RESULTS

* Age and sex distribution :

1 - The age of our cases ranged from 5 - 49 years with an average of (21.6 years).

They were 30 males and 20 females.

The age of the control group ranged from 23 - 32 years with an overage of (27.3 years).

2 - The main presenting symptoms were feeling of fullness in the ear, decrease in hearing and tinnitus.

* All of our patients showed dull tympanic membrane with limited mobility, injection and retraction of the drumhead.

In 5 cases an air - fluid level could be seen.

The audiogram of all cases showed a conductive hearing loss. The air-bone gap ranged from 20 - 40 db with a medium 23.4 db. Our cases were selected to have type B tympomogram with long duration of the disease (chronic OME). Early cases or those showing type C tympomogram were excluded as the mucosal changes in these cases may not be well-evident.

* Histopathology :

We classified our cases into :

Control (5 cases), serous (18 cases) and mucoid types (32 cases). The histopathological picture varied in different groups.

(1) Normal middle ear mucosa :

The lining epithelium of the middle ear mucosa was simple cuboidal type and had both dark and light cells (Fig.1). Normal rough endoplasmic reticulum and normal nuclear contour was found (Fig.2).

(2) Serous Otitis Media :

The epithelial membrane was thickened due to active secretory condition, though oedema was very distinct in the intercellular space (Fig.3,4 & 5). The basement membrane was thickened, oedematous with swollene collagen fibers (Fig.6).

The oedema was very marked in the propria (Fig.7,8,9,10,11), due to transudation or passive secretion in the lamina propria. Intercellular infiltrative cells inside the epithelium was marked including lymphocytes (Fig. 12,13,14), monocytes (Fig. 15) and other leucocytes that were escaping from the distended proprial blood capillaries due to hyperaemia. The proprial transudation included also escaped red blood corpuscles (Fig. 16).

As a result of hyperaemia and over - distended blood capillaries perforated pores could be seen easily in the endothelium lining of the blood capillaries (Fig. 17,18). In many regions, an escaping blood cell could be traced during its passage through the perforated pores (Fig. 19). The cilia of normal cells lining the middle ear cleft were lost (Fig. 20) in serous type.

Cellular infiltration of the lamina propria included plasma cells (Fig. 21,22) with their specific cart - wheel appearance of the chromatin arranged on the inner surface of the nuclear membrane. Other infiltrating cells were, lymphocytes (Fig. 23), monocytes (Fig. 24,25), neutrophils (Fig. 26) and macrophages (Fig. 27).

Metaplastic light cells of the lining epithelium of middle ear cleft showed disturbed heterogenous nuclei (Fig.28,29) with many secretory granules (in dark).

Expanded lymphatic vessels with lymph were present in some slides denoting lymphostasis (Fig. 30).

(3) Mucoid Otitis Media :

The middle ear mucosa in these cases showed different changes :

1 - Metaplasia :

The lining epithelial cells was formed by pseudostratified or stratified columenar cells (Fig. 31). The stratified epithelium showed basal cells, dark and light cells situated at different levels (Fig. 32). The cells have abundant mucigen granules and have lost cilia.

2 - Intercellular infiltration of the epithelium by migrating mononuclear cells were also noticed in the epithelium (Fig. 31).

3 - Increased secretory activity :

In some sections the epithelial cells had a picture of apocrine secreting cells. The apical borders of the cells were protruded inside the middle ear cleft and the blebs were filled with mucous vacuoles and were liable to be detached (Fig. 33 & 34).

The endoplasmic reticulum was severely distended in the secretory metaplastic cells (Fig. 35) where the mitochondria were compressed or squeezed in between the other cell organelles.

Moreover, the basement membrane under the epithelia was thickened (Fig. 36). This thickening was more marked in comparison with that of the serous type.

The vacuoles inside the mucous secretory metaplastic cells were either pure mucus (Fig. 37) or mixed vacuoles (Fig. 38,39,40).

The metaplastic dark cells of the lining epithelium showed pyknosis and karyarrhexis of the nucleus (Fig. 41), while in some light cells the nuclei also suffered from disturbed contours (Fig. 42).

The proprial connective tissue revealed an abnormal fibrosis with thick collagenic bundles separated with delicate spaces (Fig. 43).

The proprial cellular infiltration with macrophages (Fig. 44), was less marked in mucoid type in comparison with the serous type.

4 - Sero-mucoid type:

In some conditions the epithelium showed a stage intermediate between serous and mucoid types in which the cells showed intercellular spaces having tenaceous substances (Fig. 45) and the cilia were more or less distructed (Fig. 46). Mixed vacuoles can also be seen in (Fig. 38,39,40). This can be considered as seromucoid type of OME.

Drumhead changes in OME :

Normally the inner surface of the drumhead is lined with one layer of simple squamous or cuboidal epithelial cells. This epithelium is continuous with that lining the middle ear cleft, hence it shares in the pathological processes involving the epithelium of the tympanic cavity. The squamous epithelium covering the outer surface is less liable to changes (Fig. 47).

The inner lining epithelium of the drum showed different changes. There were stratified instead of simple cuboidal epithelium (Fig. 48), escaping blood cell, partially inside and partially outside the blood capillary in the inner surface of lamina propria (Fig. 49), distended cisternae of the smooth endoplasmic reticulum (Fig. 50), and over - distended mitochondria (Fig. 51) with abnormal light patches due to destruction inside the matrix of

mitochondria.

A marked oedema with irregular infiltrative cells were seen in the lamina propria which includes irregular infiltrative cells. (Fig. 52). Moreover distended lymph vessels with lymph including lymphocytes were also present at the subepithelial propria with cell debris (Fig. 53).

* * * *

Fig. 1. Normal simple cubiodal epithelium lining the middle ear, formed of dark (d) and light (l) cuboidal cells and carrying microvilli (in dots). (6.7 x 1000)

Fig. 2. Normal rough endoplasmic reticulum (r) and part of the nucleus (n) in the lining normal epithelial cells of middle ear mucosa. (50 x 1000).

Fig. 3. Serous OME, showing very distinct intercellular spaces (s) inbetween the epithelial cells. (8 x 1000).

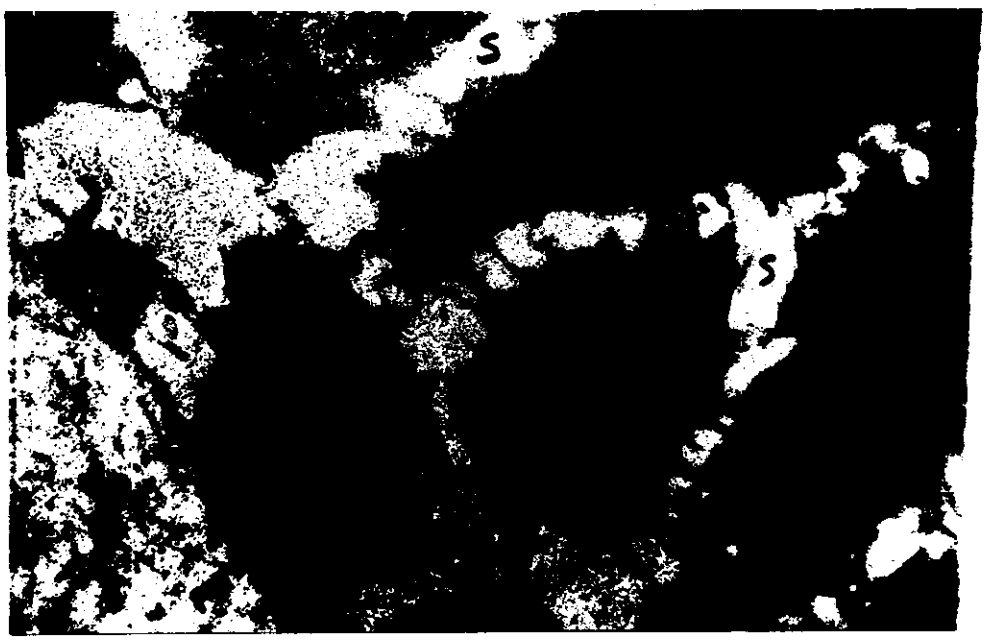

Fig. 4. Serous OME, showing numerous intercellular spaces (s) inbetween the epithelial cells of the mucosal epithelium in the middle ear mucosa.

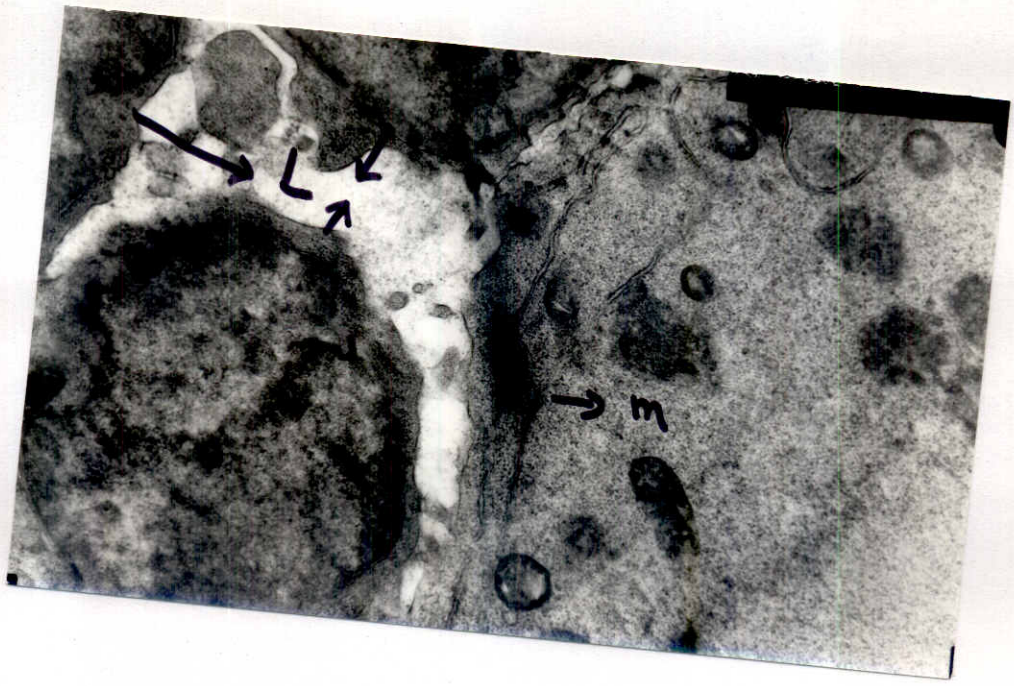

Fig. 5. Serous MOE, showing wide intercellular spaces (s) inbetween two adjacent dark epithelial cells in the mucosa of middle ear. (14 x 1000).

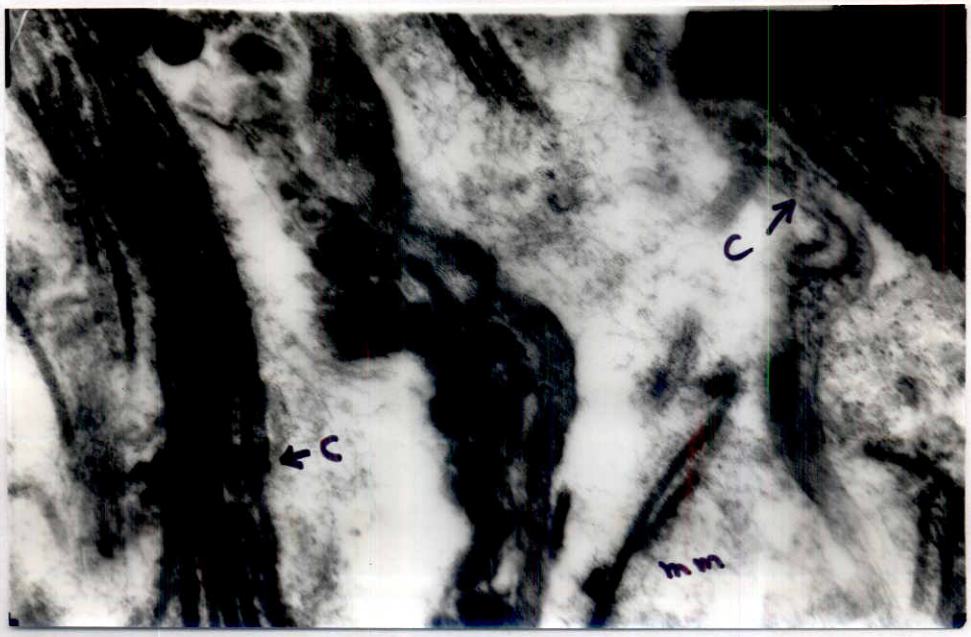

Fig. 6. Serous OME, showing oedematous basement membrane (mm), swollen collagenic fiber bundles (c). (27 x 1000).

Fig. 7. Serous OME, showing passive transudation in the submucosa with some infiltrative connective tissue cells (Macrophages) "arrows" . (10 x 1000).

