

PEEP SHOW  
IN  
SUDDEN HEARING LOSS

Reg.No.M8908

AN INDEPENDENT PROJECT WORK SUBMITTED IN PART FULFILMENT FOR  
FIRST YEAR M.Sc., (SPEECH AND HEARING) TO THE UNIVERSITY OF MYSORE

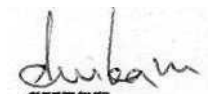
ALL INDIA INSTITUTE OF SPEECH AND HEARING: MYSORE - 570 006.

MAY 1990

MY DEAR THATHA & PATTI  
AND  
TO ALL PEOPLE FOR WHOM IT  
IS INTENDED

## CERTIFICATE

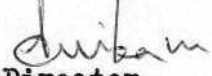
This is to certify that the Independent  
Project entitled: PEEP SHOW IN SUDDEN HEARING  
LOSS has been prepared under my supervision  
and guidance.

  
GUIDE

CERTIFICATE

This is to certify that the Independent Project entitled: PEEP SHOW IN SUDDEN HEANING LOSS is the bonafide work done in part fulfilment for First Year M,Sc., (Speech and Hearing) of the student with Register Mo.M8908.

Mysore  
May 1990

  
**Director**  
All India Institute of  
Speech and Hearing  
Mysore-6

**DECLARATION**

This Independent Project entitled: **PEEP SHOW**  
**IN SUDDEN HEARING LOSS** is the result of *my* own study  
undertaken under the guidance of *Dr.* (Miss) S.Nikam,  
Professor and Head, Department of Audiology, All India  
Institute of Speech and Hearing, Mysore and has not  
been submitted earlier at any University for any other  
Diploma or Degree.

Mysore  
May 1990

Register, No, M8908

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### ACKNOWLEDGEMENTS

My sincere thanks to Dr.(Miss) S.Nikam, Professor and Head of the Department of Audiology, All India Institute of Speech and Hearing, Mysore for her guidance and help.

I sincerely thank the Director, AIISH, Mysore for having given me an opportunity to undertake this study.

'akka' you have been a source of immense help and moral support. Thank you.

I don't think Jyots and Yam will forget my nagging them. Thank you for bearing with me.

Among friends there is no THANK YOU. But... it is the least I would like to convey to all my colleagues including...!!!

# INTRODUCTION

Facts are shocking BUT figures illuminate them!  
Hence, here we 'GO' to get an insight into  
the multifaceted facts of Sudden Hearing Loss!!!

Deafness, never of itself  
Killed anyone, BUT who can count  
the lives it has wasted!

So folks, ARISE, AWAKE and STOP not till you've  
cast your ignorance!

A GLIMPSE, a GLANCE, a PEER, a PEEP is  
all that is required now - to get to know about  
an entity which was practically unknown a few  
decades ago. Nowadays, everybody seems to know  
what Sudden Hearing Loss is?

But do we really know? Is it a disease  
of its own? Has it split up....?

The sudden onset of severe or total hearing  
loss is a most dramatic event in the life of  
the person who is so afflicted. Its causes are  
frequently obscure. Its symptoms are varied and  
often fluctuate. Treatments have run the gamut  
from verbal reassurance to radical surgery to the  
application of leeches. The prognosis, known so far is  
a matter of chance.

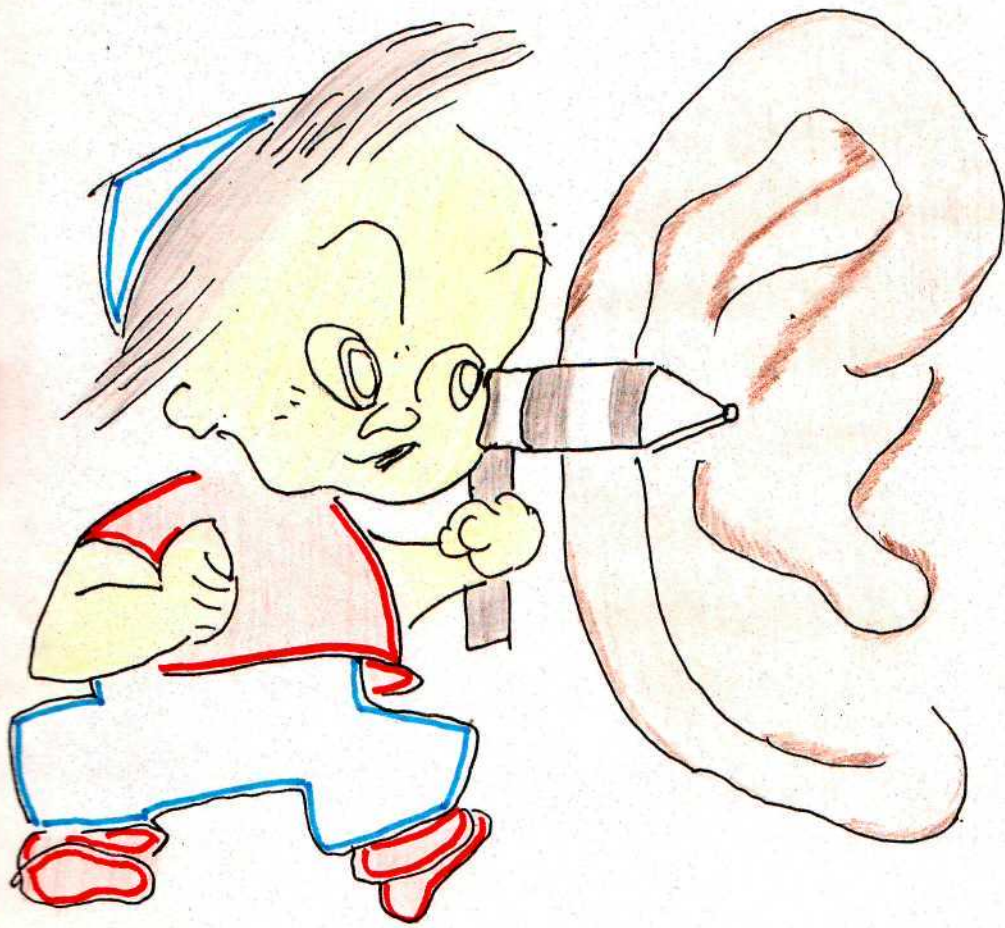
But then, has man ever settled with the  
attitude of the fox who considered the unattainable  
grapes sour?! If it were so then progress would be  
unknown. It is his quest for knowledge and the  
drive to unravel the unknown aspects of events and  
phenomena that has won him in the race against  
the phenomena/events.



It is with this in mind, that we "PEEP" into the domain of this mysterious event of Sudden Hearing Loss:

- to get an idea of what is KNOWN about it ; what has been unravelled so far ;
- which in turn, will help in sowing new seeds of knowledge about the unknown ;
- and thus pave the way for future advances .

# Focus



Well let's introduce you to the one in FOCUS today - OUR EAR!

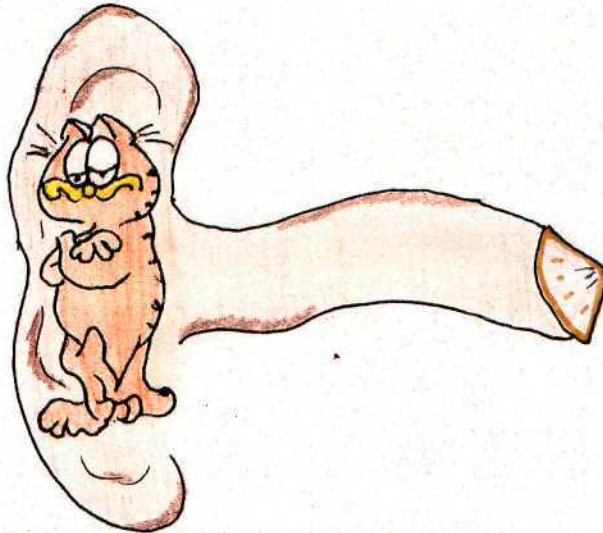
OUR EAR has had the honour of playing a triple role.



It has 3 distinct parts each unique but distinct synchronous with each other.

## EXTERNAL EAR

### PINNA



## FUNCTION

### PINNA

- collection
- direction
- localization of sound

### EXTERNAL AUDITORY CANAL

- one inch long
- open at the visible end & closed at the other end by eardrum
- skin secretes wax

### EXTERNAL AUDITORY CANAL

- useful for boosting sounds.



