

# Hearing and Hearing Impairment



Larry J. Bradford and William G. Har

# HEARING AND HEARING IMPAIRMENT

*Edited by*

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*To those hearing-impaired persons  
and their families from whom we  
have learned so much.*

## Preface

The management of persons with impaired hearing and what the world thinks of them, whether or not they may appropriately be called “deaf,” varies considerably from one society to another. This is a complicated matter often determined by variations in philosophy, religion, and the science of the times. A basic problem arises from the fact that most people know relatively little about hearing, and care little about this earliest and most influential function of mankind and its potentials for learning, until something goes wrong with the auditory structures, or until parents realize that their offspring has a maldeveloped or injured sensory system. The public’s general attitude has been strengthened over the years by scientific error and misconceptions of “fact,” and reinforced by various religious dicta that only divine intervention could cure the loss or lack of hearing.

What passed for a science of hearing—now called audiology—was restricted for centuries by such assertions as that of Plato in the seventh book of the *Republic*: “Men expend fruitless labor, just as they do in astronomy, in measuring audible tones and chords.” “Yes, by heaven,” he continued, “and what fools they make of themselves, talking of densities and what not.” The social and educational status of those with impaired hearing was directed for more than fifteen hundred years by Aristotle’s pronouncement in the *History of Animals*: “Those who are born deaf all become senseless and incapable of reason.”

Although ancient and medieval thought was keyed to the belief that the

deaf could not obtain salvation because they could not be taught (“Faith cometh by hearing,” Romans X,10), it was the zeal of 16th-century missionaries that extended the Kingdom of God by bringing faith to the multitudes who were for the most part illiterate. This brought about a genuine breakthrough for those with impaired hearing of whatever degree.

Demonstrations by Charles Michel de l’Épée in France of a system of signs and by Samuel Heinicke in Germany of an oral system opened some genuine frontiers for the education of those with seriously impaired hearing. Unfortunately, these two intellectual pioneers were in quite sharp disagreement about rationale and procedure, and their diverse theories and attitudes opened a chasm that has not been serviceably bridged yet.

Lacking such a bridge, this book has been designed in several ways to fly over the chasm. It is not designed to resolve the problems of the education of the deaf. It is about hearing quite as much as it is about hearing impairment.

With more than fifty authors and two editors, this effort inevitably becomes a tome, a large undertaking that includes many topics of quite diverse interest and concern. Some of the experiences, opinions, data, and interpretations that are presented seem entirely clear. Some issues of one sort and another are presented on what apparently is firm ground. Others may be considered controversial and, therefore, subject to complaint, if not to change. Without much question, this selection of writers and their opinions insures that this tome is not a tomb. It is

quite inconceivable that most informed readers will agree with everything in this book. That, we believe, is good, so long as they can be informed.

There are many references in the Bible (and probably in the Koran and in many other admonitions about the fundamentals of religion) to deafness and "the deaf." Only in quite modern times has a statement about "hearing impairment" been made. This is not a casual development, for only in modern times has it been possible to help those who do not hear well to function with a disability rather than with a handicap. Much of this state of affairs has to do with developments and new insights in medicine and surgery. Much has to do with related developments and insights in education. And even more with a combination of the two, with some realization of the point that all this is not a "one-man show," that what must be dealt with is a chronic state of affairs, not subject to cure but, rather, to society's awareness, compassion, and insistence that the individual not only be permitted but encouraged to do his best as he understands that "best." Such statements as these, which the editors freely undertake to make, have nothing to do with past and current polemics. They have much to do with human nature and a persistent wish to see it operating at its best, for an individual and for a society.

All of us concerned with hearing and hearing impairment have so much "going for us" that we can ill afford to ignore. It was not always so. Persons with impaired hearing of various degrees—mild, moderate, severe, or profound—have usually been subjected to "current attitudes." Those with profound involvements (whether of hearing, or listening, or both) have commonly been casualties in what has been termed a "One Hundred Years War." With due regard for l'Épée and Heinicke, who undertook a warm correspondence in Latin, it might as well be a

"Two Hundred Years War." One of the leaders in the education of the deaf wrote a few years ago that this war "has been characterized by emotion on the part of both educators and parents, by lack of precise thinking including the understanding of terminology and definition of terms, and finally by lack of perspective in regard to the appropriate relationships between means and ends" (Brill, 1970). Some of the failures in the education of the deaf have been attributed to "the ostrich syndrome." The features of this set of attitudes are human and formidable: first, an inability to accept change; second, an inability to recognize some of the implications of current research on hearing impairment; third, a failure on the part of many educators of the deaf to undertake sound research (which involves inquiry, not political attitudes), and thence to castigate those who do; and fourth—back to the ostrich—to bury their heads in the sand and hope that current trends toward change (or difference) will disappear, or, at worst, that other findings will appear to justify the *status quo* (McLure, 1973). For centuries, the widely varying attitudes outlined here have generated controversy and conflict. With the insistence from parents (now the national law in the well-known PL 94-142) for adequate services for their children's needs, and with the accompanying demands for professional accountability, it seems entirely warranted to believe that the contention, animosity, even hostility that has been so apparent among professional persons is no longer appropriate nor acceptable in these late years of the 20th century.

