answer for a limited number of specimens, namely, those presenting a white or a very light substance in the interior of the hemisphere.

Specimens filled with dark tumors, or those in which nothing remained in the interior but retina and choroid, yielded negatives with no detail whatever in the center until the cornea and sclerotic, transparent and white, respectively, were hopelessly over-exposed. To obviate this a white bristol-board truncated cone, with an angle sufficient to throw the rays under the specimen near the center, was placed around the cup, as shown by the dotted lines in the cut. In this instance, instead of diffused daylight, sunlight was reflected into the cone by means of a mirror. Some specimens gave good plates with this method of illumination, but the danger of over-exposing the cornea and sclerotic still remained, and an old difficulty reappeared, namely, the imperfections of the surface of the cup. But the increase in the obliquity of light brought out all the scratches on the surface of the cup, especially if a trifle over-exposed. This in turn was reduced to a minimum by cementing a perfect glass disc to the anterior surface of the cup by means of Canada balsam.

In working with direct sunlight, or the electric arc, it is important to remember that glycerin jelly becomes liquid at a temperature of 105 F.

In many instances the cornea is so transparent, and the sclerotic so white, as to require more contrast than is afforded by the porcelainized glass disc with which our mounts are sealed. This is met by supplying backgrounds made of colored papers such as black, pea-green, a rather dull canary, and neutral gray. Of these, the latter color was most useful. The canary-colored background works well in some cases where it is desirable to "hold back" the sclera, but it is liable to interfere with a transparent cornea.

Color screens have not given any useful results in Dr. Dixon's hands.

On the whole, the most satisfactory plates used were Corbutt's A and B, which require exposures varying from three to twenty-five minutes, depending on the quality of the light, size of stop and character of specimen, as in all other photography.

The method is still imperfect, as will be seen. No single method of illumination yet tried has answered for all specimens, and the color of some is such as to defy all efforts with or without color screens, with different colored backgrounds, with diffused daylight, direct sunlight, or the electric arc.

Other methods are in process of application, the most promising of which is an annular prism at the base of the cup with or without the use of the truncated cone.

TUMORS OF THE CONJUNCTIVA.

ILLUSTRATED BY THE PRESENT EXHIBIT OF MORBID GROWTHS.*

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In response to the request of the Chairman of your Committee on Exhibit of Pathologic Preparations for a paper on some points in the pathology of the eye, as illustrated by our exhibit of the present year, it occurred to me that it would be well to confine myself within the limits of a comparatively narrow subject, and I have therefore

attempted to make a résumé of our knowledge of tumors of the conjunctiva. With this aim in view I have obtained a number of preparations showing the various growths which are found on this membrane, and I desire at this time to express my thanks to the gentlemen who have assisted me by loaning sections and mounted specimens from their collections, especially to Drs. G. E. de Schweinitz, Clarence A. Veasey, William Campbell Posey and L. Webster Fox, of Philadelphia; John E. Weeks, Peter A. Callan, Wilbur Marple, Emil Gruening and Edgar S. Thomson, of New York; Dr. Flemming Carrow, of Ann Arbor, and Dr. Brown Pusey, of Chicago. Many of the cases have already been reported, and others will be published in detail at a later time.

The growths of the conjunctiva are of considerable interest, pathologically, because of their great variety, although they are, relatively speaking, infrequent, and constitute only a small proportion of the cases which we see clinically. The conjunctiva may be the primary seat of the growth, or it may be secondarily involved by extension from the neighboring tissues. I shall limit myself to those tumors which originate primarily in the conjunctiva. They may be divided into two main classes: (a) Malignant; (b) benign.