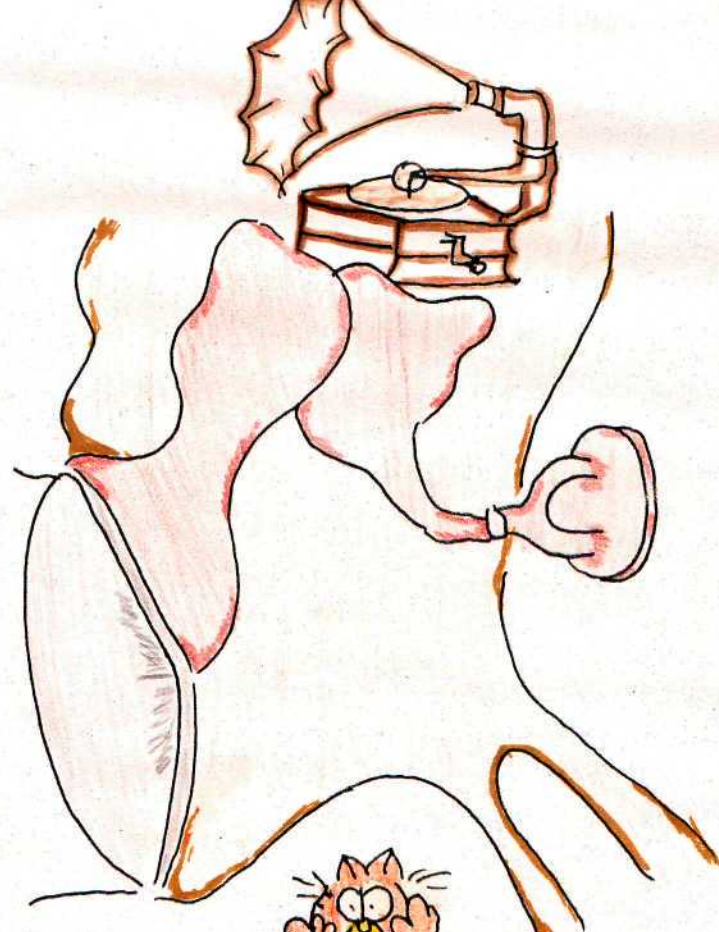
Protection from foreign body entry

### TYMPANIC MEMBRANE



- Helps in reducing energy loss along with the middle ear
- vibrates in response to air pressure changes in the ear canal.

MIDDLE EAR  
 • air filled cavity  
 • includes chain of 3 smallest bones of the body :-  
 i) Malleus  
 ii) Incus  
 iii) Stapes  
 (Ossicular chain)  
 controlled by 2 muscles → Tensor tympani & stapedius



FUNCTIONS  
 • safe and intact transmission of the signal to the inner ear

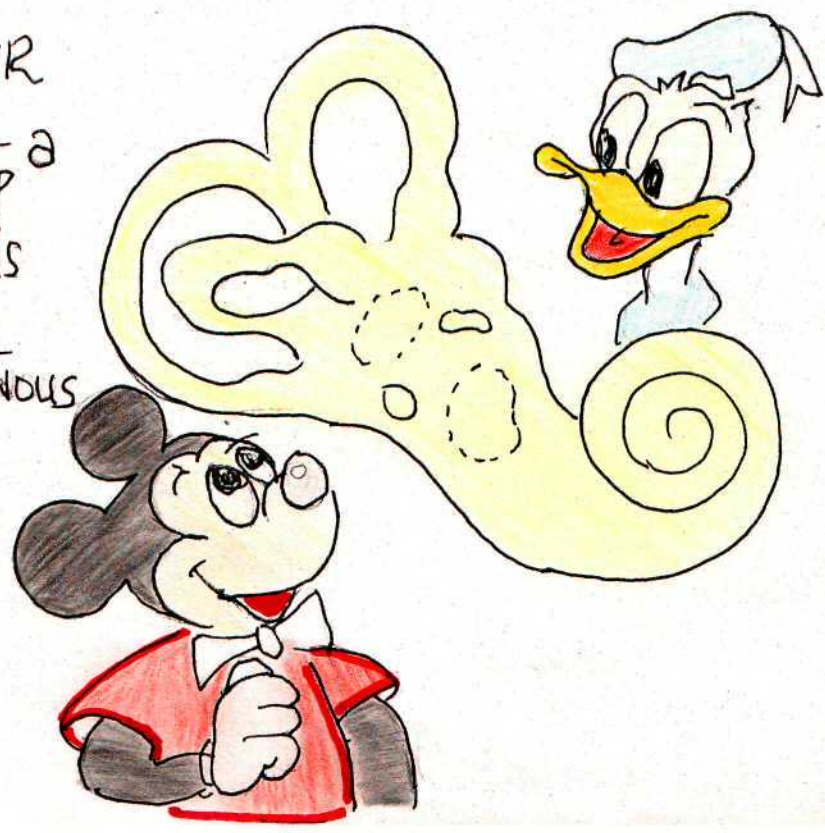
• Protect the inner ear  
 - Equalization of pressure.

EUSTACHIAN TUBE



INNER EAR  
 Labyrinth - a structure of winding paths

NY MEMBRANOUS

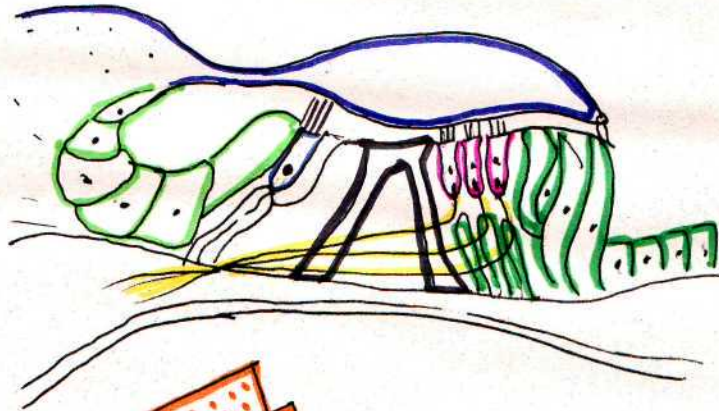


• Transmission of sound to the brain.  
 • Maintenance of Balance

# CONTENTS

## COCHLEA

- snail shaped
- includes Organ of Corti with sensory hair cells



# FUNCTION

Organ of hearing

It's movement sets up electrical signals that are carried to the brain by the 8<sup>th</sup> cranial nerve.



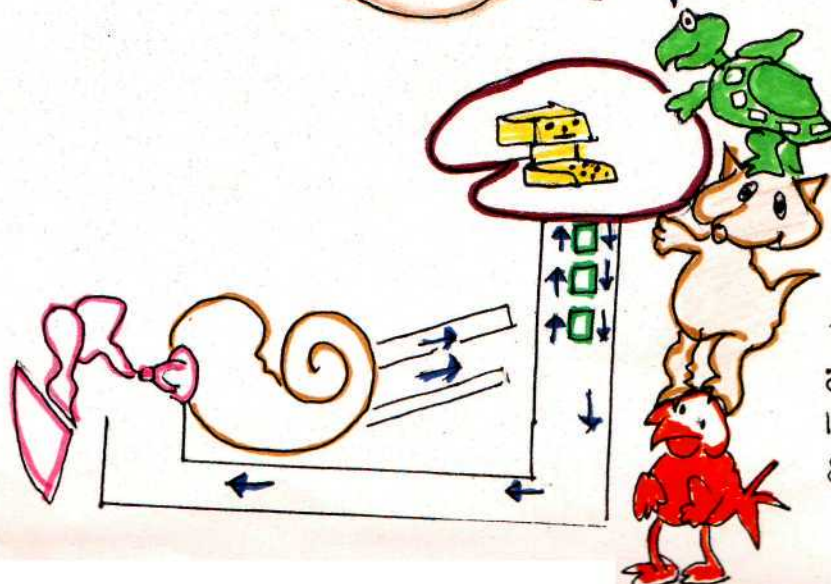
## Vestibule and Semicircular canals

Organ of Balance



## EAR & BRAIN

Includes the path between ear & brain which is a two way traffic with many stations.



