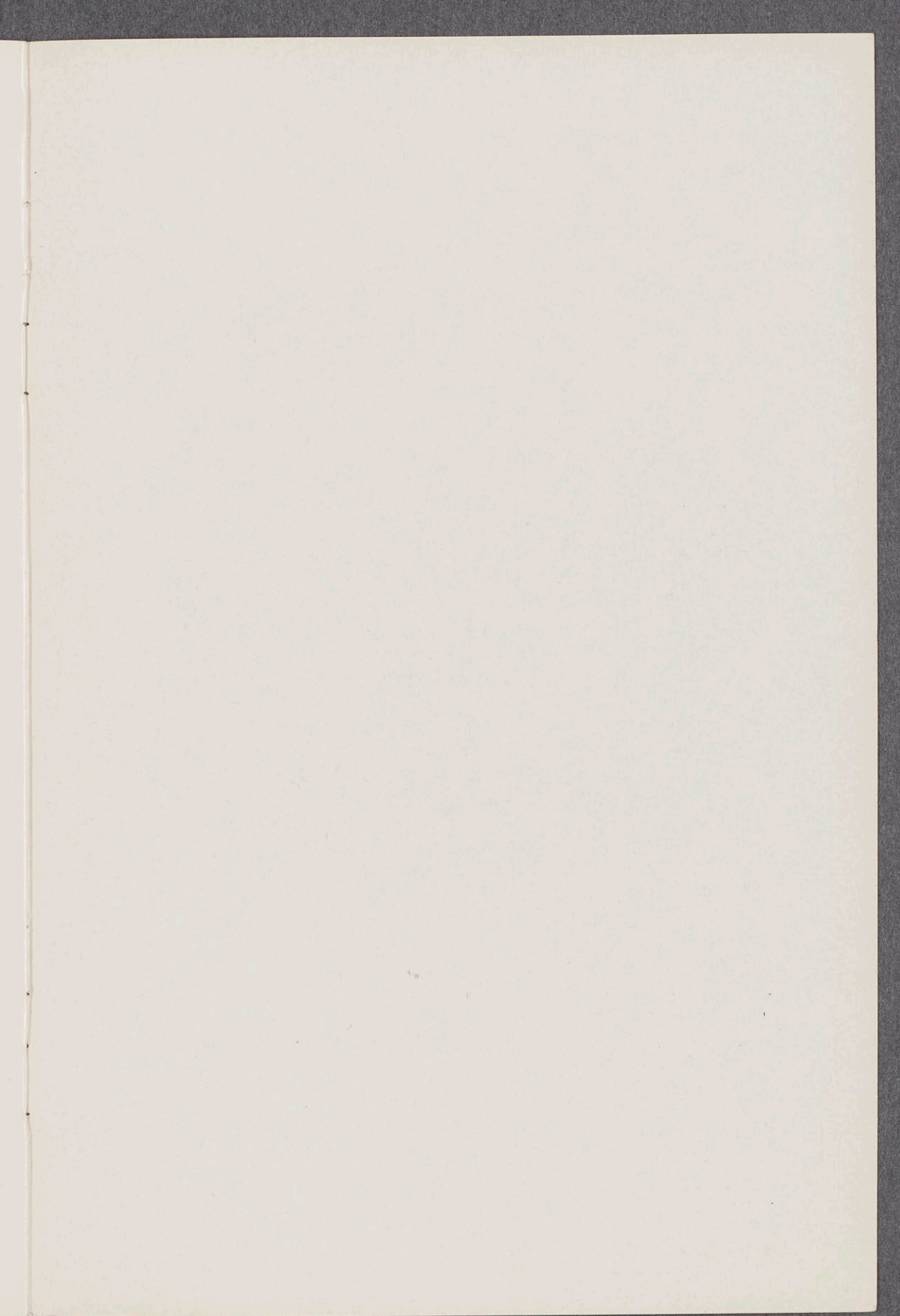
WHO'S WHO IN NEW YORK

Thirteenth Edition

ANGELUSCHEFF, Zhivko Dimitroff:

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Prof.
Dr. Norbert Wiener
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Belmont, Mass.

Feb. 22, 1961

Dear Colleague:

You have been the first to recognize that although biological and engineering sciences have identical problems, these two branches of science are marching separately. To help understand this discrepancy of facts, you have coined the term "cybernetics" as a binding idea.

Recently Charles P. Snow in his "The two cultures and the scientific revolution", has analysed this condition of Babel-relationship in our society. His writing is a contribution toward your point of view.

Unite all efforts toward a solution of pending problems! This should be the slogan. The problem which troubles me is rooted in the very same discrepancy between the medical (biological) and engineering concepts in helping the human deafness.

The progressive deafness, which grows at a terrifying tempo in our mechanized society endangers the human hearing in its very essence- its biology! Without the hearing organ, we won't have any human communications, which are a primary source of human knowledge and emotional happiness.

In the enclosed booklet " Are we going deaf?" I described my worries.

Would I impose very much upon you, if I ask you to help me out in this dilemma? I'm on the biologically thinking track. Ist it possible to come to some understanding with the technologically minded colleagues in the effort to save the human ear?

I shall be very greatful to you for some guidance and suggestions.

Thanking you in advance

I remain sincerely yours,

Tom Auguska