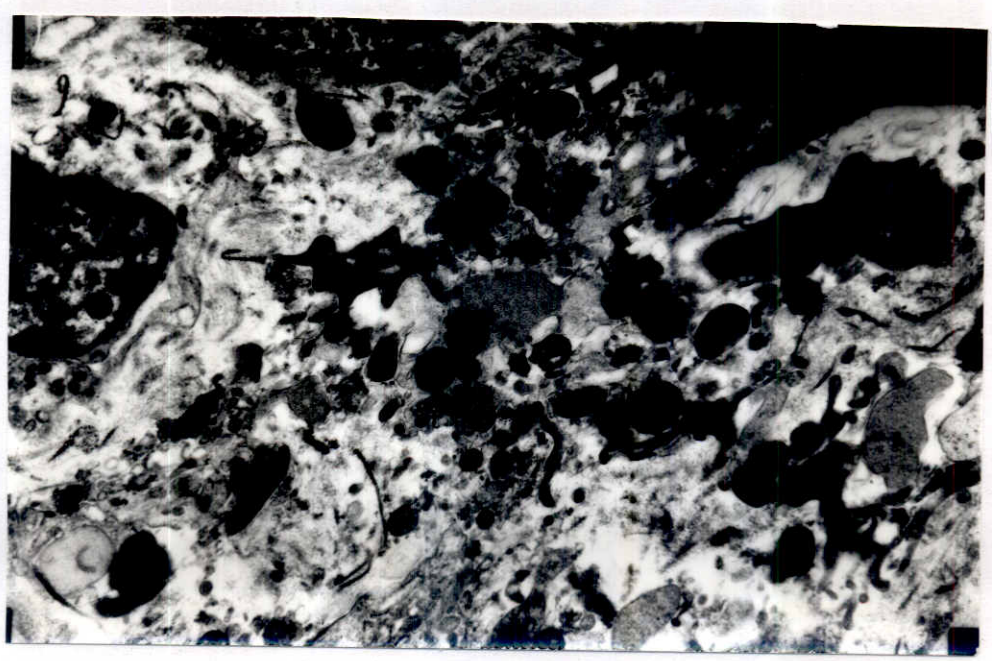

Fig. 8. Serous OME, showing passive transudation in the lamina propria with serous granules (in dark) and cell debris. (6.7 x 1000).

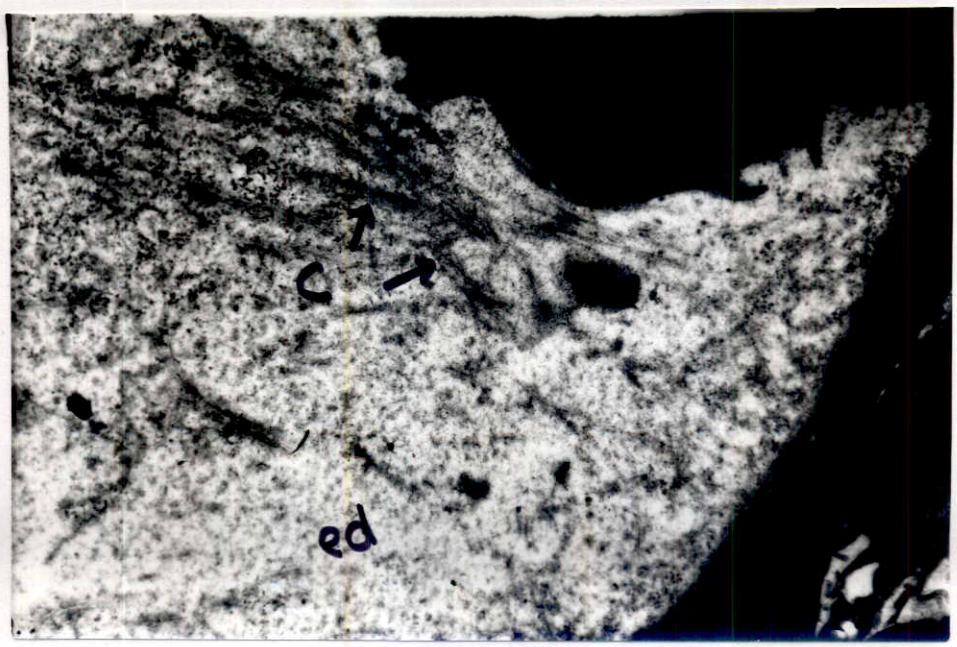

Fig. 9. Serous OME, showing proprial transudation (ed) and collagenic fibers (c) underneath the basement membrane of the epithelium. (5 x 1000).

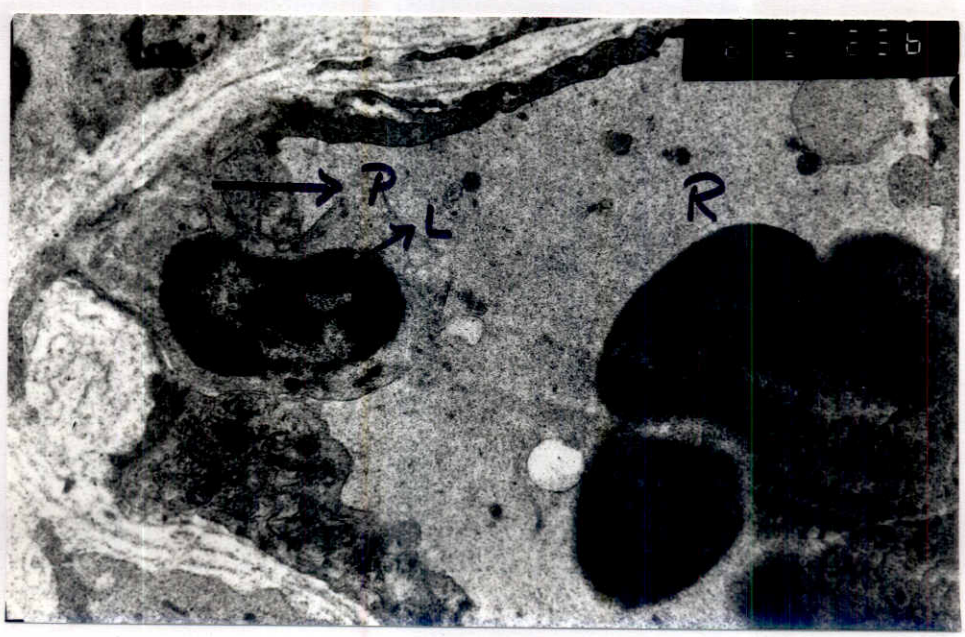

Fig. 10. Serous OME, showing an escaping lymphocyte (l) through a perforated pore (p) in the wall of blood capillary. " Notice the red blood cell (R). (6.7 x 1000).

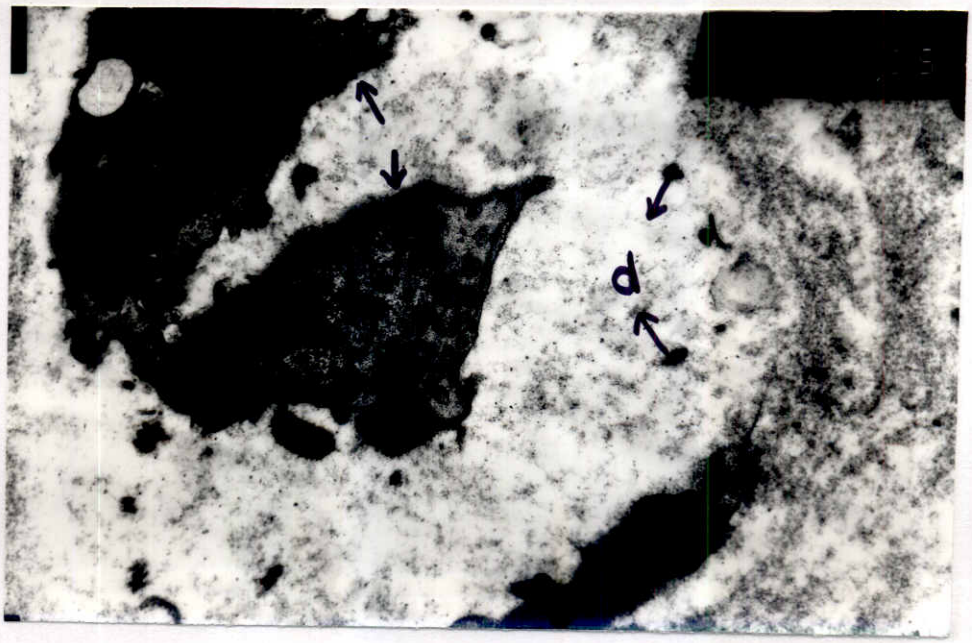

Fig. 11. Serous OME, showing transudation in the lamina propria of middle ear mucosa. " Notice some infiltrative cells (arrows) and debris (d)". (8 x 1000).

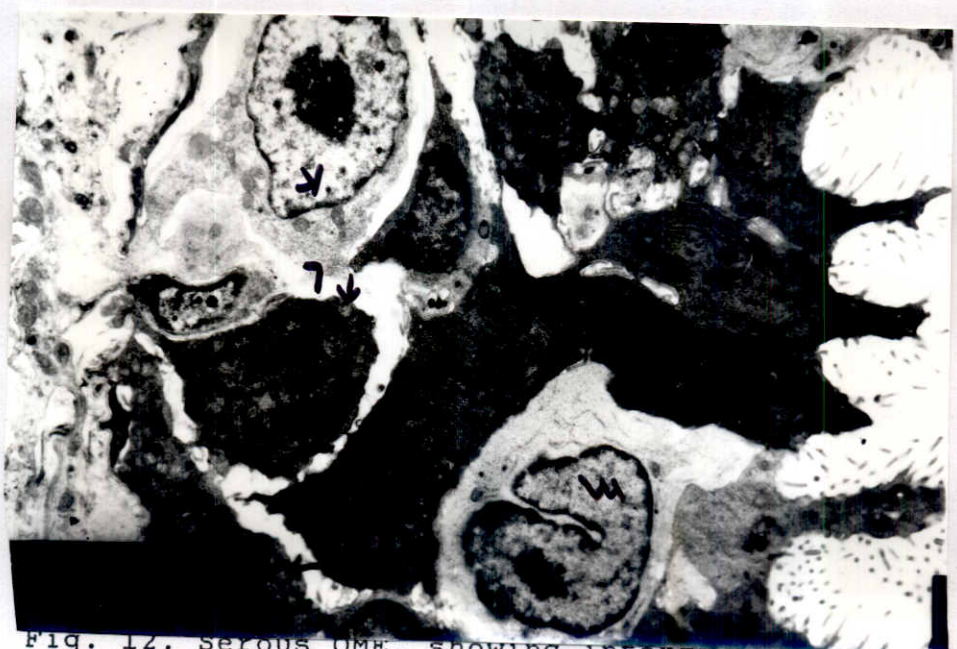

Fig. 12. Serous OME, showing intercellular spaces (s) and intercellular infiltrating cells including lymphocytes (l) and leukocytes (k). (4 x 1000).

Fig. 13. Serous OME, showing invading lymphocyte (l) inbetween the epithelial cells and clear pericellular space (s). (14 x 1000).

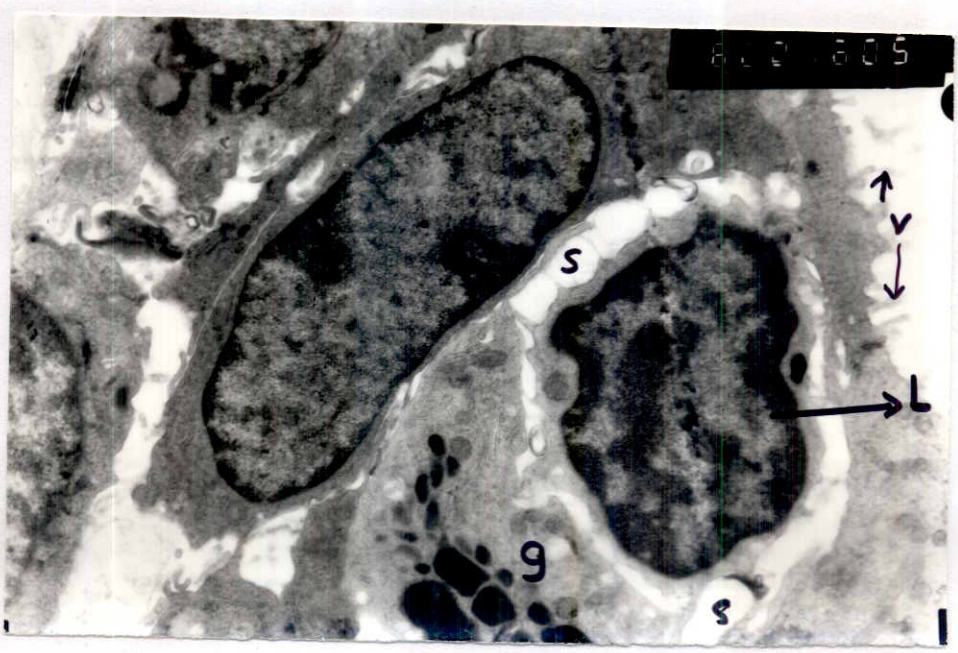

Fig. 14. Serous OME, showing invading lymphocyte (l) with pericellular or intercellular spaces (s) inside the epithelial cells. Secretory serous granules (g) inside one cell, abscence of cilia and few microvilli (v). (8 x 1000).

