# Juergen Tonndorf, M.D., Ph.D.

## Guest of Honor at the Second International Tinnitus Seminar, 1983

*by*

R. F. NAUNTON, Director, Communicative Disorders Program, National Institute of Neurological and Communicative Disorders and Stroke, National Institutes of Health

It is extraordinarily appropriate that the organizers of the Second International Tinnitus Seminar should choose this occasion to honor Dr. Juergen Tonndorf. The printed summary of the Seminar objectives reminds us that tinnitus is a matter of concern to a remarkable spectrum of disciplines including audiology, neuropsychology, otology and psychoacoustics; and I know of no one person more thoroughly informed in each of those areas than our guest of honor, Juergen Tonndorf, M.D., Ph.D.

Juergen has many roots in Germany, from the place of his birth in Goettingen, in central West Germany but close to the East–West Germany border, Kiel in the north where he attended Medical School, and Heidelberg in the south where, for two years prior to emigrating to this country, he was an Assistant Professor of Otolaryngology at the University of Heidelberg and where he earned a Ph.D. and certification as a card-carrying otolaryngologist. His father was Professor and Head of the Department of Otolaryngology at the University of Leipzig; and Juergen spent his early school years and later completed an internship in Dresden—cities now both behind the iron curtain in East Germany.

Juergen's age and training as a physician determined that he would serve his country during World War II. He served in the Germany Navy; but even during those wartime years his expertise in otolaryngology and his proclivity for research developed and flourished. His earliest publication, in 1939, dealt with the anatomy and physiology of the nose; but the last of his publications reporting work carried out in Germany, clearly reflected a beginning focus on the vestibular and the auditory systems—a focus that was to continue through the rest of his career.

In 1947 he emigrated to the United States of America and joined the School of Aviation Medicine at Randolph Field in Texas. He stayed there for six years working on a variety of applied topics reflecting, no doubt, his employers' interest in hearing in noise; but his bibliography shows clear evidence of a then-developing interest in the electrophysiology of the ear—with only an occasional glance back to the days of his interest in the physiology of the nose.

In 1953 he left Texas and joined the University of Iowa at Iowa City where he stayed for the next nine years. Again, his bibliography reflects what had by then become a major focus of his research interests—the study of the anatomy and physiology of the cochlea with particular emphasis on the mechanical principles involved. His bibliography, I am surprised to report, shows no indication of the development of any interest in football during those Iowa years; but there are further signs of an occasional foray back into the area of his first scientific publication—that of the physiology of the nose; these forays ceased after he left for Columbia University in New York in 1962 and one is tempted to surmise that, while the perfume of Iowa corn may well at intervals have stimulated a throwback to his



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olfactory days in Germany, New York induced in him a permanent state of olfactory inhibition.

In 1962 Juergen left Iowa City where, during the years, he had earned promotions from Assistant Professor to full Professor of Otolaryngology. He moved to New York, taking up a position at Columbia University as Professor of Otolaryngology and Director of Research and Training in the Columbia College of Physicians and Surgeons.

His work at Columbia continued the focus on the middle and inner ears and is remarkable in part for its volume, but also for the clear demonstration that Juergen was and is a scientist well able to adapt to and to take advantage of the introduction of new technologies. He was, for example, one of the first investigators to use laser interferometry in the measurement of the displacement amplitudes of the tympanic membrane and, in collaboration with colleagues at Columbia (notably S. M. Khanna) he was one of the earliest to introduce holography to the study of the middle ear.

A considerable proportion of Juergen's investigative work has been focused on the study of hearing by bone conduction, thus extending the earlier studies of Bárány, Békésy, Kirikae and others. In the course of this work he addressed such clinically appropriate topics as the Carhart notch and the Bing, Weber and Gellé tests. The work of early investigators, together with his own substantial contributions in this area, are well summarized in his chapter on bone conduction hearing in the 1976 Handbook of Sensory Physiology edited by Keidel and Neff. In this publication Juergen proposed that, with respect to bone conduction, the ear constitutes a complex multiple input system. From the bone conduction vibrator, energy may travel along three different pathways: skin, bone, and through the interior of the skull.