8<sup>th</sup> nerve fibres pass thro' these stations to the hearing centres of the brain, where the signal is analyzed & interpreted as sound.

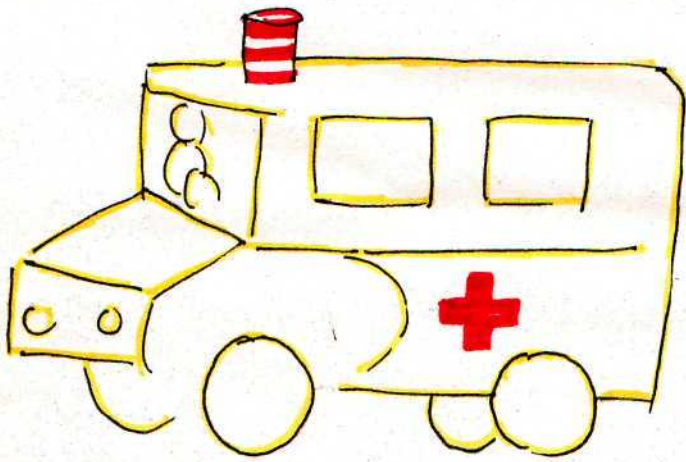
CURTAIN RISES &



SHOW BEGINS

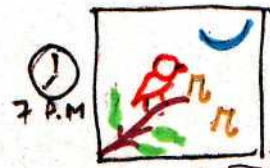
Coming to the crux of the show - SUDDEN HEARING LOSS!

Before we go onto unearthing the facts of this enigmatic act, we have for you a brief note on Sudden Hearing Loss.

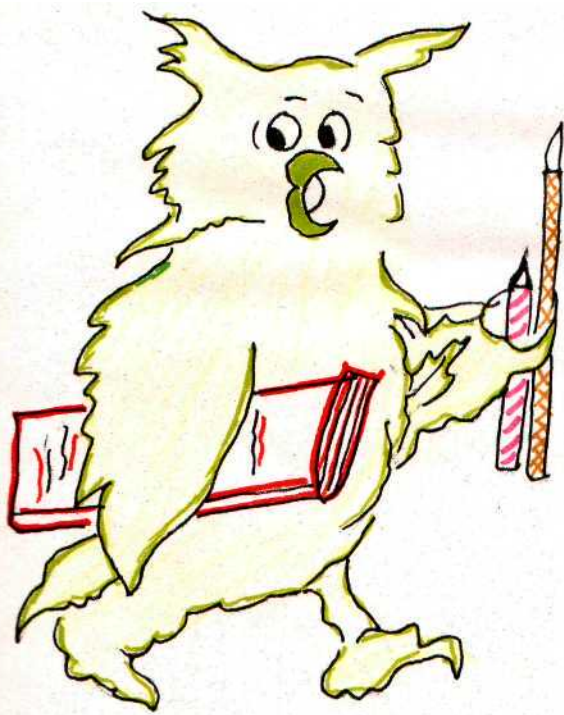


Sudden Hearing Loss is an otologic emergency!

It is defined as a hearing loss that the patient notices in an instant or one that progresses over 24-48 hours.

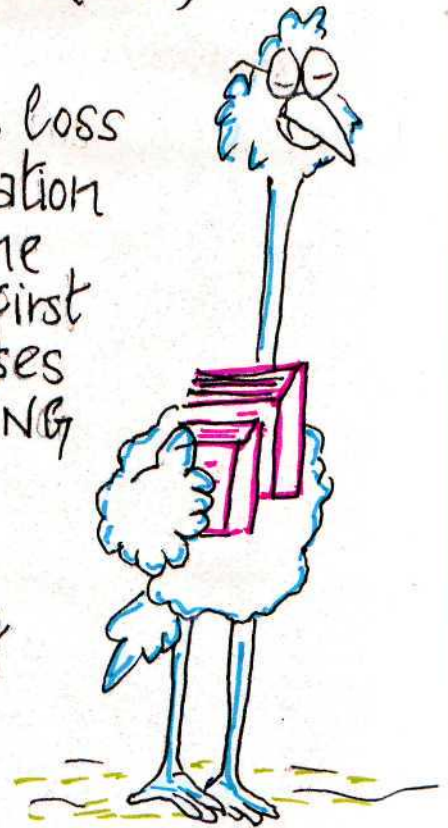


Sudden hearing loss can occur as the result of lesions in external, middle, or inner ear or as a result of brain lesions.



The first reported case of Sudden hearing loss is attributed to PROSPER MENIERE (1861)

Sudden hearing loss being a manifestation of Cerebello-Pontine Angle tumor was first mentioned in 2 cases published by LUSHING (1914)



Sudden deafness presenting as the initial symptom of an Acoustic Neuroma was first described by HALBERG (1956)

It is usually unilateral and permanent.