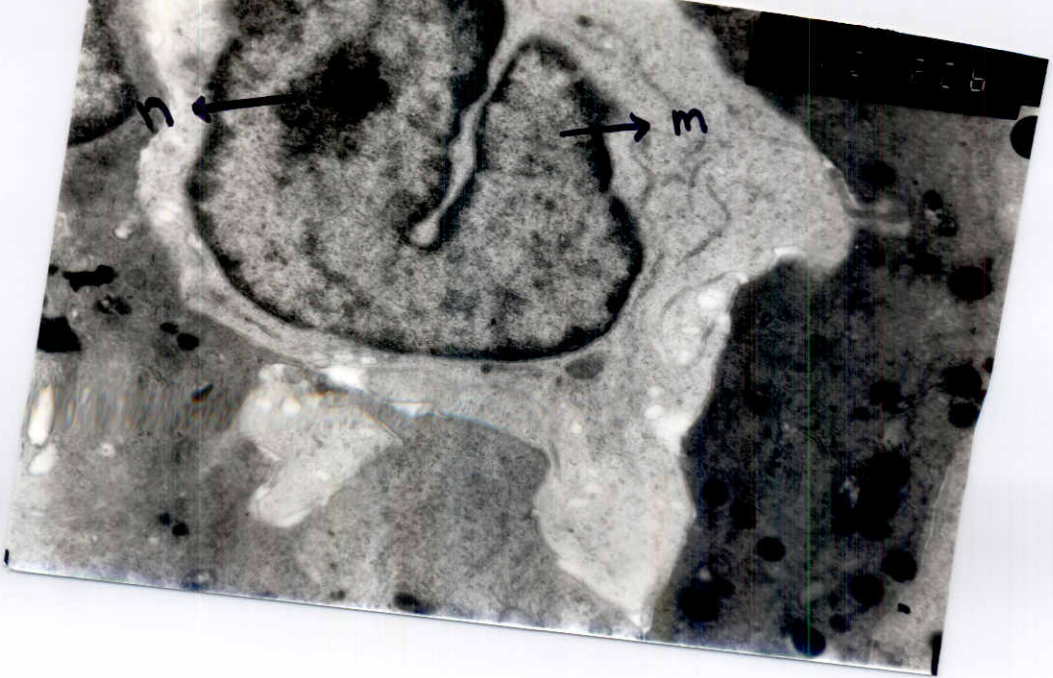
n
m

Fig. 15. Serous OME, showing monocyte (m) invading inbetween the epithelial lining cells, the nucleus of monocyte (n) is clear. (10 x 1000).

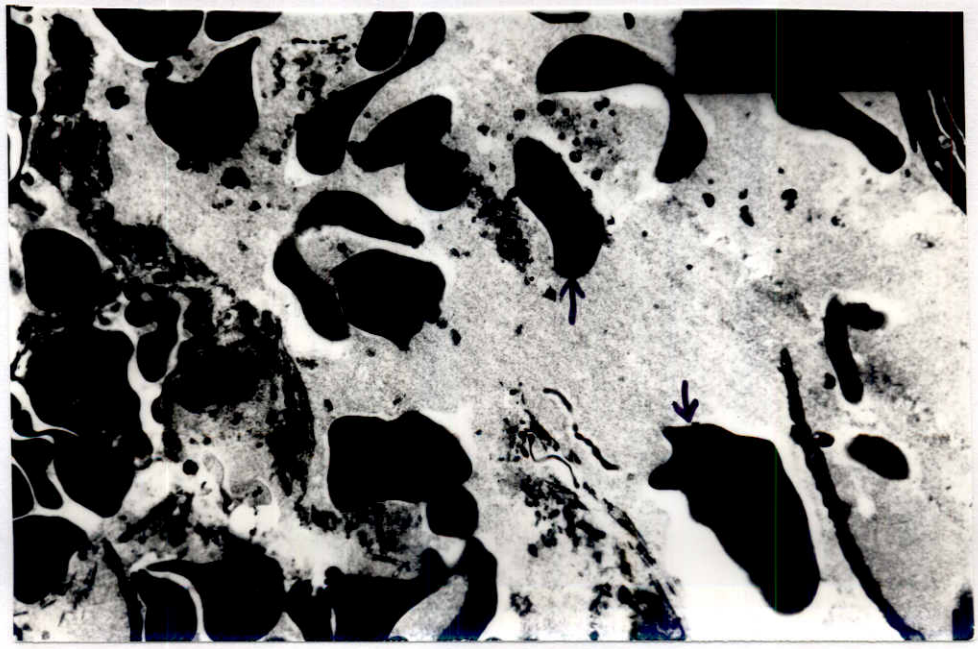

Fig. 16. Serous OME, showing transudation with hyperaemia and escaping of red blood cells (arrows) in the lamina propria, cell debris. (2.7 x 1000).

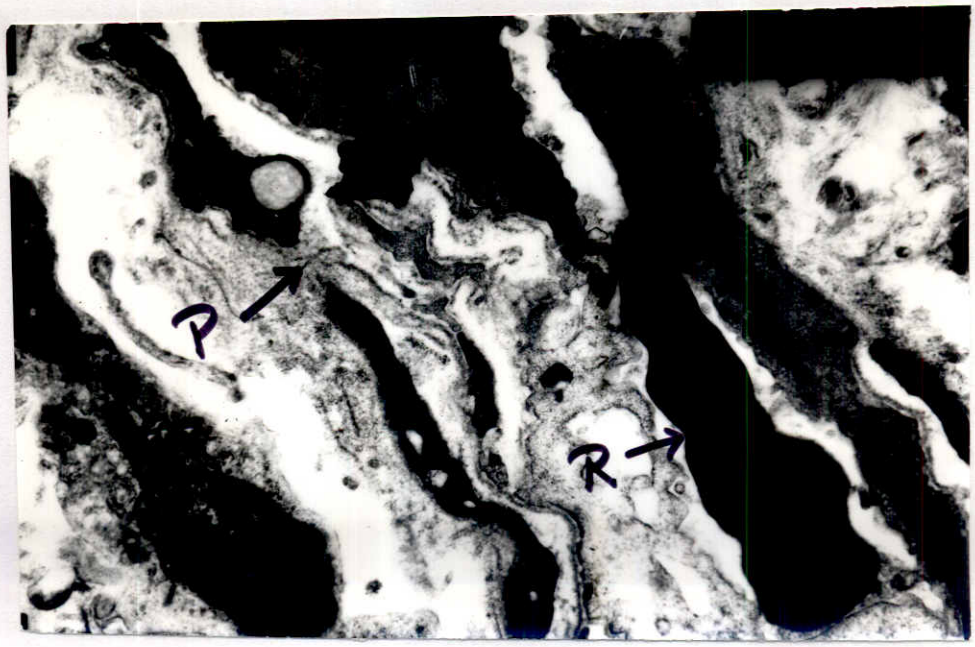

Fig. 17. Serous OME, showing the perforated pore (p) in the wall of blood capillary in the lamina propria, R B cs (R). (8 x 1000).

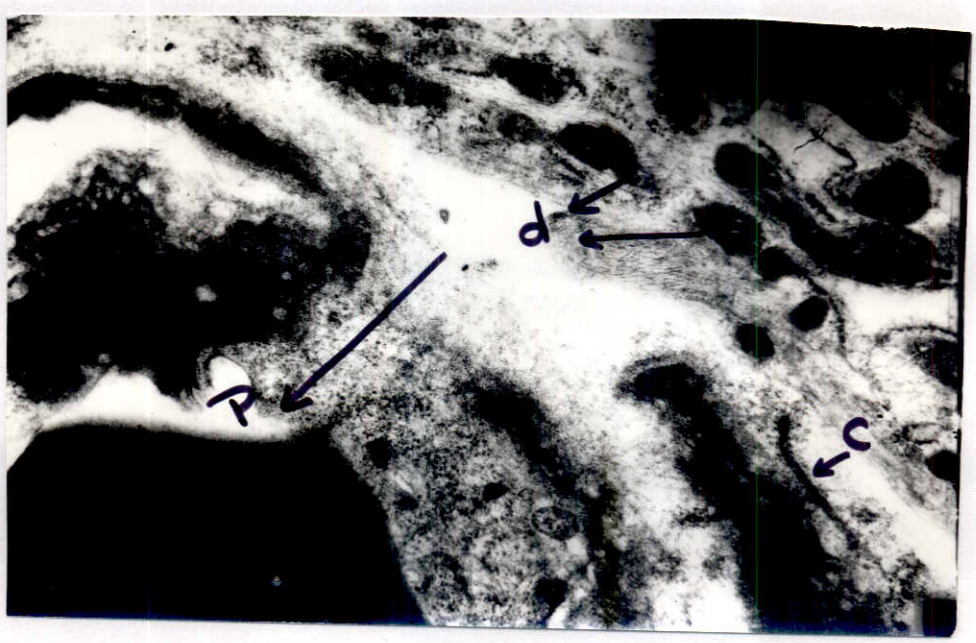

Fig. 18. Serous OME, showing perforated pores in the wall of blood capillary (p) with proprial cell debris (d) and pericyte (c). (20 x 1000).

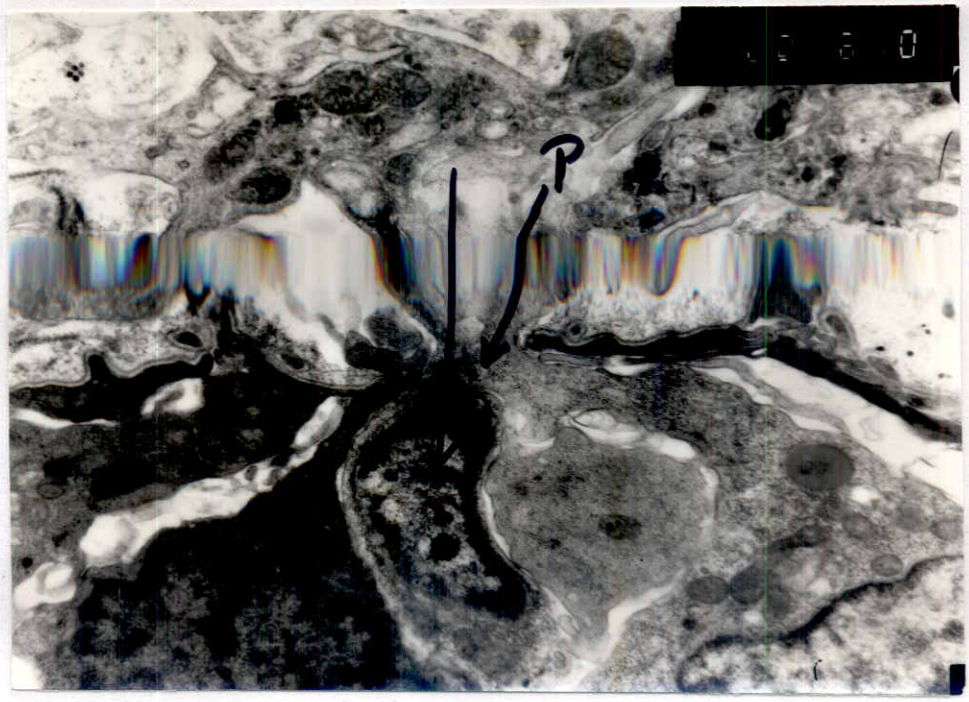

Fig. 19. Serous OME, perforated pore (p) through which passing an escaping leucocyte (arrow). (10 x 1000).

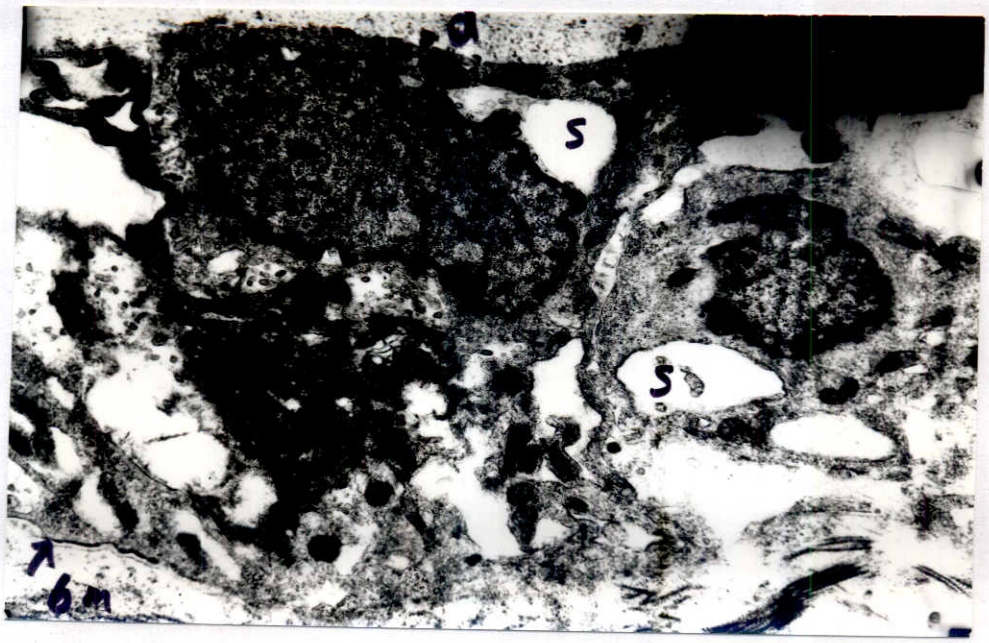

Fig. 20. Serous OME, showing intercellular spaces (s), abscence of cilia and note the basement membrane (bm) of the epithelium and debris (d). (6.7 x 1000).