Once, not very long ago, one could have asked "who are the hearing impaired?" and "who are the deaf?", including the former term in the latter, but not *vice versa*. Perhaps these questions are no longer pertinent. It has been suggested that being deaf is a state of mind and of

limitations of the mind, not simply a "condition of the ears." The expression "falls on deaf ears" is old in the folkways of the language. One often hears professional persons referring to "deafness" as an inclusive term ranging factually from a temporary 20–25 dB hearing loss as a result of upper respiratory infection to a genetic state that is at least subtotal. This employment of terms is scarcely a useful mode of communication. Definitions must be made specific and communicative judgments must be refined.

This book is designed to contribute to a possible integration of various and often differing opinions, approaches, procedures, and techniques in working with and aiding those afflicted with what Dr. Samuel Johnson called "the most desperate human calamity." It provides a forum from which readers may envision new configurations and relationships, and from which fresh approaches to inquiry, techniques, and demonstrations may be generated. The text is divided into six parts: backgrounds, sciences, programs, mental health, societal issues, and delivery systems for today and tomorrow. The first, "Hearing Impairment in Man," sets the historical stage in presenting the backgrounds of the several professions that address themselves to our most fundamental and phylogenetically oldest sensory modality. The second, "Sciences of Hearing and Hearing Impairment," is designed to contribute to an understanding of ordered and disordered hearing, language, and speech, with considerable attention to instrumentation and its use; the chapters represent broad points of view. The third part, "Programs and Practices with the Hearing Impaired," presents various techniques and procedures

used in education and training by teachers and directors of programs; subsections deal with multiple problems, aspects of learning disability, special education in school systems, and problems in the rehabilitation of adults with impaired hearing. The fourth part, "Mental Health and Hearing Impairment," offers information from psychiatrists, psychologists, and sociologists concerning behavioral problems and possible adjustments related to auditory involvements. The fifth part, "The Hearing Impaired and Society," offers information about professional services that are available, a variety of social and recreational services for those with impaired hearing, a discussion of some important legal issues, religious programs, vocational training, noise control at work, and some of the difficulties and achievements of parents and of adults with hearing problems. The sixth and final part describes the delivery systems presently available and planned for the future in order to improve the well-being of "consumers" as individuals and as minority members in a hearing society. The entire book is concerned with public health in a broad sense; part six is concerned with what actually happens, or can happen, relative to the health of one group with special problems that should be understood in a vast society.

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# Hearing Impairment in Man

The first section in this book addresses the major aspects of hearing and hearing impairment. Perhaps there can be general agreement that one must know about hearing and its uses in the complex societies of mankind before presuming to offer opinions about the description and management of hearing impairment. This usually seems to be a basic requirement of knowledge, although it must be admitted that it is not necessarily a universal practice. What is quite obvious, on the other hand, is that every idea has some sort of history. The shapes and forms of this history may be varied, indeed, but they are there.

What follows in Part I is a series of ideas, impressions, experiences, and convictions from three distinguished writers and investigators. Among them, they have contributed immeasurably to our general topic. Here they express themselves both as historians and as participants of far-reaching events in nearly 50 years of the emergence and development of important ideas about hearing and hearing impairment. They have been pioneers in clearing the forests to open up new ground for the planting and flowering of fruits that were scarcely visualized 50 years ago.

In Chapter 1, Dr. Bordley and Dr. Brookhouser present a masterful and scholarly overview in their "History of Otology." It is a

fascinating story of development in one branch of medicine and, much later in modern times, of surgery. In early records of otology in Egypt in the second millennium B.C., this was a function of the priesthood, a most powerful sociopolitical organization. As the writers remark, their work "had reached a very high degree of specialization." Age by age, century by century, the story is traced to the present day, with multiple and invaluable references to specific personalities and achievements. It will interest the younger audiologists of today (and, one suspects, most young otologists) to learn that it took over 3000 years of development and change before seventeenth-century anatomists of otology conclusively demonstrated that aural discharge was not leakage from the brain. This is an excellent overview executed with authority and clarity.

Arrangements had been made for a fairly extensive treatment of the history of audiology. Unfortunately, and for various reasons, this did not work out. The editors will try to fill in.

Although some claim that the term "audiology" had been used casually in earlier years, it was not until World War II and the years immediately following that it came into being as a master term for the "science of hearing." This occurred largely because of the insistence of Dr. Norton Canfield on a definition and on the re-



cruitment of groups of eminent otologists and audiologists in working out principles and facilities for resolving service-related claims of hearing impairment.