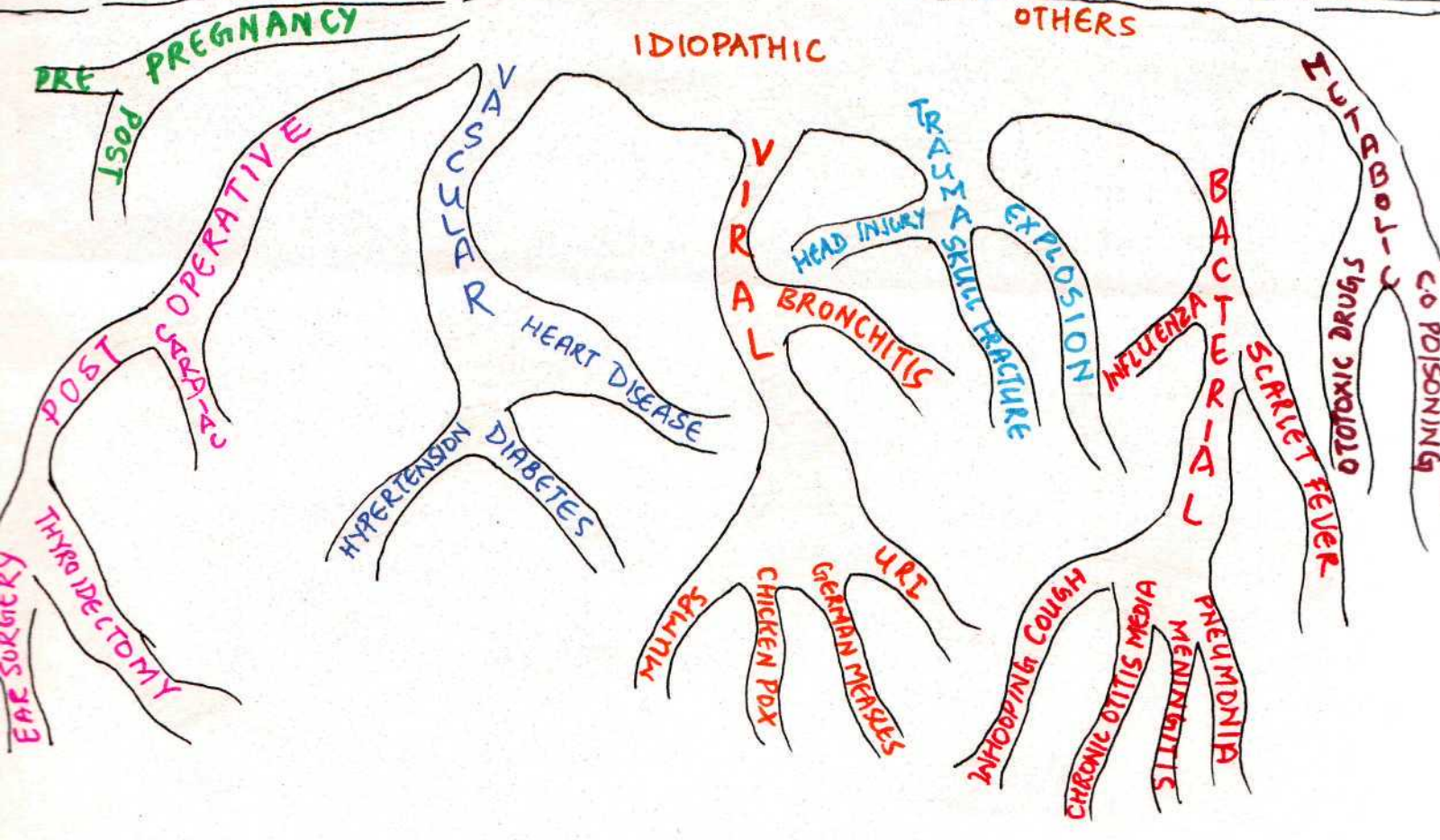
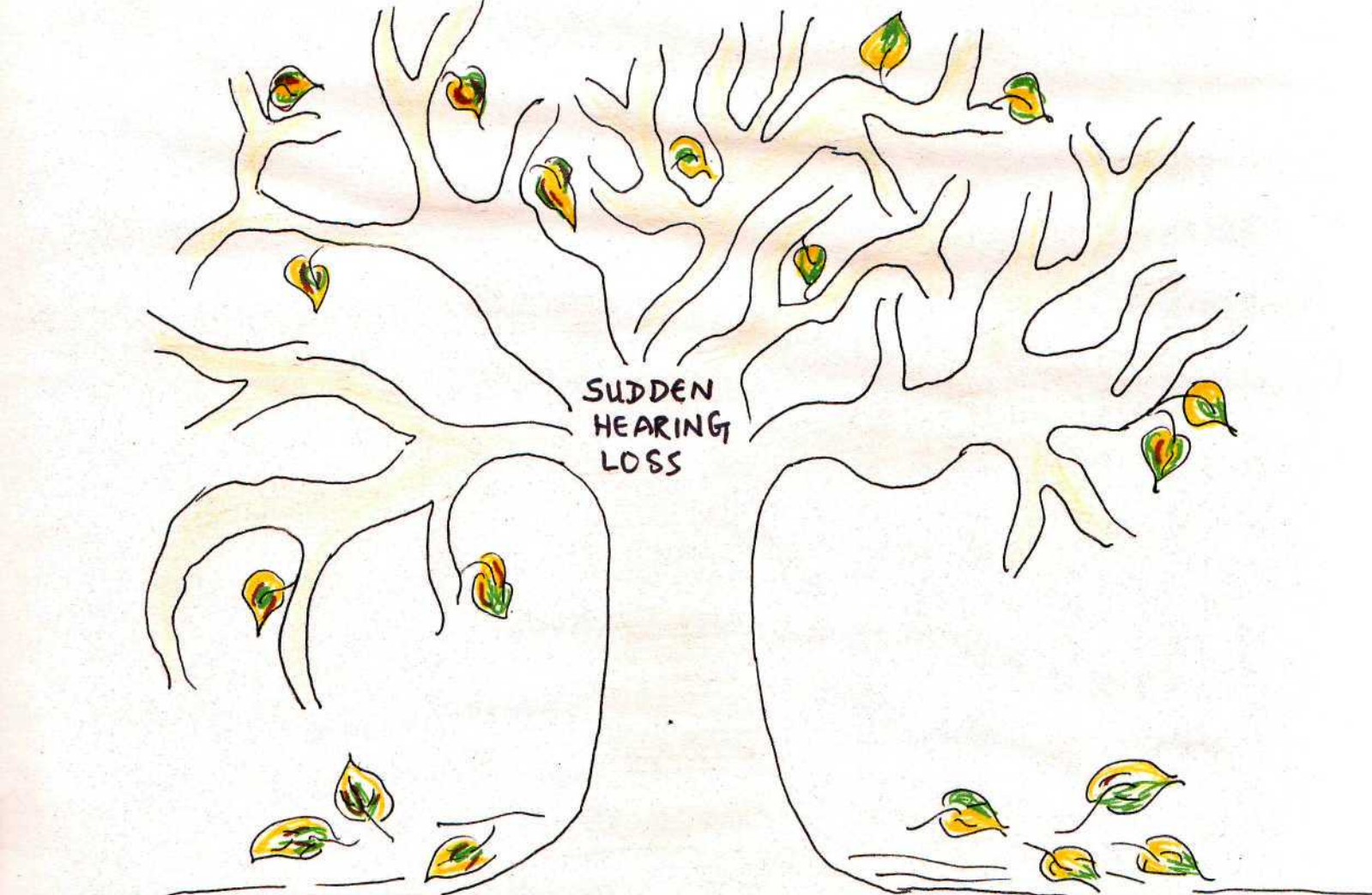


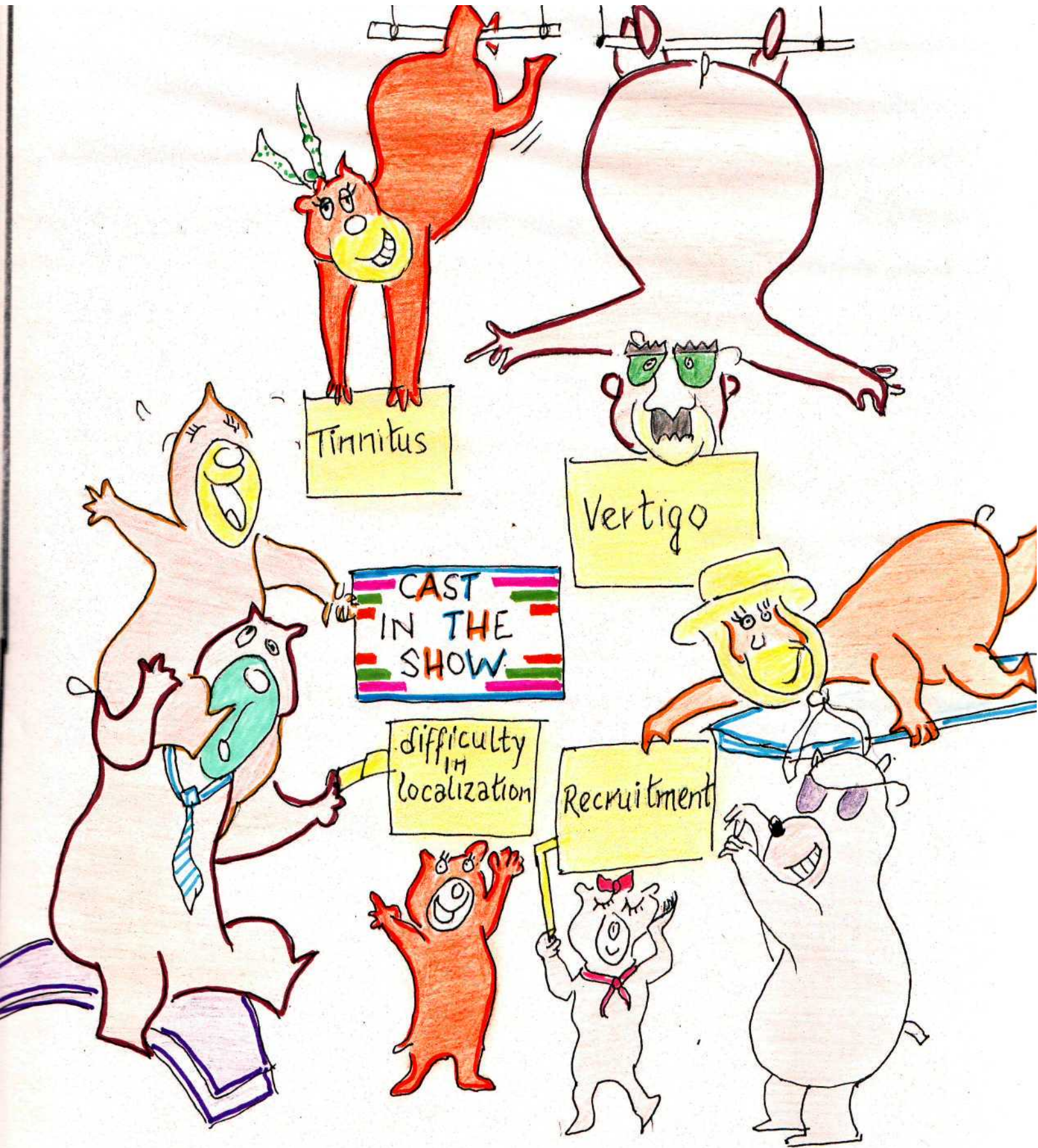


# PRODUCERS OF THE SHOW



Well, who conceived this show?  
Who made it possible?  
Of course, the ROOTS will tell you!