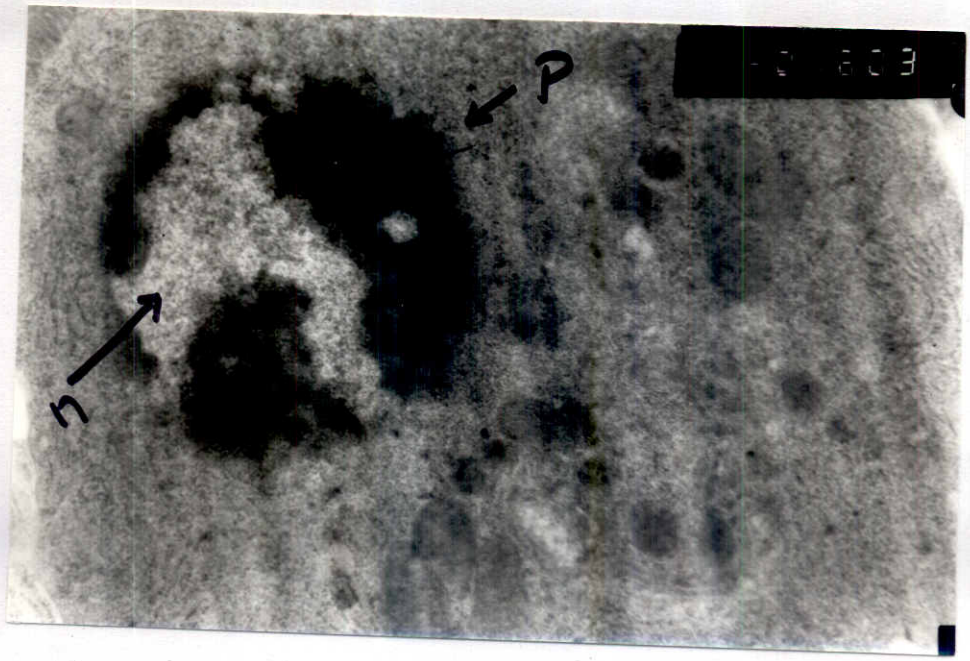

Fig. 21. Serous OME, showing plasma cell (p) included in the cellular infiltration in the lamina propria of middle ear mucosa. Note its nucleus (n) showing peripheral chromatin. (14 X 1000).

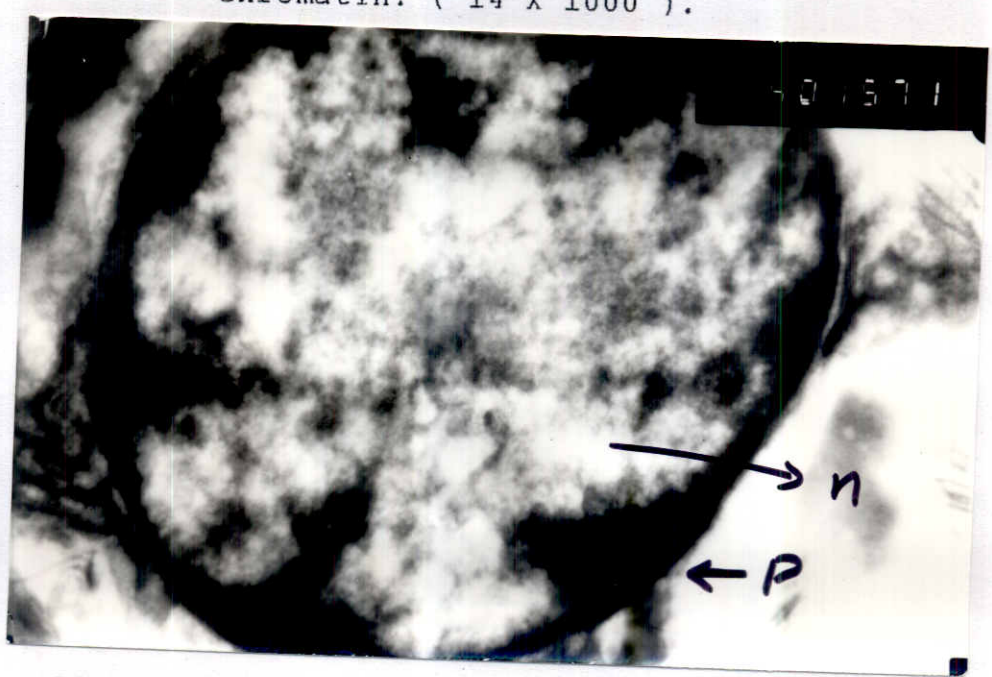

Fig. 22. Serous OME, showing plasma cell (p) to be included in cellular infiltration. Note the nucleus (n) showing a cartwheel appearance due to arrangement of its chromatin on the periphary of nuclear membrane. (14 x 1000).

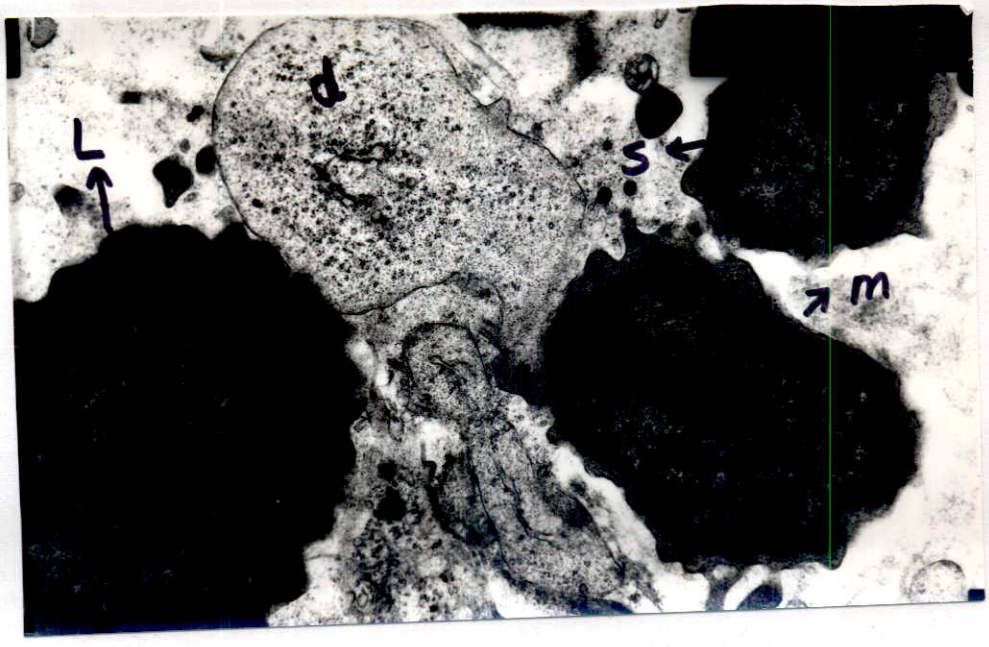

Fig. 23. Serous OME, showing small (s), medium (m) and large (l) lymphocytes included in the proprial oedema of middle ear mucosa, degenerated cell with karyolysis nucleus (d). (8 x 1000).

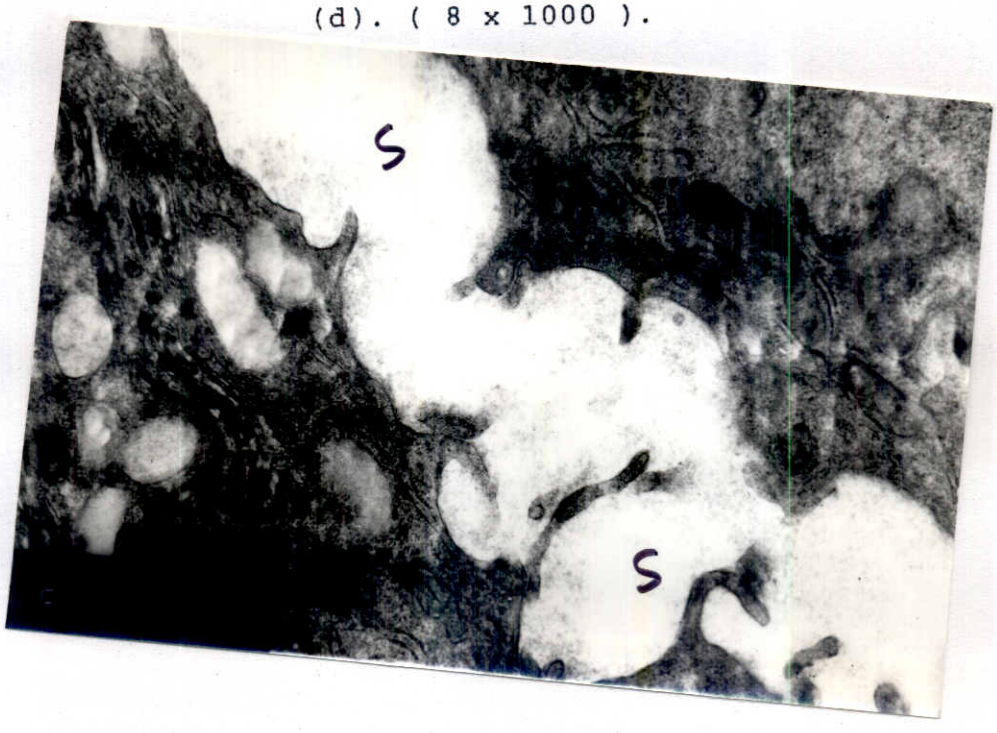

Fig. 24. Serous OME, showing subepithelial cellular infiltration including 3 lymphocytes (l) and part of monocyte (m) of middle ear mucosa.

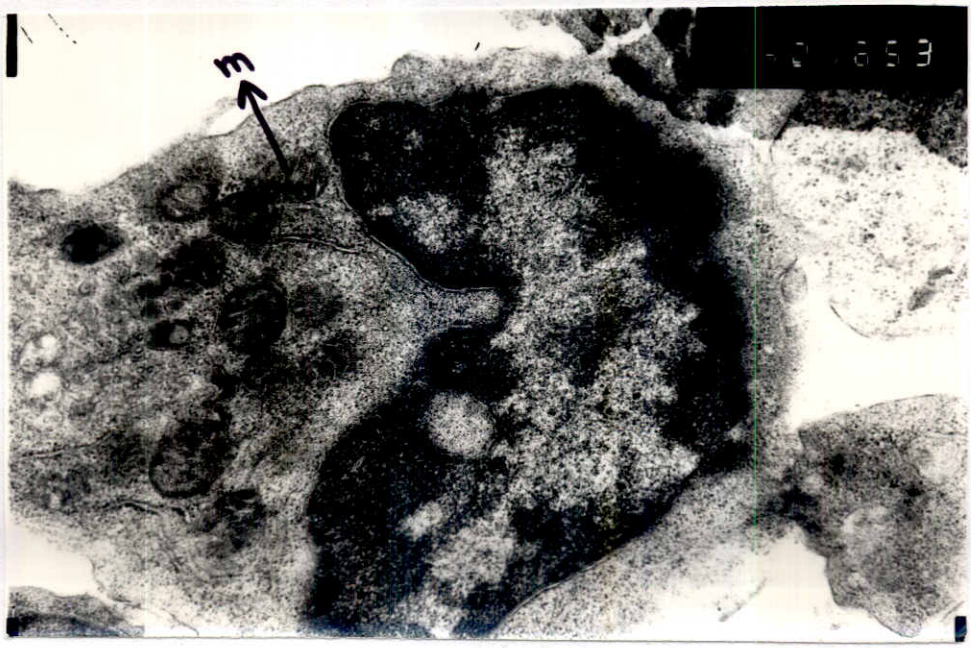

Fig. 25. Serous OME, showing monocyte (m) as an included cell in the cellular infiltration of middle ear mucosa, "its nucleus is kidney shaped". (14 x 1000).

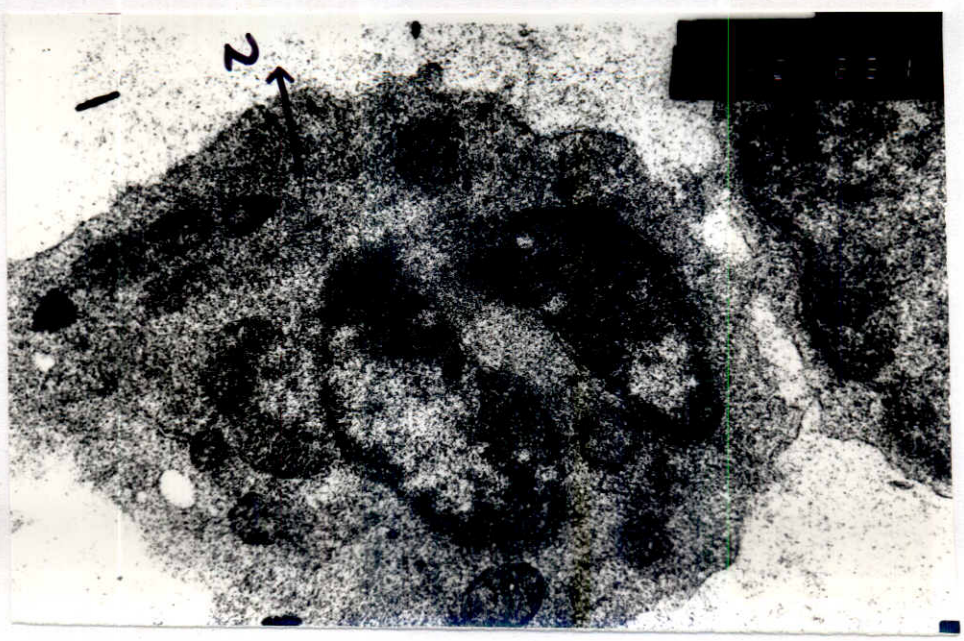

Fig. 26. Serous OME, showing a neutrophil (n) included in the subepithelial propria. (14 x 1000).