By 1947, shortly after the war, a few clinics had been initiated, some in the Veterans Administration and a few in university clinical centers. The demand for services was great, for these were fresh ideas. From these beginnings burgeoned a tremendous array of research and clinical practice about hearing and hearing impairment, which we now call audiology. In many respects the work has scarcely begun. It is an aspect of the times that infants endure who used not to do so and that individuals many live with multiple problems of which some kind of hearing impairment is only one of the difficulties of learning and living in a complex society. As well, at the other end of the spectrum of life, a major infirmity of advancing years is increasing loss of hearing that can only bring further discomfort with the usual problems of the aging processes. Much that had been learned in the treatment of men in the Armed Forces could be applied to the needs of the private sector. New kinds of test equipment, developed for service needs, became available for general use. Vacuum-tube hearing aids that had been restricted to the Armed Forces Rehabilitation Centers, both Army and Navy, were available to the public for the first time.

Early in this shift into private use, a formidable demand arose for evaluation and guidance with regard to babies, young children, and school-aged children. This involved close clinical integration with otology, neurology, and psychology and with those concerned about child development. Involved, as well, was close liaison with the hearing aid industry. Indeed, it could well be said that a major aspect of clinical audiology with children has been a kind of diplomatic service between medicine and education, with neither group understanding much about the other's principles and practices. This situation has not changed remarkably in the past 25 years.

The Veterans Administration has for many years had a full complement of clinical centers in the field, with large and well-trained staffs.

There are now many hundreds of clinics across the country—in medical centers, hospitals, schools, rehabilitation centers, centers for the aging, and so forth. Audiology has come to stay as part of a complex of professional efforts toward evaluation and remediation from birth to death.

Goodhill's treatment of "Otologic Relationships with Audiology" in Chapter 2 offers a succinct overview with insightful observations of these various current events related to hearing impairment. He discusses detection, measurement, varieties of treatment for amelioration, and understanding, of which careful diagnosis and thoughtful follow-up are of principle importance. Indeed, one can envision from his view a slightly different term that might well describe what is recognized and practiced as a combined effort in the patient's best interests—this would be the clinical science of "oto-audiology."

A third view of these historical perspectives is presented in Chapter 3 in Flint's treatment of the "History of Education for the Hearing Impaired." Again, there appears to be gathering strength, in a genuinely positive fashion, for turning away from the classical use of the terms "deaf" or "deafness" about which some of the most influential "ancient ones" had such positive attitudes and so few facts. For better or worse, despite the best efforts of oto-audiology in terms of medicine, surgery, and audiological management in rehabilitation, a sizable proportion of infants and youngsters through school age require very special work in education and in relations among hearing, cognition, and the processes of learning, to the end of joining a society that is, for the most part, verbal in its symbolic habits. Some of the background and much of the foreground of these needs and efforts are treated with genuine discernment and respect.

These various presentations are handled with a broad catholicity that can only augment the useful gleanings from the past and offer insightful vistas for the future. This, indeed, is considered to be a major goal of this book. What follows, it is hoped, will offer nerve and muscle to develop the historical skeleton.

L.J.B.  
W.G.H.

# 1

## The History of Otology

### OTOLOGY

Otology, like the other fields of medicine, had its beginning before recorded history, and when relatively accurate records were made, it was described by a number of historians. In its early period, otology seems to have been practiced by priests of various religious orders, where knowledge in medicine was passed on to them by their elders. Surgery was not practiced on the ear before the eighteenth century, which was most fortunate because the early practitioners lacked knowledge of the complicated neurological and mechanical structures lying in the temporal bone. On the other hand, nonsurgical therapy as described in the early records was not only ineffective but also in many instances revolting. Early medical writing concerned the eye and the ear to a much greater extent than the problems of the nose, throat, or larynx.

Some of the first descriptions of otology were found in the *Ebers Papyrus*, which was written about 1600 B.C. (*Papyrus Ebers*, 1971). In this work, we see that Egyptian medicine had reached a very high degree of specialization in which one priest might specialize in deafness, another in running ears, and a third in epistaxis. Long lists of therapeutic agents are presented in the papyrus; the less noisome of these are such compounds as those composed of ground ass's

ear, red lead, caraway, and olive oil, which were mixed and injected into the ear. Goat's urine mixed with various ashes such as bat's wing, ant eggs, or lizards was almost a specific for discharging ears for hundreds of years in Egypt, Greece, and Rome. In the *Ebers Papyrus*, very little is said about diagnostic signs and symptoms, but there was a therapeutic protocol outlined for the instruction of priests. Later in the *Hermetic Books of Thoth* (Stevenson and Guthrie, 1949), we see medical practice rigidly prescribed, and if these treatments were not applied for at least 3 days before any changes were made, the physician might lose his life. Around the fifth century B.C., Herodotus (Camac, 1931) described the hygienic customs of the Egyptians, which included otologic therapy, and at about the same time, Pythagoras investigated the physics of sound. He noted that chords of different pitch were elicited when a blacksmith struck the same anvil with hammers of different weight, and by using different lengths of string, Pythagoras was able to construct a musical scale.

An improved type of medicine was recorded for us by Hippocrates around 400 B.C., who taught bedside observation of illness and pointed out the importance of pulse rate, temperature, and respiratory rate (*Genuine Works*, 1891). He wrote about the symptoms of diseases, the