Neither the cast nor the characters are fictitious in sudden hearing loss. The entire TROUPE may not participate in every performance of the show or play a lead role always. The cast and the characters played can be in different configurations.



## TINNITUS

- changing in pitch
- tickling or roaring type
- usually subsides within a month.

## VERTIGO

mild or incapacitating  
less in sensorineural lesion  
rare in retrocochlear lesion



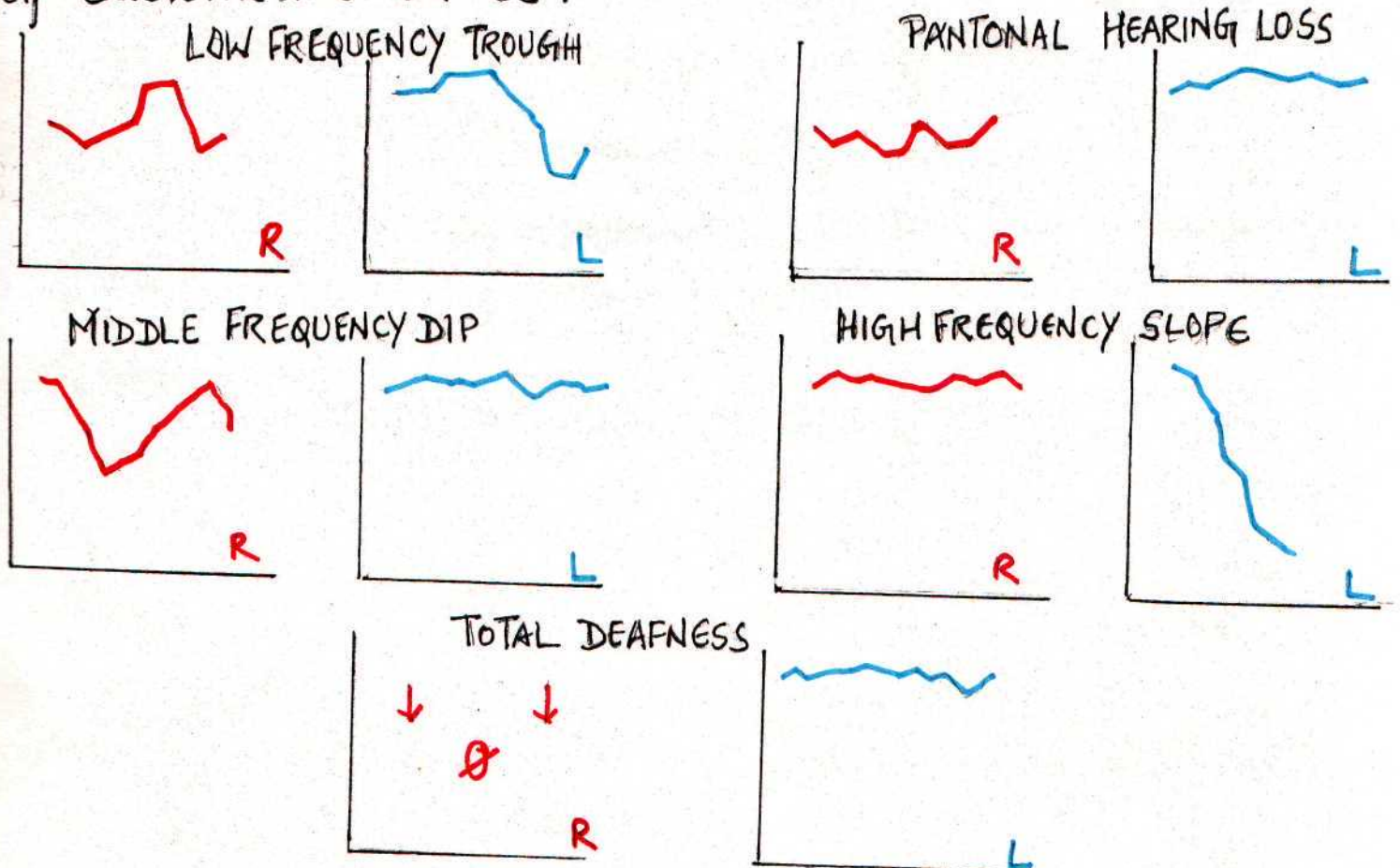
Difficulty in  
localization.



# RECRUITMENT

## AUDIOLOGICAL IMPLICATIONS

Sudden Hearing Loss may present a great variety of audiometric curves :-



# GENERAL AUDIOLOGIC PROFILE

Short Increment Sensitivity Index test  
Result: Positive

Alternate Binaural Loudness  
Balance test: Positive

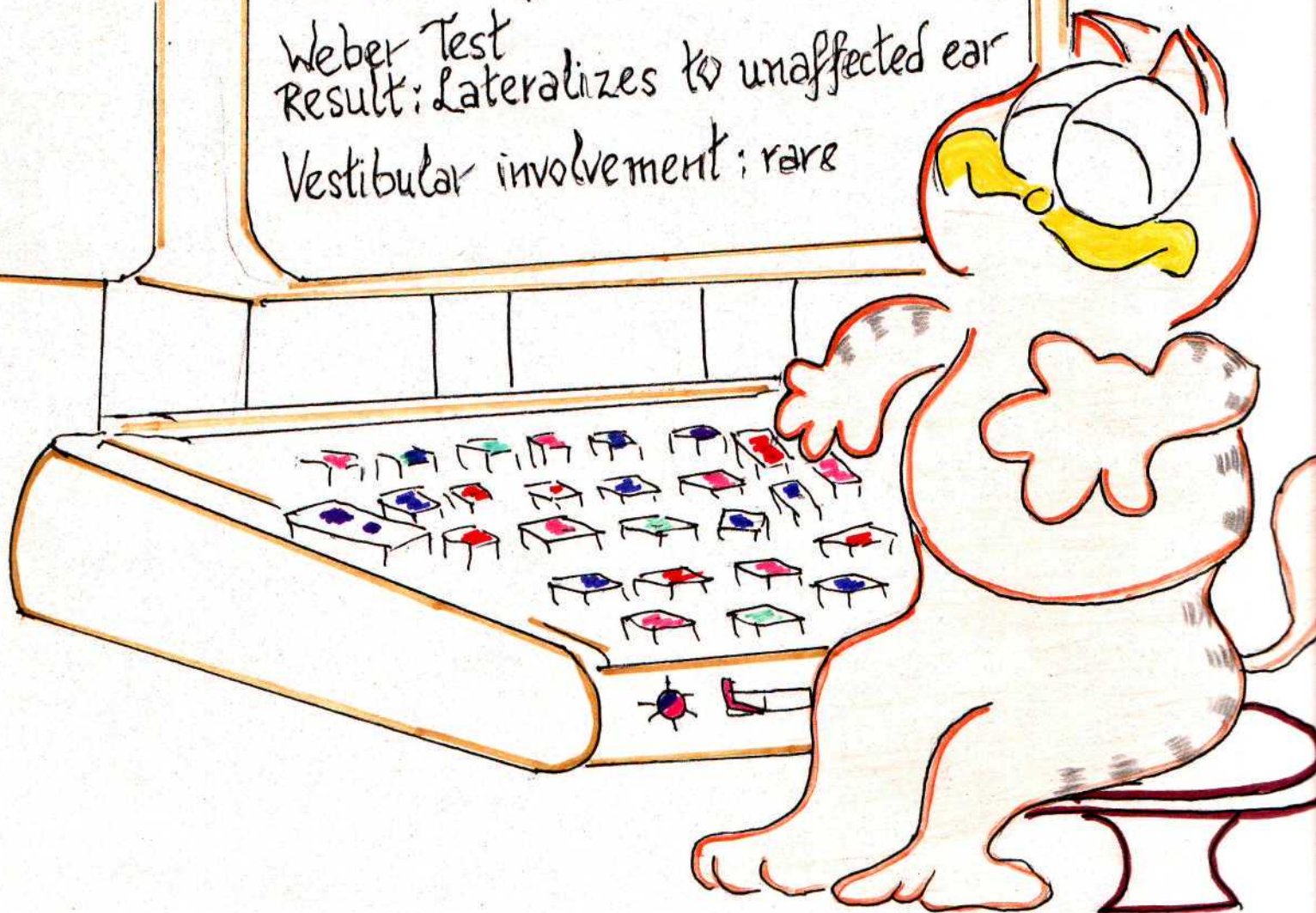
Speech Discrimination Test  
Result: Poor Score