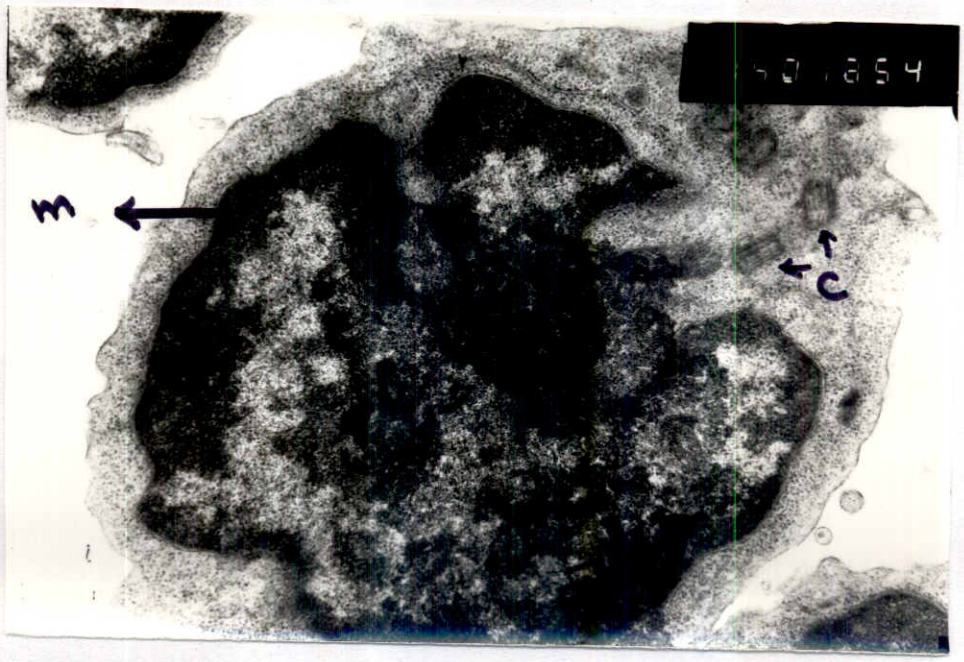

Fig. 27. Serous OME, showing large macrophage (m) included in the transudate of the subepithelial propria in middle ear mucosa. Note the cell has two distended centrioles (c). (14 x 1000).

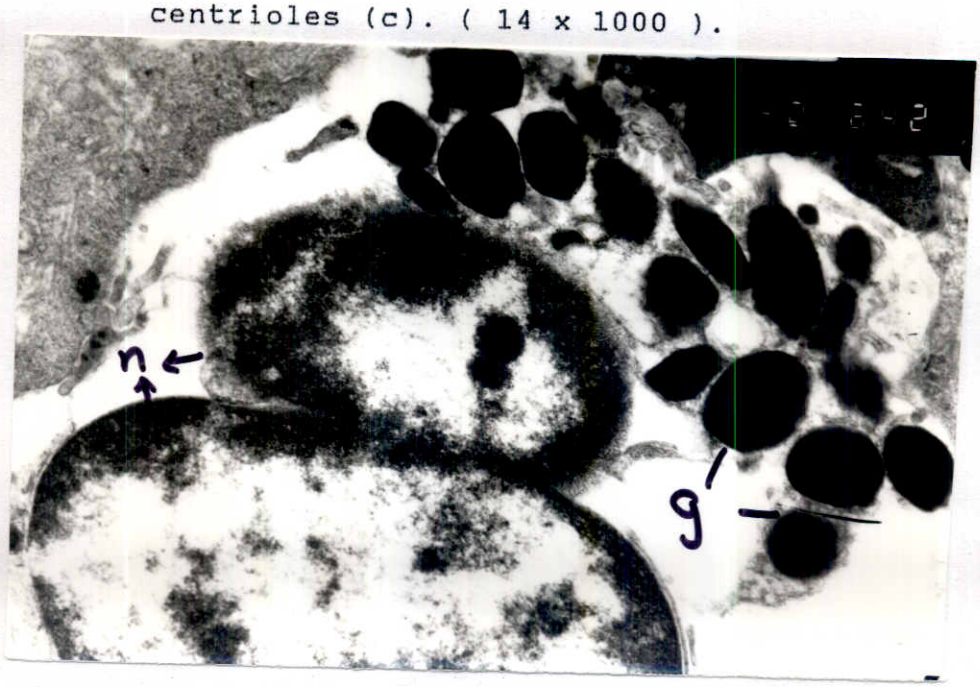

Fig. 28. Serous OME, showing a secretory light cell of middle ear mucosal epithelial having serous granules (g) and two heterogenous nuclei (n). (14 x 1000).

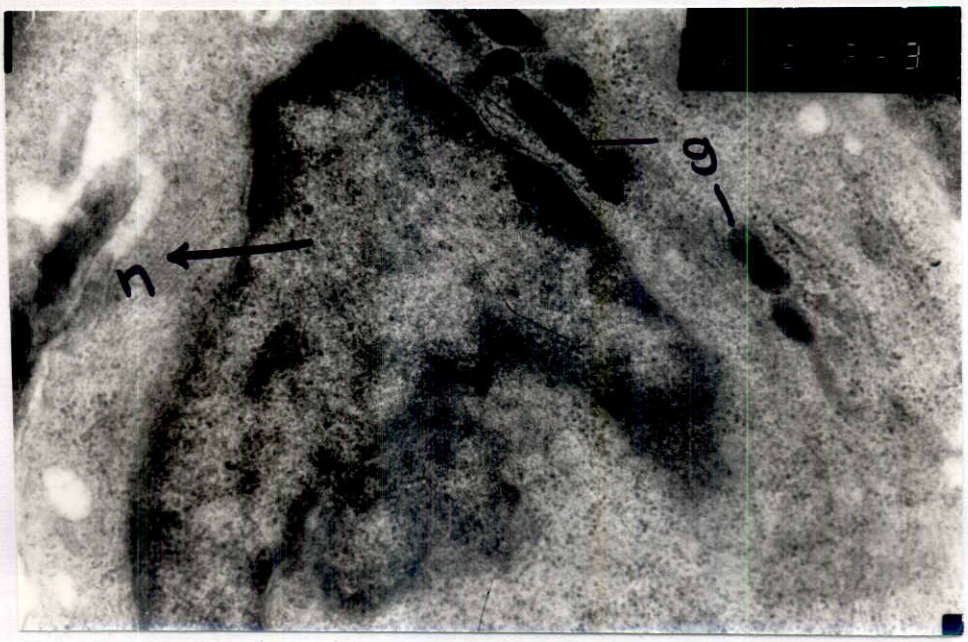

Fig. 29. Serous OME, showing wrinkled and disturbed nuclei (n), secretory granules (g) of light cell in the epithelium of middle ear mucosa. (27 x 1000).

Fig. 30. Serous OME, showing an extended lymphatic vessel (l) with lymph in the lamina propria of middle ear mucosa. (6.7 x 1000).

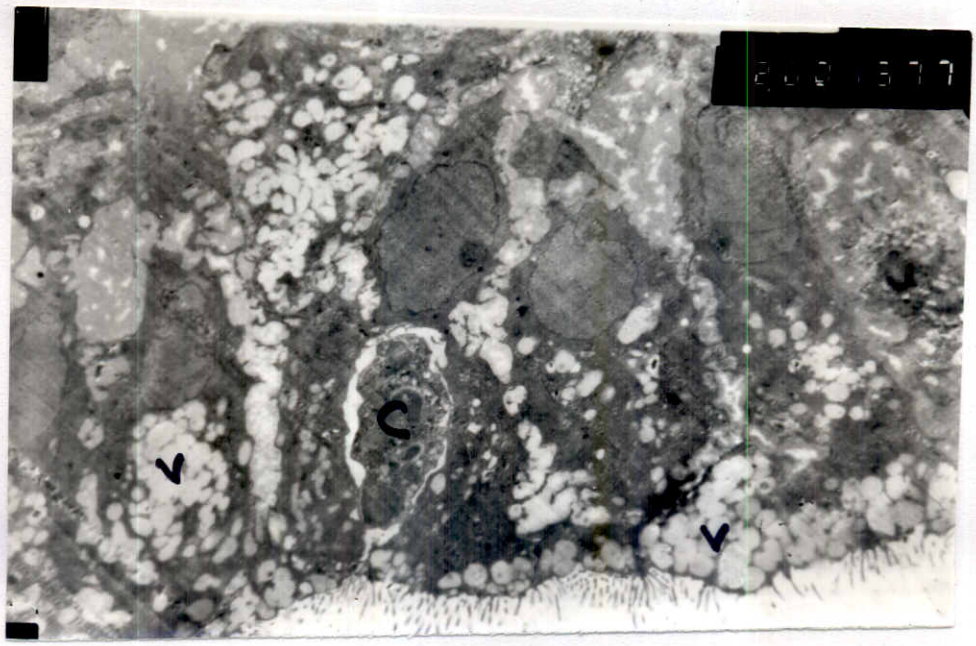

Fig. 31. Mucoid OME, showing pseudostratified columnar epithelium and mucous vacuoles (v) in most of the cells and less marked intercellular spaces. Migrating mononuclear cells (macrophage) (g). (2 x 1000).

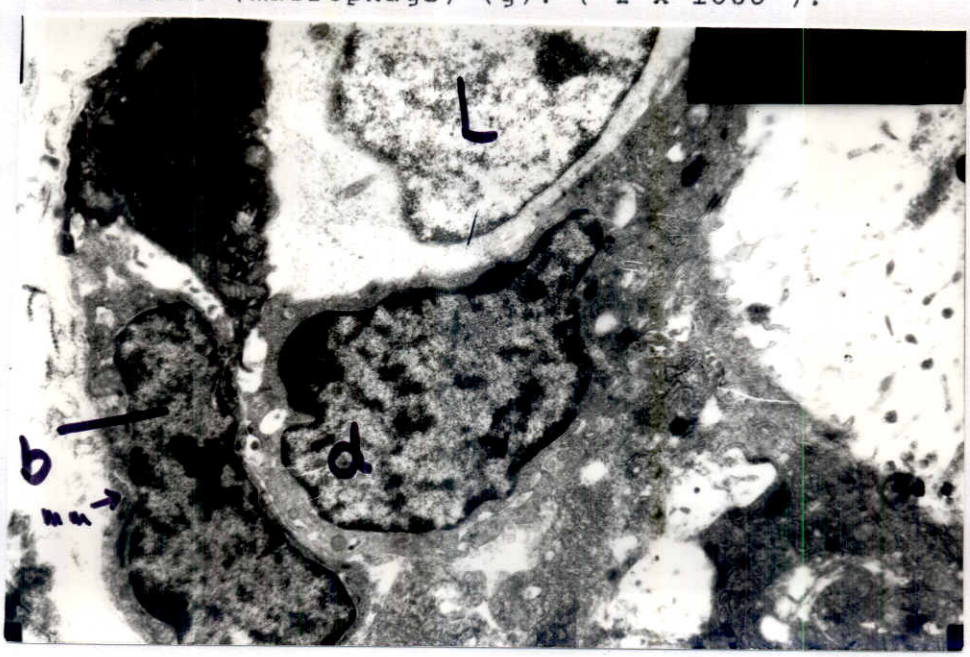

Fig. 32. Mucoid OME, showing stratified epithelium of dark (d) and light (l) surface cells and basal cells (b). Thickened basement membrane. (6.7 x 1000).

