

of the snare, in a large proportion of the cases seen. I will briefly summarize and discuss the most prominent and constant features which were present.

They may be conveniently arranged under the following headings:

1. Transformation of the columnar ciliated and special olfactory cells into stratified squamous epithelium.

2. Disappearance of the hyaloid basement membrane.

3. The presence of special hyaloid bodies and pigment masses.

4. Changes in the glands.

5. Changes in the lymphoid tissue and blood-vessels.

6. Changes in the bones.

All these conditions were present in degrees proportional to the intensity of the disease in every well-marked case; I shall, therefore, consider them as the histological constants of atrophic rhinitis. Although transformation of the surface epithelium and many of the other changes may occur *separately* in various diseased states of the nasal mucous membrane, *collectively* their significance is of the utmost weight in identifying the specific nature of the process.

It has been observed by Bosworth* that these epithelial cells may become active inflammatory corpuscles, but I have not found any evidence to justify such an assumption.

The disappearance of the hyaloid membrane is very constant and characteristic, for in other forms of rhinitis it generally remains intact.

Perhaps the most striking and interesting feature is the presence of hyaloid bodies, which increase in number with the duration and severity of the disease. They consist of small, refractive, rounded, homogeneous masses, imbedded for the most part in the interlobular tissues of the glands and in the adjacent lymphoid tissue, but are also seen amongst the surface stratified epithelium. In the early stages they exist as small spheroidal masses about one two-thousandth of an inch in diameter, gradually increasing in size to about one eight-hundredth of an inch. At a later stage a complete change can be demonstrated—they seem to break up into

minute refractile bodies, resembling spores embedded in a transparent matrix.

In some places they are apparently encapsuled, whilst in others they are free. I have never satisfied myself of their nucleation, for whilst they readily take up rubin and orange they resist hæmatoxyline and other nuclear stains. The granular stage is well demonstrated by means of osmic acid and gentian violet.

What is their nature? Until consulting Burnett's "System of Diseases of the Ear, Nose and Throat," I was unable to find any reference to their existence. Under atrophic rhinitis, Fraenkel* describes homogeneous round and oval bodies, consisting of broken-down cells and nuclei, which he regards as the result of retrograde cell metamorphosis. These are doubtless similar to my hyaloid bodies, but I cannot agree with his interpretation, for they bear very little resemblance to broken-down cells, and I find no vestiges of nuclear particles. Stepanow† (Moscow) has described hyaloid bodies in polypi, rhinoscleroma, and adenoid growths, which he attributes to the action of bacilli, believing that their production is a process which presents too great a propagation of bacilli.

These bodies I have also seen, but they differ entirely from those of atrophic rhinitis, being concentrically laminated, staining differently, and are similar to the laminated corpuscles which occur pathologically in thyroid growths, and normally in thymus gland as Hassell's corpuscles.

Fat globules are also described by many writers, but these bodies are not fatty, since they do not give the characteristic reaction with osmic acid, and they are insoluble in ether. They are not composed of amyloid substance (lardacein), since they give negative results with methyl violet and similar stains. They are very suggestive (in their earlier stages) of myelin masses so often seen in preparations of nerve tissues after treatment with alcohol; but their presence in such large numbers, and subsequent granular changes, sufficiently negatives this interpretation. One feature is, however, very remarkable and suggestive, viz., their strong resemblance in staining reaction to the substance which

*Burnett's "System of Diseases of the Ear, Throat and Nose," Vol. I., p. 675.

†*Journal of Laryngology*, Vol. V., p. 322.

* "Diseases of the Nose and Throat," Vol. I., p. 166.