Bekesy Audiometry  
Result: Type II or III

Tone Decay Test  
Result: Negative

Weber Test  
Result: Lateralizes to unaffected ear

Vestibular involvement: rare



# Audiologic Profile in :-

- Sudden Neural loss
- Low SISI;
  - Bekesy Type III;
  - Non measurable SDS;
  - Minimal Recruitment

- Sudden Cochlear loss
- High SISI;
  - Bekesy type II;
  - Low SDS
  - Some Recruitment

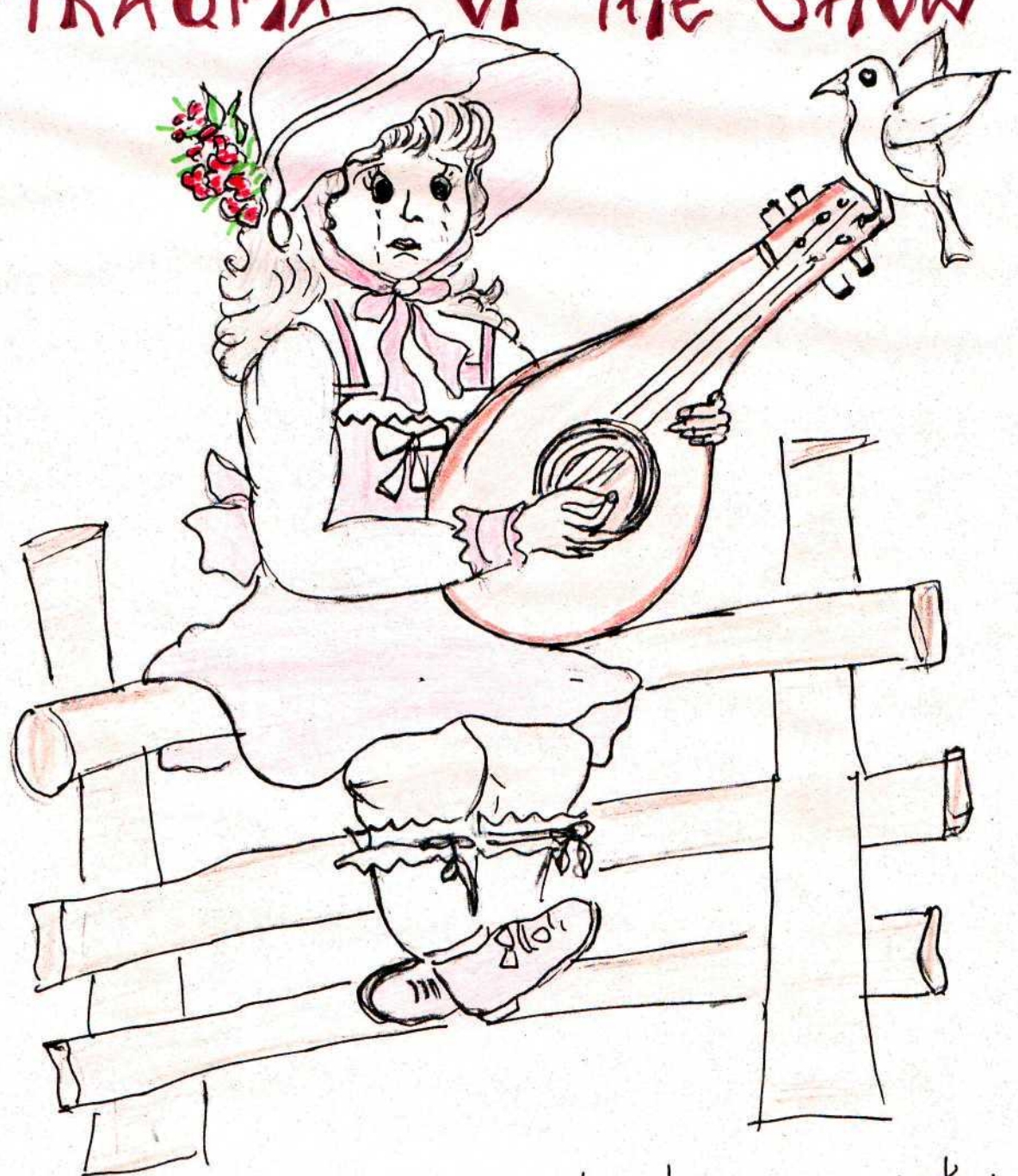
- Sudden loss due to explosion:
- High frequency loss;
  - Vestibular Vertigo not evident.

- Sudden loss due to high intensity noise:
- unilateral always;
  - flat audiogram;
  - Recruitment

- Sudden loss associated with Mumps:
- Bone conduction threshold lower than air conduction;
  - SRT higher than average
  - pure tone loss;
  - low SDS;
  - Indication of Recruitment



# MELODRAMMA OF THE SHOW



Any show can have a traumatic turning point in its course. So does **SUDDEN HEARING LOSS**! The behavior of the cast are like the puppets in the hands of the producers? How do the producers get to have such a strong hold on **OUR EAR**? What do they bring about?

Here, we have for you a glimpse of that melodramatic event of the show!!



# ROUTES OF ENTRY



Virus  $\xrightarrow{\text{viremia}}$  Membranous Cochlea

Virus  $\longrightarrow$  Perilymphatic space from subarachnoid space  $\longrightarrow$  Cochlear aqueduct  $\longrightarrow$  Inner Ear

Virus  $\longrightarrow$  Middle ear  $\longrightarrow$  Inner ear

Otitic-Barotrauma  $\longrightarrow$  Rupture of labyrinthine window membrane

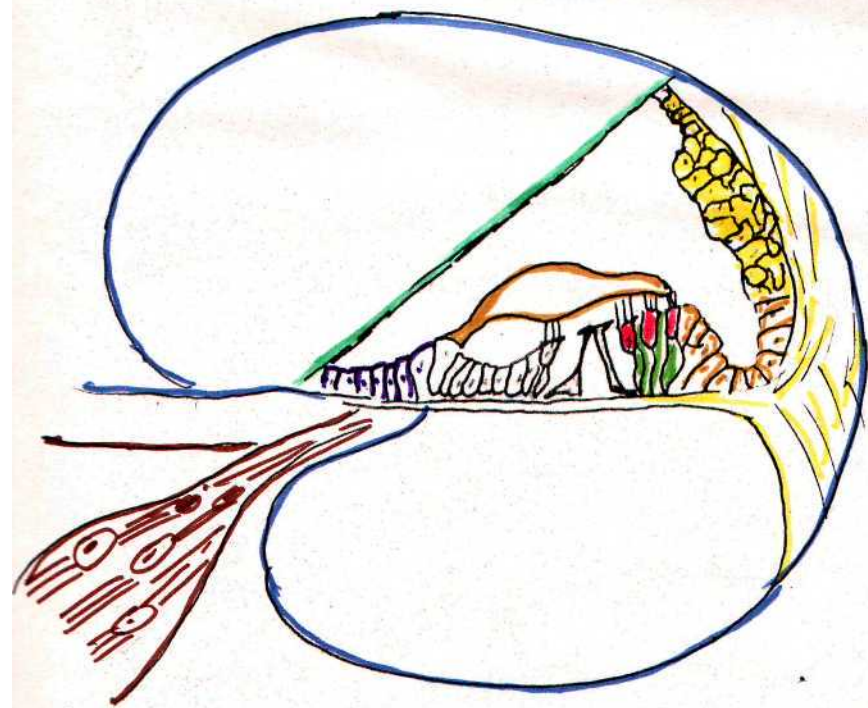
$\downarrow$   
Pressure on Reissner's, Basilar, and Tectorial membranes