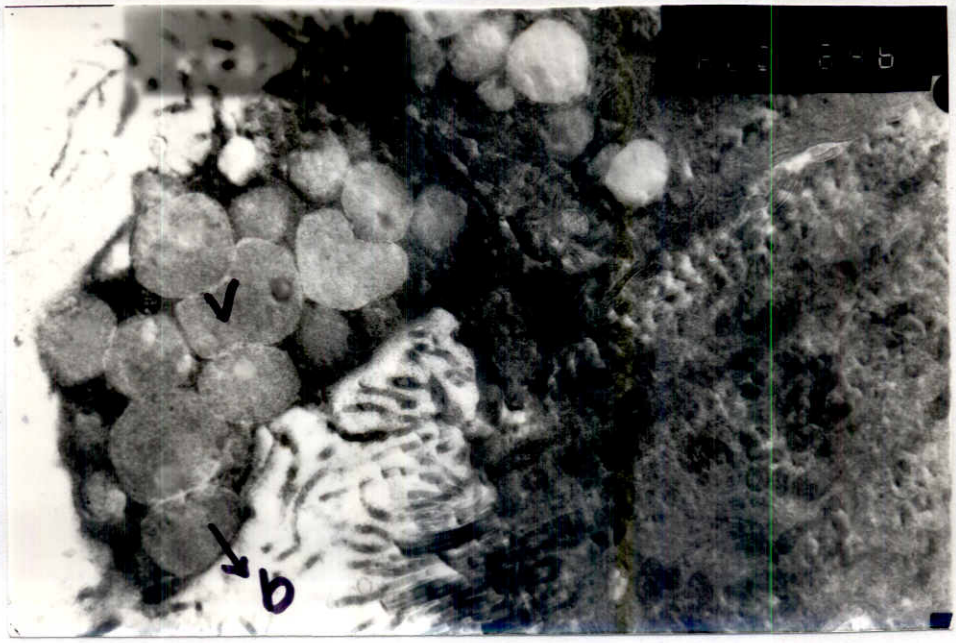

Fig. 33. Mucoid OME, showing cellular bleb (b) projecting inside the middle ear cavity as a sign of apocrine secretion, the bleb was overloaded with mucous vacuoles (v). (8 x 1000).

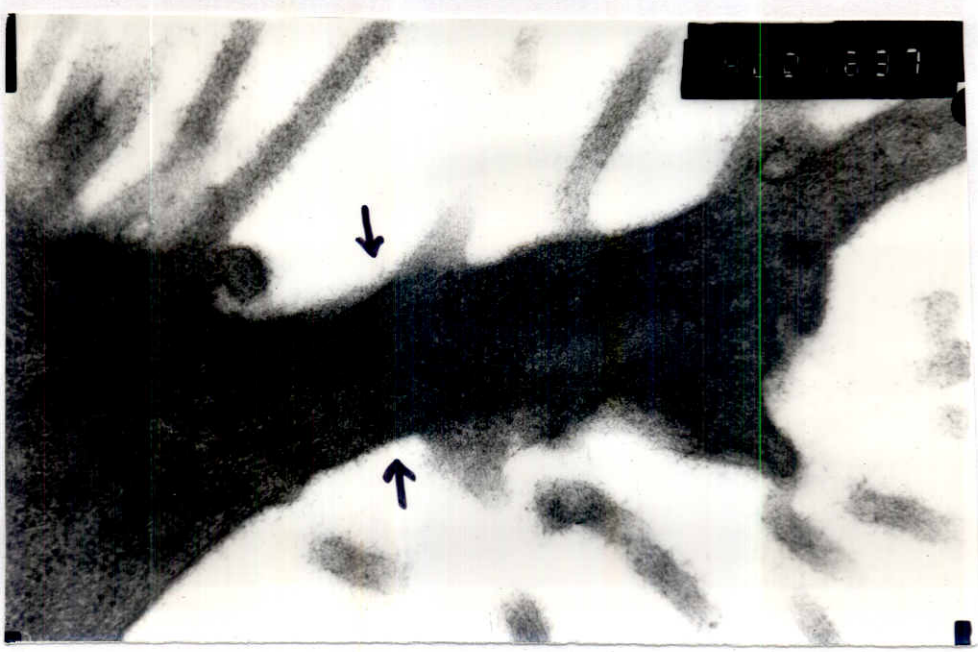

Fig. 34. Mucoid OME, showing bleb formation (arrows) carrying microvilli in a secretory epithelial cells. (40 x 1000).

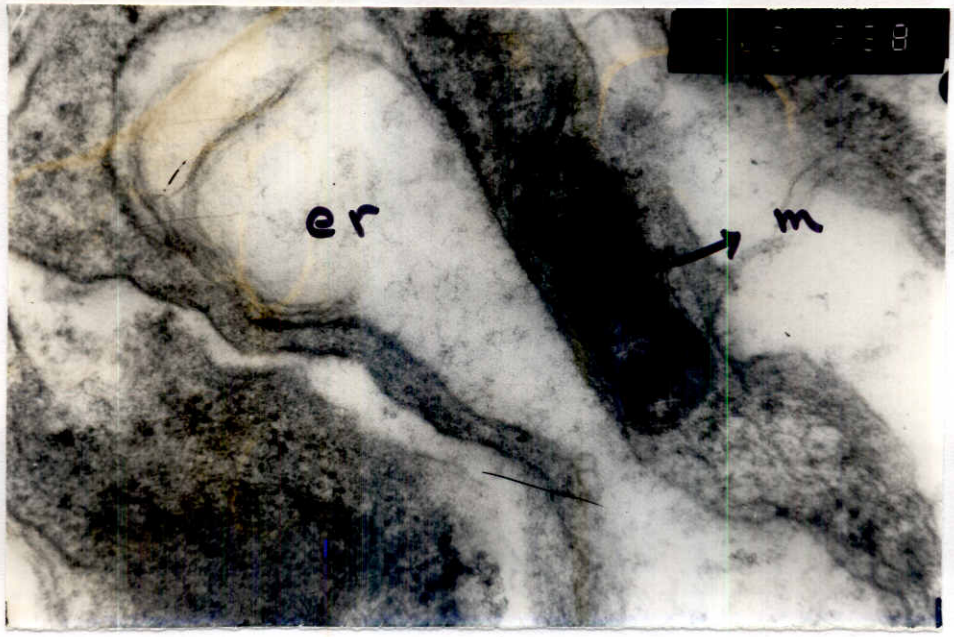

Fig. 35. Mucoid OME, showing distended endoplasmic reticulum (er) in the secretory metaplastic cell and compressed mitochondria (m). (50 x 1000).

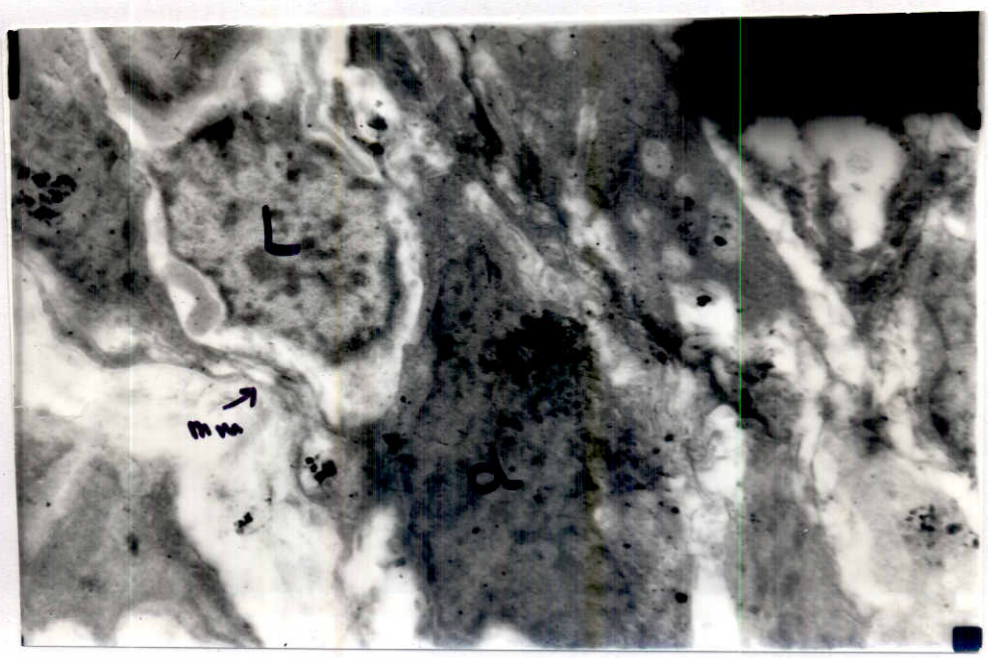

Fig. 36. Mucoid OME, showing dark (d) and light (l) cells. Thickened basement membrane (mm). (5 x 1000).

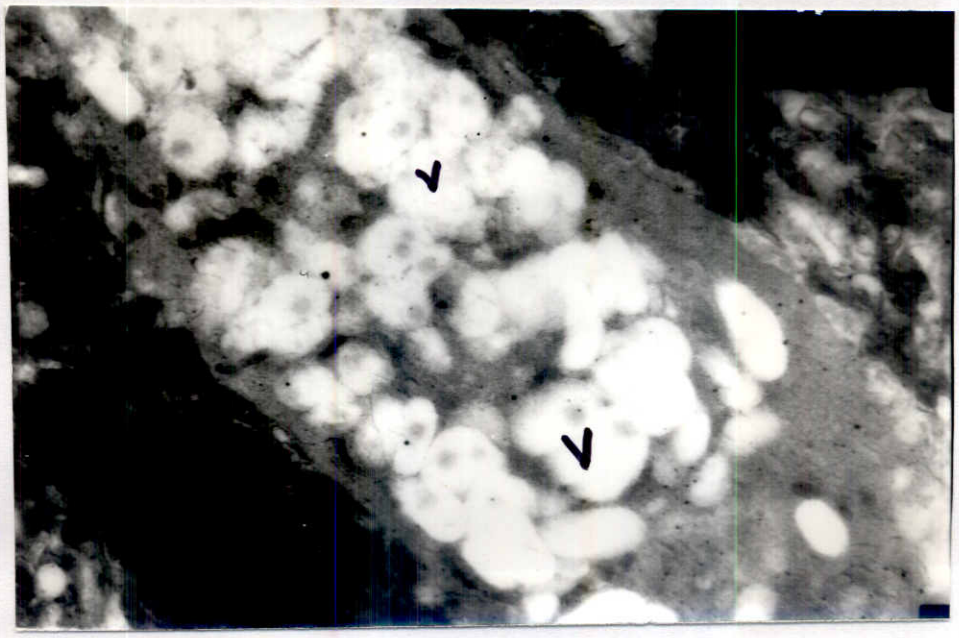

Fig. 37. Mucoid OME, showing pure mucous vacuoles (v) in the apical border of some cells lining the middle ear. (6.7 x 1000).

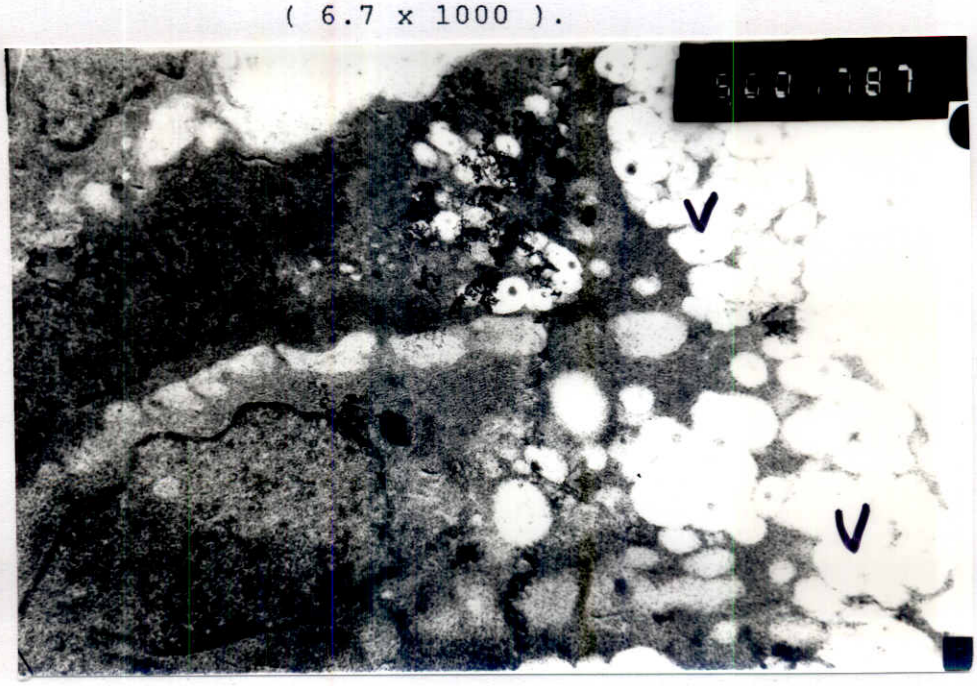

Fig. 38. Mucoid OME, showing mucous secretory cells (with some mixed mucous vacuoles (v)) and abscence of cilia in the mucosal epithelium. (5 x 1000).

Fig. 39. Mucoid OME, showing mucous secretory vacuoles (p) and some mixed one (m) in a goblet cell of metaplastic epithelium of middle ear mucosa with abscence of microvilli but are present in adjacent cell (arrows). (8 x 1000).