These pathways come together at the level of the temporal bone and from here on, there is a signal line that goes to three separate points of input: (1) the walls of the external canal, radiating sound into the lumen; (2) the ossicles responding to their moment of inertia; and (3) the cochlear capsule which undergoes distortional vibrations. At each of these points, which represent separate inputs to the outer, middle and inner ears, respectively, the responses are altered by a number of modifying factors. Finally, all these various responses are collected and integrated with one another, the integrated response then leading to hair cell stimulation. Juergen provides a block diagram in this publication in the form of an equivalent electrical network that serves to illustrate these observations in an integrated form. This particular chapter is a delight to read and, indeed, serves well to exemplify an important characteristic of Juergen's publications and presentations at scientific meetings: he has an unerring Békésy-like abilty to demonstrate to his readers and to those who listen to his presentations, how even the most complex and perplexing problems in audition can be approached, analyzed and resolved.

Juergen has been honored by many professional organizations both in this country and in Europe. He received the Guyot prize from the University of Groningen in the Netherlands; he has twice been honored by the Germany Otolaryngology Society; and in this country he has received the Award of Merit of the American Otological Society in 1978, and the Award of Merit of the Association for Research in Otolaryngology of which he was a founding member. He is a member of the German Academy of Natural Sciences and of the Collegium Otorhinolaryngologicum Amicitiae Sacrum; and he is an Honorary Fellow of the American Academy of Otolaryngology—Head and Neck Surgery, and a Fellow of the Acoustical Society of America; and, for the past 22 years, has been a member of the American Otological Society. He is one of the small group of outstanding scientist-investigators in our field who received a Public Health Service Research Career Award in the 1960s; and he has served on Study Sections at the National



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Institutes of Health. He has worked and continues to work tirelessly with the American National Standards Committee on Bioacoustics, as representative of the American Otological Society, with the Medical Devices Committee of the Food and Drug Administration and with countless committees of our research- and clinically-oriented professional societies. Many of us can still journey back in time to the 50s and the Otolaryngology Academy meetings in the Palmer House in Chicago; they were preceded, thanks in large measure to Juergen's guiding hand, by a full day of scientific research presentations which grew, as the years went by, into the Association for Research in Otolaryngology, the "ARO", which now has over 400 members and continues to grow.

Juergen's early professional growth coincided with the transition of otolaryngology from being a surgical discipline often perforce preoccupied with saving life at the expense of structure and function, to a speciality with an increasing concern for the preservation or restoration of function. This change was stimulated as basic scientific studies in audition began rapidly to expand the body of specialized knowledge at our disposal. Medical or surgical specialization followed, with the result that otology developed into a scientifically-based speciality, just as all of medicine has suffered or enjoyed, depending on your viewpoint, the development of specialization.

Specialization in medicine is often viewed as an evil brought upon us by contriving and conspiring physicians. However, whether we regard it as benefit or hindrance, it is an absolute inevitability—the result of the expansion of our knowledge base and the general evolution of medicine and the basic sciences. That process of evolution cannot be stopped, or reversed, or even slowed down. We must accept it as inevitable and adjust to it, so that our patients gain all possible benefit from the technological advances it guarantees.

Juergen showed otologic clinicians how to benefit from the advances of science by himself serving throughout all of his American years as yet another kind of specialist—an 'Intregrator'. He allowed his practice of clinical otolaryngology to contract while his scientific interests led him deep into the scientific under-pinnings of our speciality. His self-appointed role was to provide essential liaison between the clinician and the laboratory, both in this country and abroad, a role he played and continues to play with efficiency, consummate grace and candor. This I firmly believe has been Juergen's outstanding contribution to our field, albeit one that adds little to his already impressive research bibliography.

We cannot stop the evolution of medical practice or health care delivery. It is brought about by social changes we are powerless to influence. And there are indications that the separation between basic science and clinical practice may yet widen and carry the practising clinician still further from research than is presently the case. We should take heed of the splendid example Juergen has set us, plan for the future and deliberately cultivate integrating specialists like Juergen who will re-cement us back together.

Juergen, we honor and thank you for the role you have played and are playing so well and for the lessons you have taught us. Oh that we could clone you!

**Reference**

TONNDORF, J. (1976) "Bone Conduction", in *Handbook of Sensory Physiology*, Vol. 5, Pt. 3, edited by W. D. Keidel and W. D. Neff (Springer-Verlag, Berlin), pp. 37–83.



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