$\downarrow$   
Rupture of the membranes

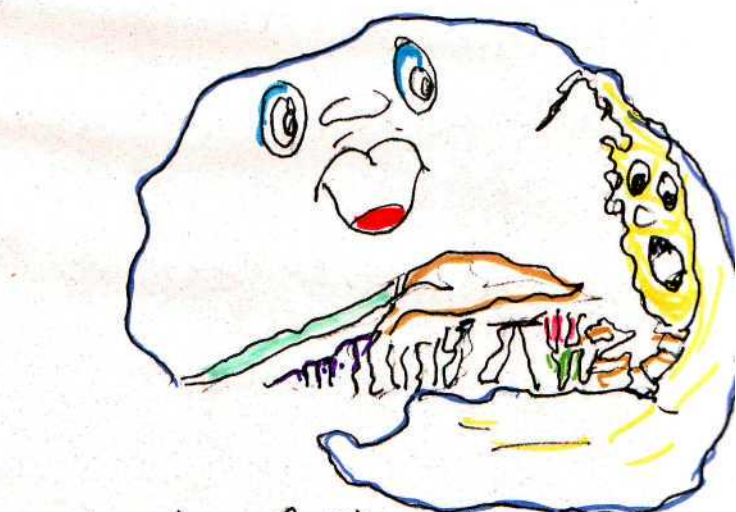
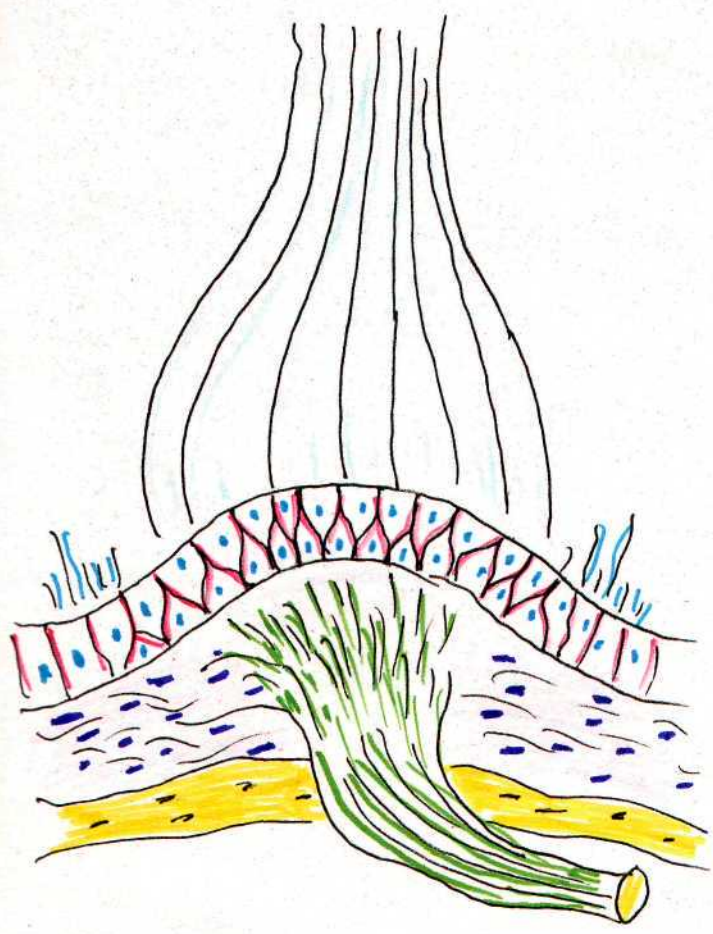
$\downarrow$   
Mixing of Perilymph and Endolymph

$\downarrow$   
Hearing loss



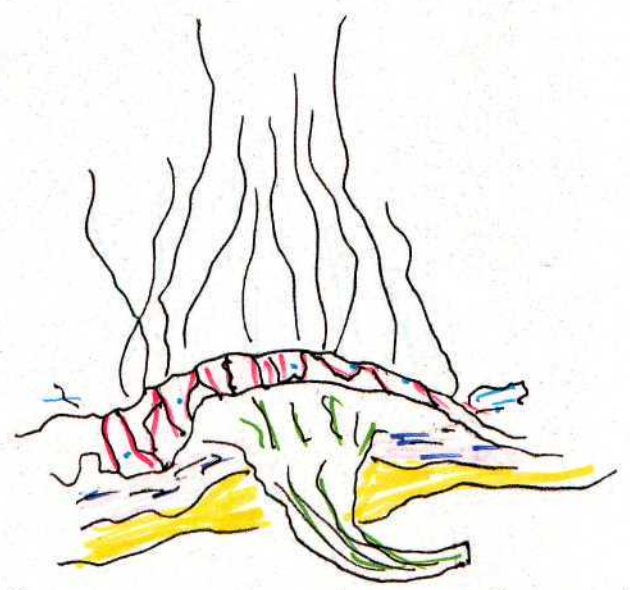


Normal Cupula & Crista



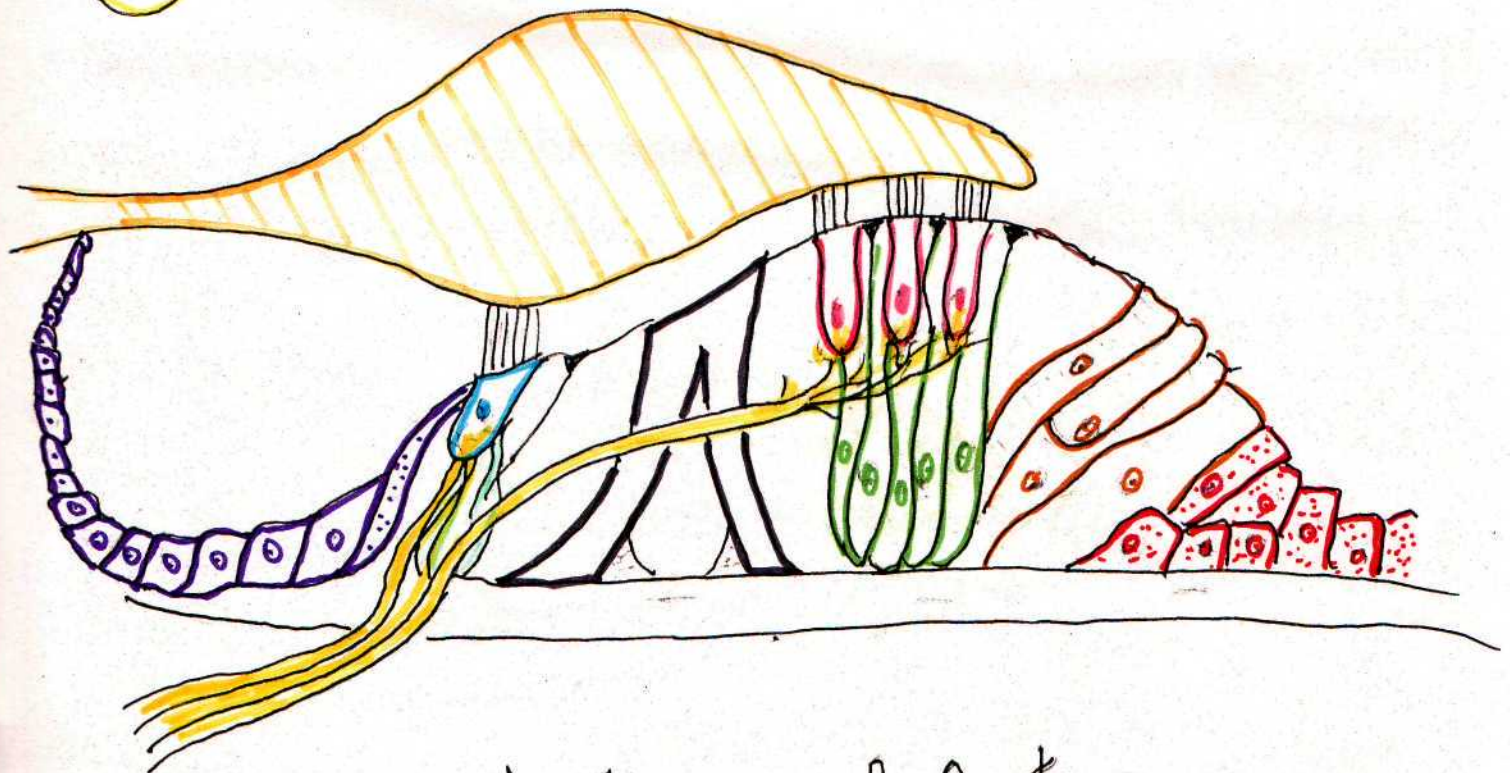
- Atrophy of Stria Vascularis ;
- Collapse of Reissner's membrane which adheres to Basilar Membrane.