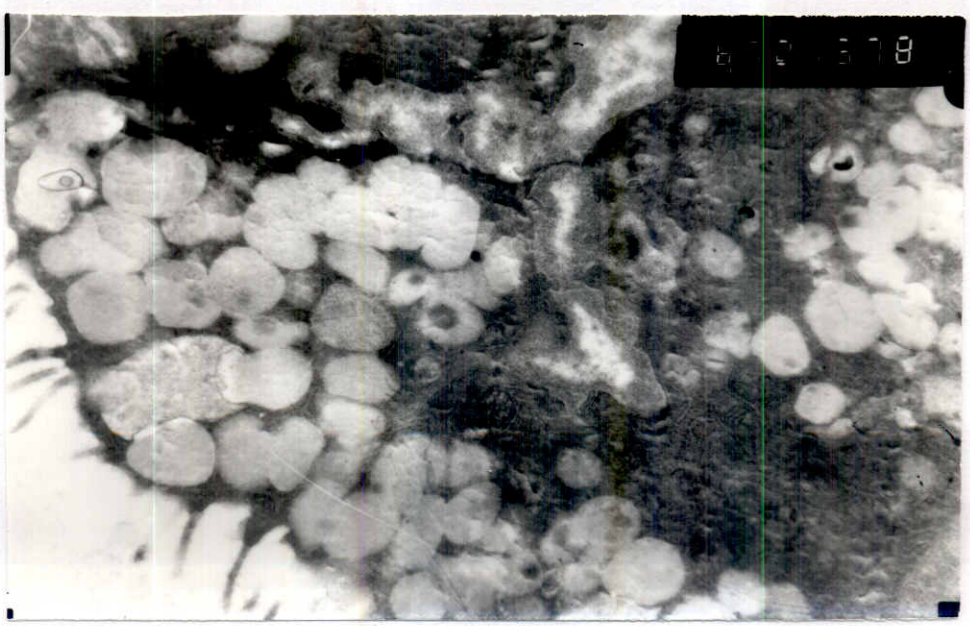

Fig. 40. Apical border of lining epithelial cells engorged with mucous glands (only few mixed ones). (6.7 x 1000).

Fig. 41. Mucoid OME, showing pyknosis and karyarrhexis of the nucleus (n) of a dark cell, normal light cell (l) and mucous vacuoles (v). (4 x 1000).

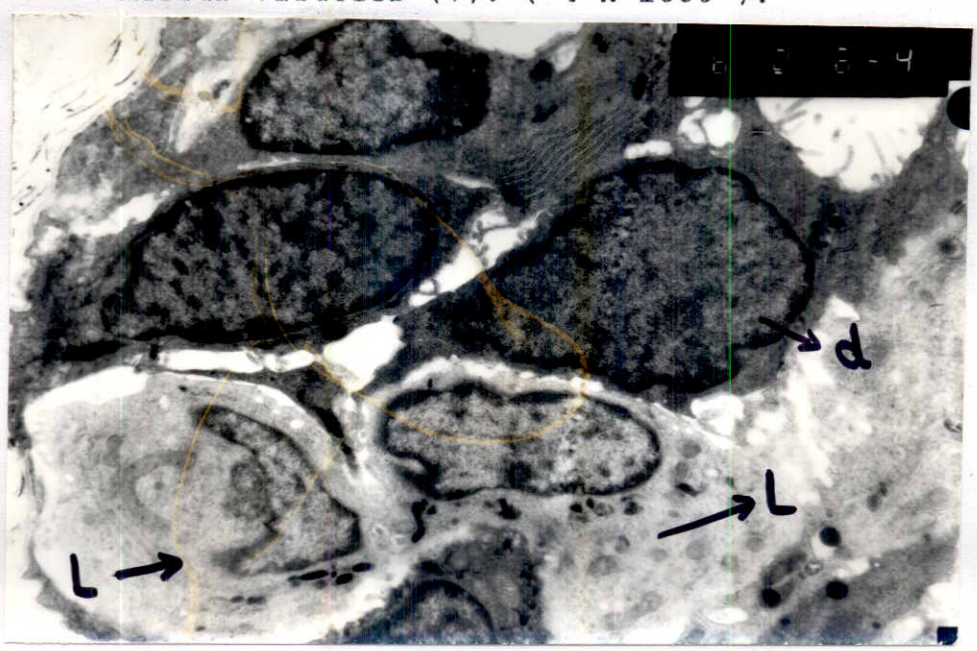

Fig. 42. Mucoid OME, stratified epithelium of middle ear mucosa showing dark (d) and light cell (l) in association with each other."Note that the light all nucleus are mostly disturbed in their contour". Endoplasmic reticulum of epithelial cells (er). (6.7 x 1000).

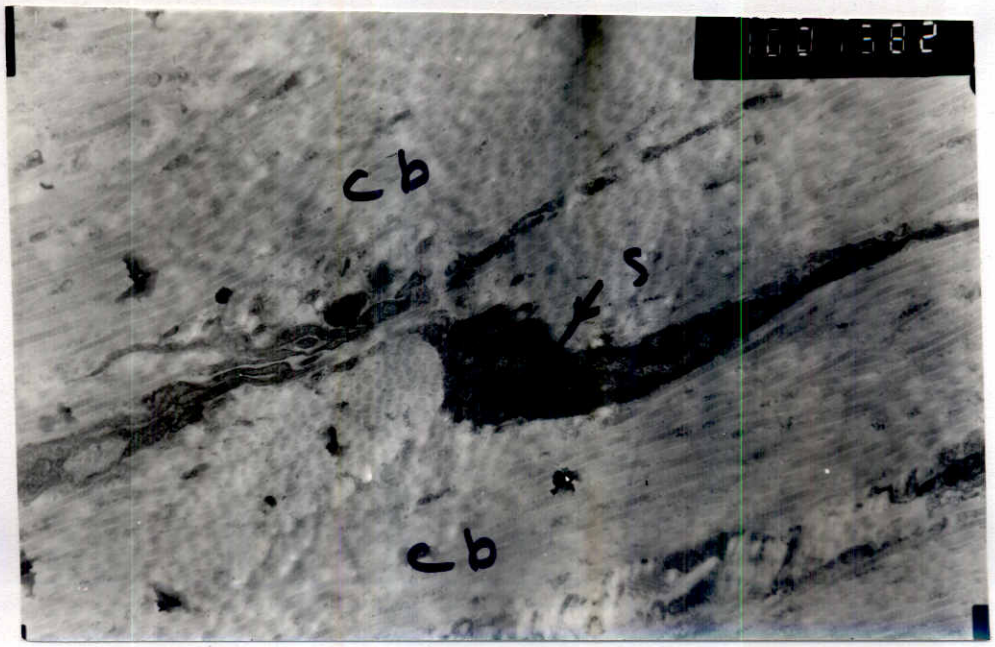

Fig. 43. Mucoid OME, showing fibrosis of the subepithelial lamina propria. "Note the collagenic bundles (c.b) with interfibrous delicate spaces (s). (10 x 1000).

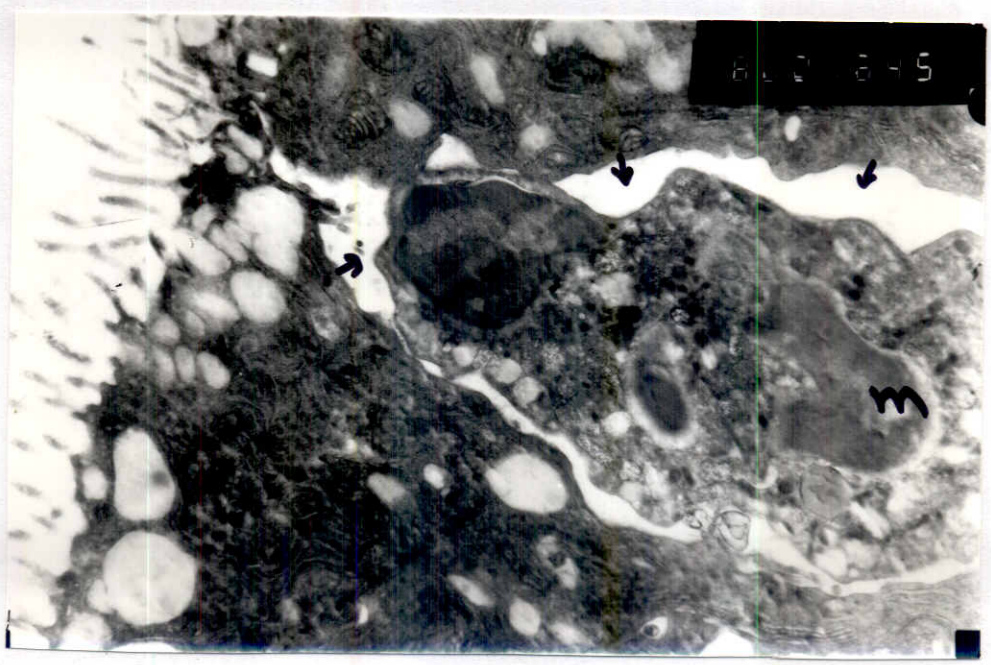

Fig. 44. Mucoid OME, with intercellular spaces (arrows) in the tall simple columnar epithelium and infiltrating macrophage (m). (8 x 1000).

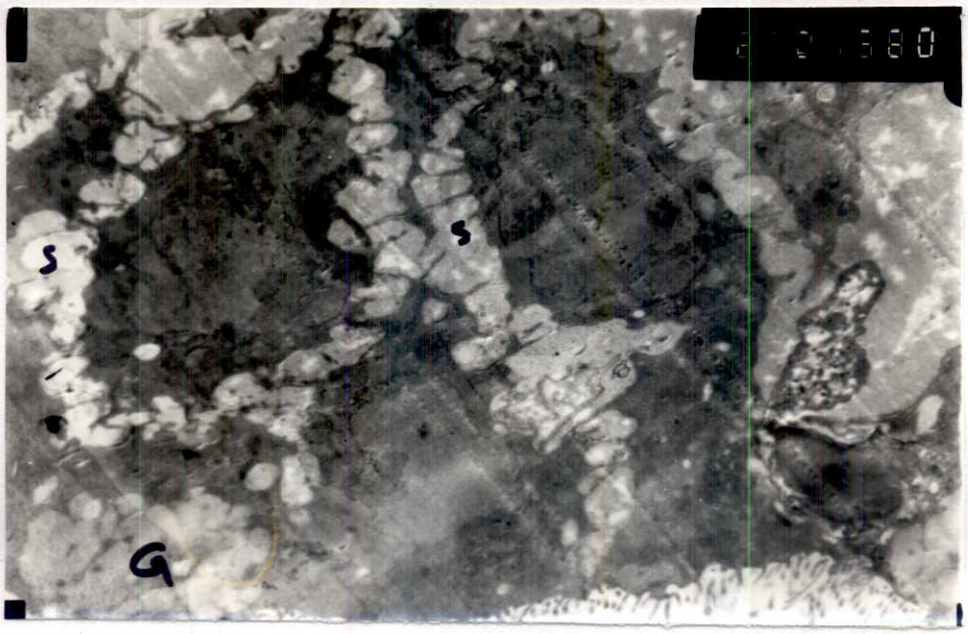

Fig. 45. Seromucoid OME, showing stratified epithelium with mucous vacuoles in secretory goblet cell (g) and intercellular spaces (s) and presence of microvilli and abscence of cilia. (2.7 x 1000).

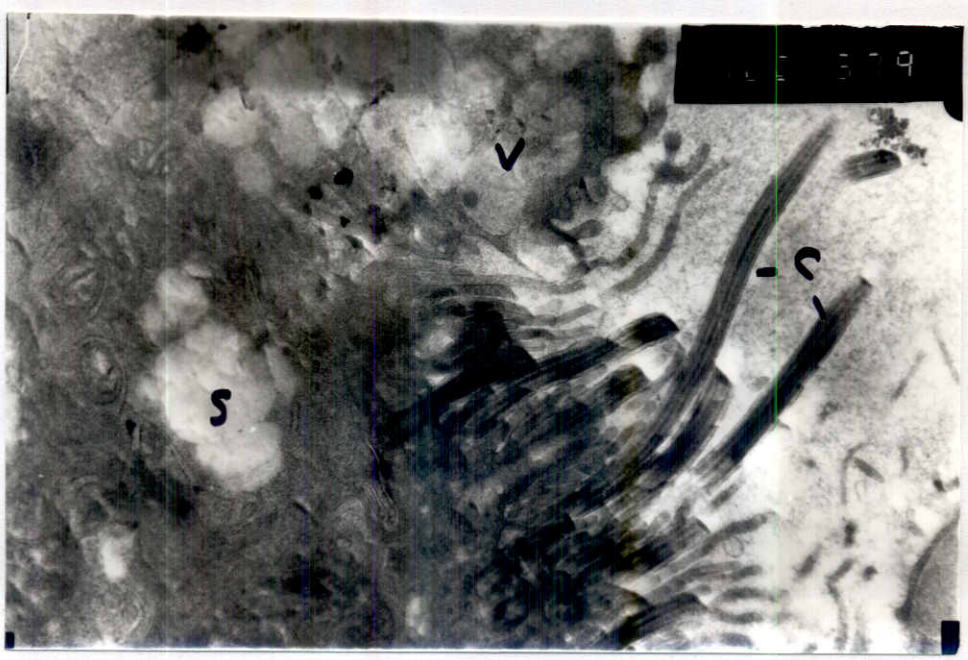

Fig. 46. Sermucoid OME, showing mucoid vacuoles in one cell (v) and large cilia (c) on another cell of middle ear mucosal epithelium, intercellular spaces (s) and the cilia are liable to destruction. (10 x 1000).