Pathological Cupula & Crista

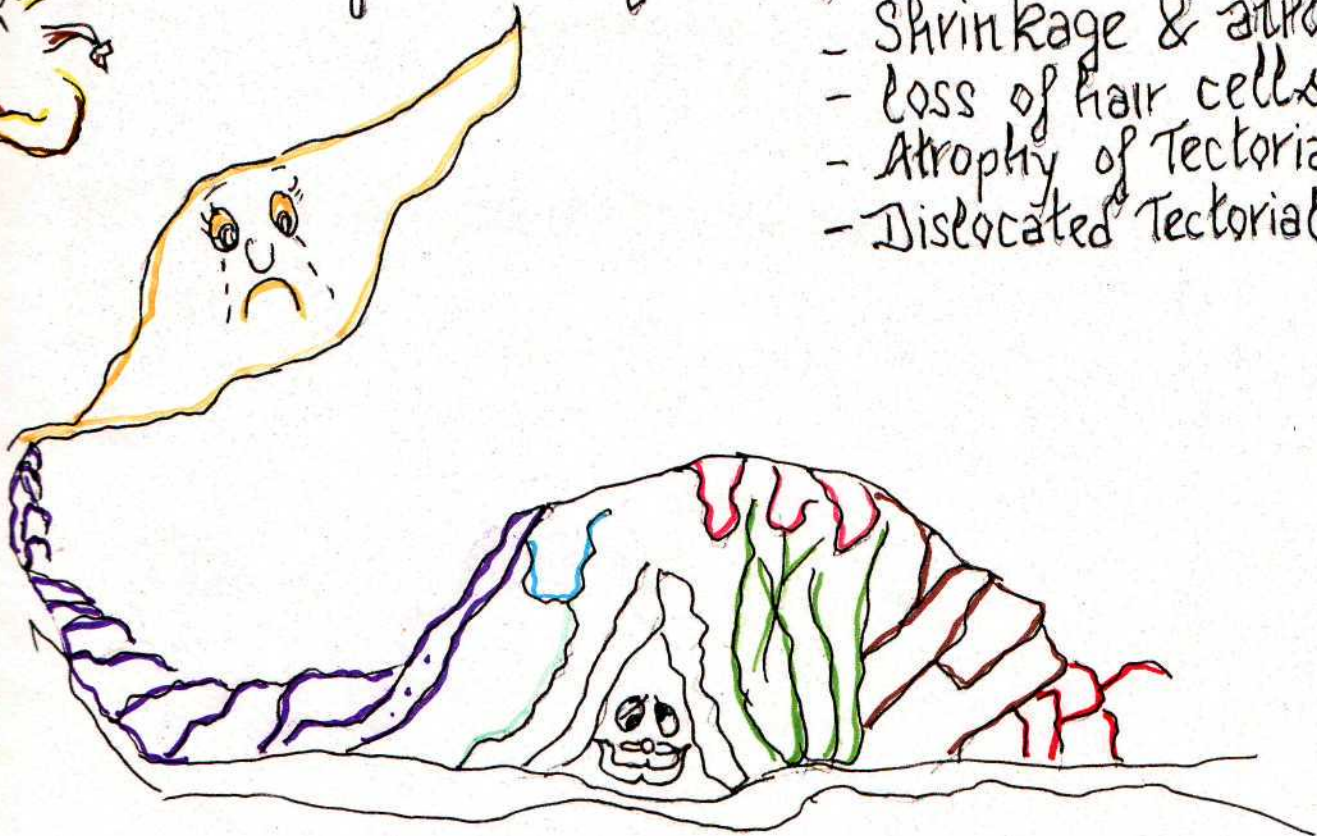


- Decrease in the number of sensory cells in ampulla, utricle and saccule ;
- Total loss of these sensory cells.

# Normal Organ of Corti



# Pathological Organ of Corti



- Shrinkage & atrophy ;
- loss of hair cells ;
- Atrophy of Tectorial Membrane
- Dislocated Tectorial Membrane.



Any show is incomplete without a finale. The last scene is often where the climax resolves. The effort is universally to show a beginning to a seeming end! Hence after having witnessed the climax in sudden hearing loss, we have for you a glimpse of the grand finale of the show!

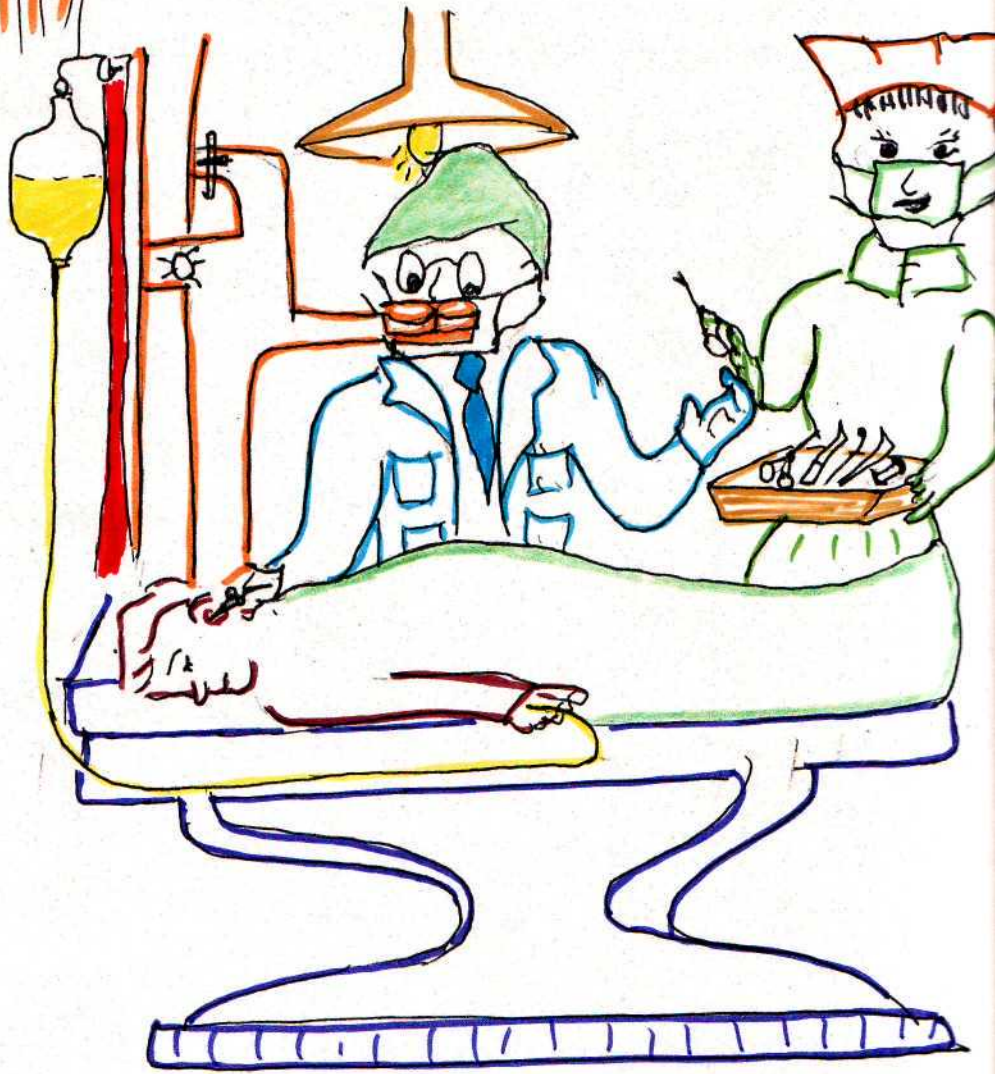


## MEDICAL THERAPY

- Based on the etiology ;
- administration of :  
 Vasodilators  
 Anticoagulants,  
 Corticosteroids,  
 Sedatives & Tranquilizers,  
 Vitamins  
 based on the proposed etiology

## SURGICAL

- In cases of Eardrum Perforation & damage to ossicles ;
- Perilymph fistula ;
- To inspect the ear structures .



## REHABILITATIVE

- Provision of suitable type of hearing aid .

## EPILOGUE

Hope this show has stimulated your dormant thought buds in :

- exploring this event further for the literature available knows no bounds ;
- in giving equal attention and care to the unassuming ears ; and
- warning the rest of the folks about this enigmatic event !!