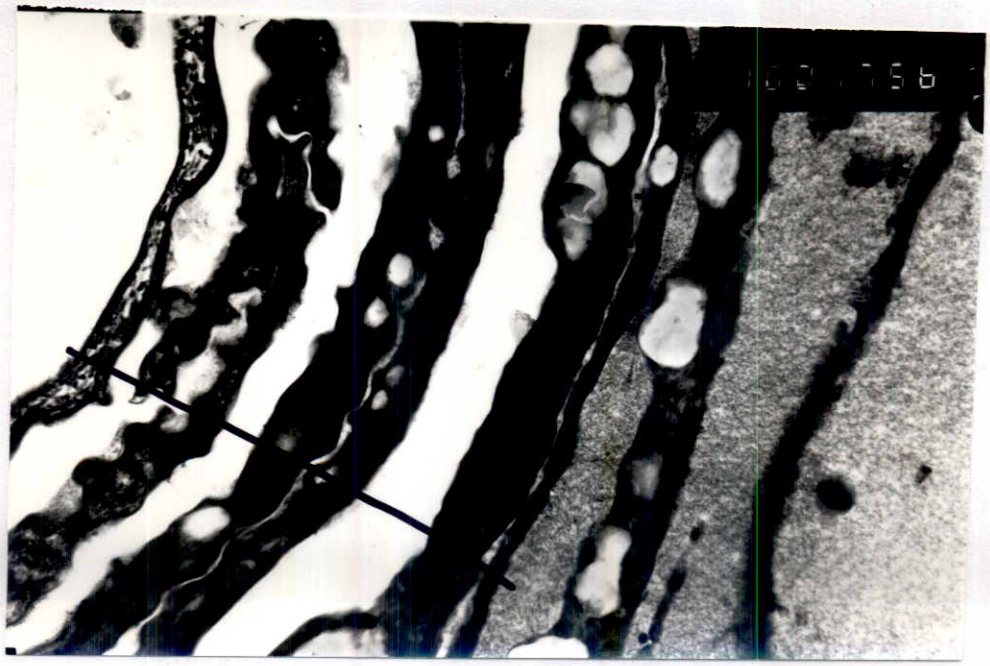

Fig. 47. Normal stratified squamous epithelium of the outer surface of drumhead. (10 x 1000).

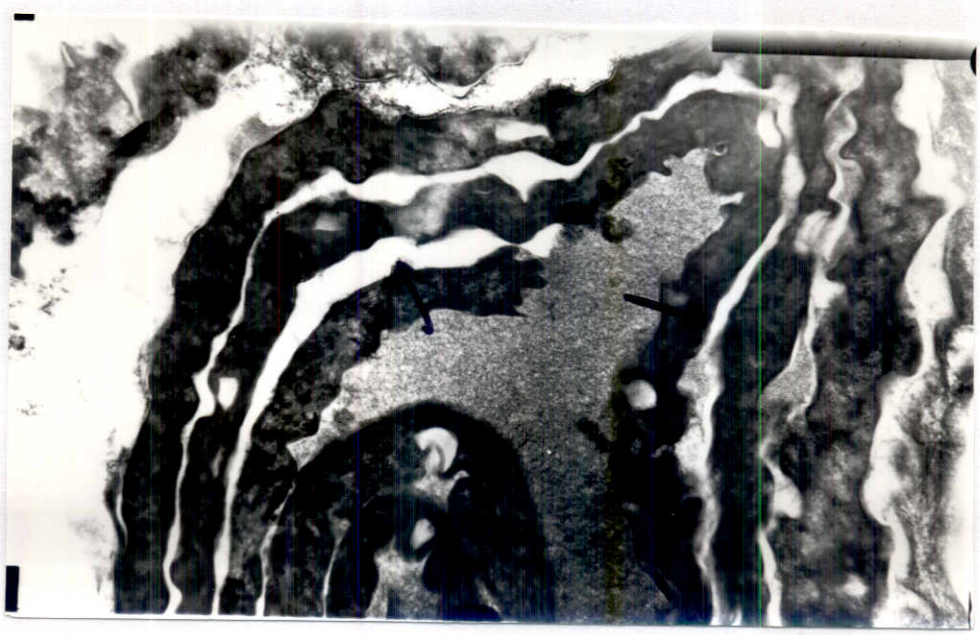

Fig. 48. The inner surface epithelium of drumhead in OME showing stratification (arrows) instead of simple cuboidel epithelium in normal. (10 x 1000).

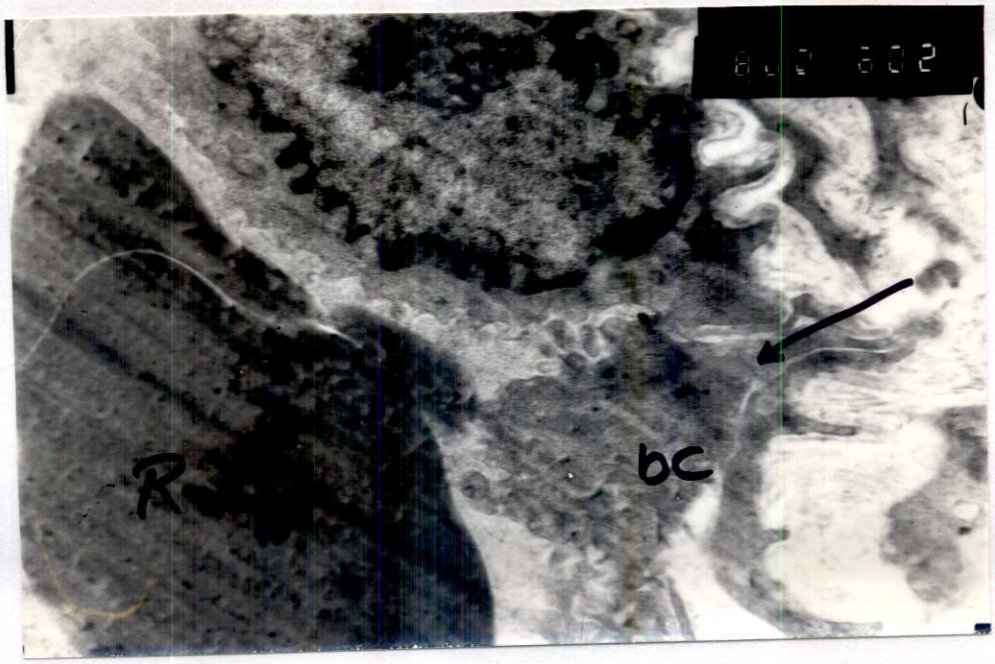

Fig. 49. Serous OME, showing an escaping blood cell (arrow) partially inside and partially outside the blood capillary (bc) red blood cells (r) in the inner surface of the lamina propria of drumhead at the periphary.(8 x 1000).

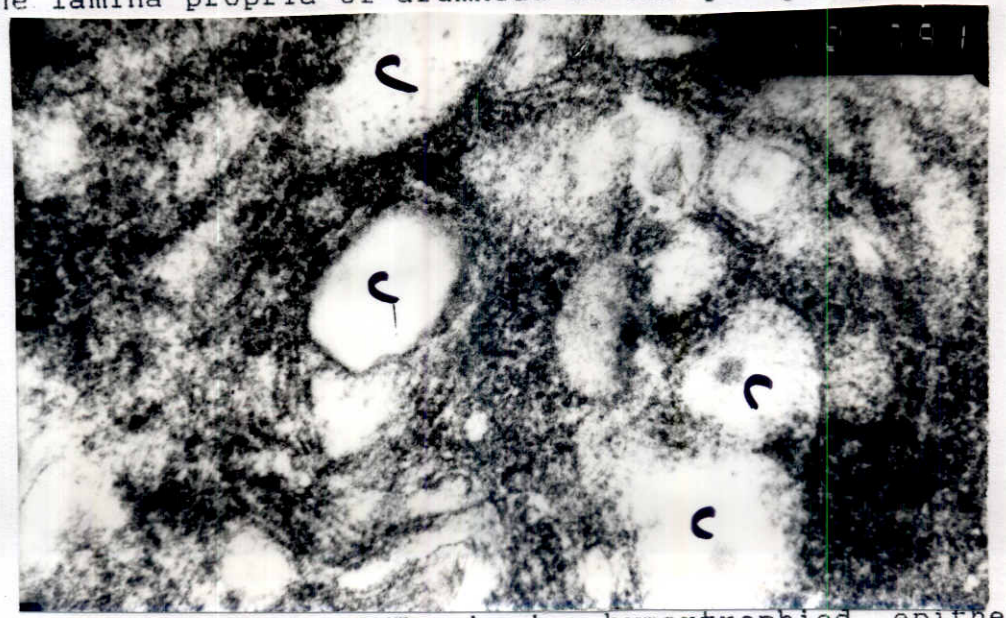

Fig. 50. Serous OME, showing hypertrophied epithelial cells of inner mucosa of drumhead, the cell has disturbed cisternae (c) of the smooth endoplasmic reticulum. (40 x 1000).

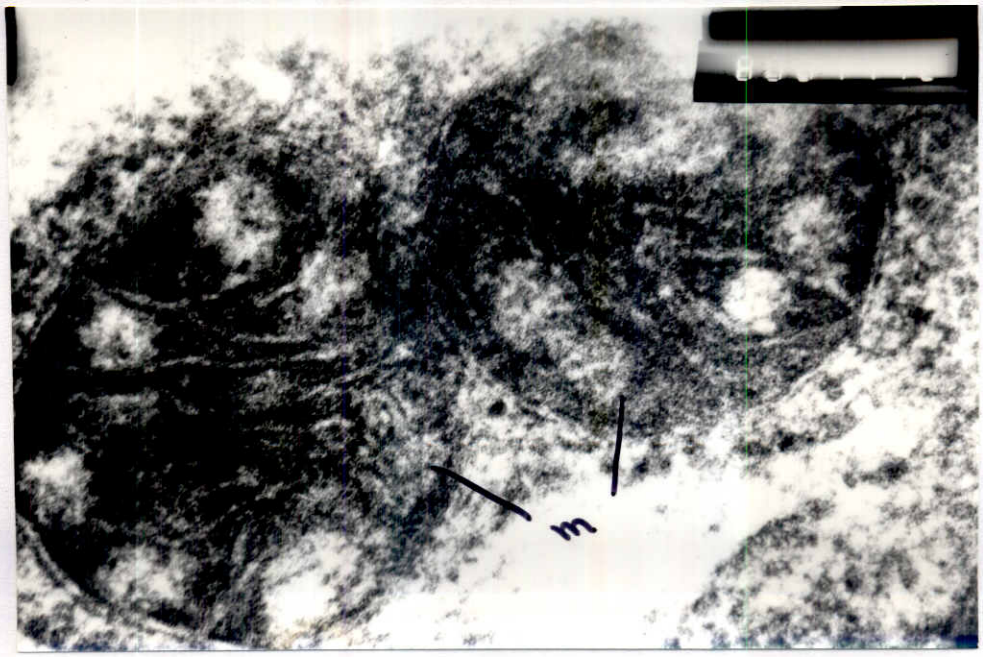

Fig. 51. Serous OME, showing over-distended mitochondria (m) "with abnormal light patches due to destruction inside the matrix" in the hypertrophied cells of inner mucosal epithelial cells of drumhead. (80 x 1000).

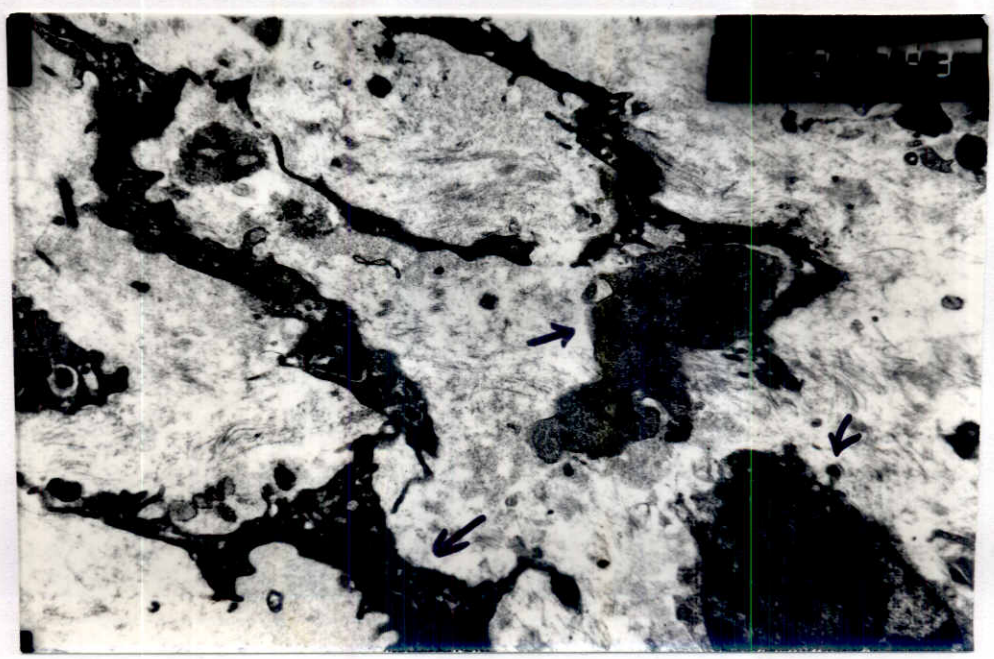

Fig. 52. Serous OME, showing proprial oedema (++) which includes irregular infiltrative cells (arrows). (5 x 1000).

Fig. 53. Mucoid OME, showing subepithial propria of eardrum showing distended lymphatic vessels (l.v.) with cell debris (d) and lymphocytes (l). (5 x 1000).

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