The malignant growths are represented by carcinoma and sarcoma. They appear clinically in very much the same forms and in patients usually beyond the fortieth year of life. Their point of predilection is at the corneo-scleral limbus, and it is often impossible to distinguish them, except by microscopic examination. The growth of carcinoma at the limbus has been said to correspond with its occurrence elsewhere in the body at the junction of epithelial surfaces of dissimilar structure. The difference at this point between the conjunctival and corneal epithelium is not marked, however, and the etiology factor is rather the occurrence of true papillæ in the conjunctiva surrounding the limbus, varying from four to thirteen in number, which, as Nakagawa¹ has recently shown, become deeper in old people, and take on a sudden and enormous growth in beginning carcinoma. The carcinomatous growths appear first as small, pale reddish masses, which have but little tendency to spread inward, both cornea and sclera acting as very resistant checks; so they grow superficially, although rare cases have been described in which there was an inclination to extend inward from the start. In contrast to some of the benign epithelial growths, especially papillomas, they have no tendency to the formation of a pedicle, but possess a broad base, and are closely united to the underlying tissues.

The tumors consist of proliferating masses of epithelial cells, which develop directly from the surface epithelium and are separated into alveoli by a connective tissue stroma which is an extension of the connective tissue of the sclera and cornea. The behavior of the surface epithelium is at once a characteristic difference between carcinoma and sarcoma. In the former it is directly involved, while in the latter it passes smoothly over the surface of the growth, which raises it from the structures beneath as it extends. As a rule, carcinoma grows very slowly, but in some cases it forms large, fungous masses on the surface of the eyeball, the microscopic structure of which resembles papilloma very closely, and the examination of superficial portions of the tumor may lead to a very erroneous diagnosis. If allowed to remain, all of the carcinomas will ultimately perforate the eyeball, usually along the vessels and nerves at their point of penetration through the sclera. In

* Read at the Fifty-fourth Annual Session of the American Medical Association, in the Section on Ophthalmology, and approved for publication by the Executive Committee: Drs. J. A. Lippincott, Frank Allport and John E. Weeks.

1. Nakagawa: *Archiv f. Augenheilk.*, March, 1903.

some cases there is a distinct pigmentation of the stroma, so that a number of cases of melanocarcinoma of the corneoscleral limbus have been reported. Panas,² in fact, considered melanosarcoma to be the exception and melanocarcinoma to be the rule.

The question of malignancy is difficult to determine. The rapidity of growth may vary greatly; likewise the involvement of the cornea and sclera. Even superficial growths tend to recur, and while the extension by metastasis is rare, they should be thoroughly removed and the eyeball sacrificed, if it is evidently involved. Our collection shows a number of very good examples of carcinoma—some small and superficial, some showing tall fungous masses, and others extensive infiltration of the cornea and sclera.

SARCOMA.

Sarcoma, like carcinoma, occurs in individuals usually beyond middle life, and most frequently at the corneoscleral limbus. As a rule, the growths are pigmented, the pigment occurring both in the tumor cells, and in the connective tissue stroma, in which the cells are imbedded. As in the case of melanosarcomas of the skin, the conjunctival sarcomas develop chiefly from the pigmented nevi—the so-called pigment spots—on the conjunctiva, and, as Wintersteiner has shown, usually in the area corresponding to the palpebral opening, probably as the result of repeated slight traumatism. The study of these pigmented nevi, or melanomas, is of importance, therefore, for the correct interpretation of some of the facts concerning sarcomas. Their structure corresponds closely to that of the skin nevi: circumscribed collections of large polygonal cells which are imbedded in a groundwork of subconjunctival tissue. The question as to the origin of these cells has been, and still is, a matter of dispute. On the skin Unna,³ Kromayer⁴ and others have held that they are derived from the surface epithelium, although the direct connection can not always be shown, while Ziegler⁵ believes that they are due to the proliferation of the endothelial cells of the lymph vessels. Wintersteiner⁶ was unable to find any confirmation of Unna's theory in so far as it related to the conjunctival nevi; on the other hand, as has been mentioned in speaking of carcinoma, Panas⁷ long considered that these epibulbar growths were practically all carcinomas, although in a subsequent article he modified his claims and admitted that many were probably alveolar sarcomas, or endotheliomas, and thought that epitheliomas and sarcomas occurred together. In all of the nevi the epithelium is changed, often thinned, but many times it sends processes of cells downward into the tissue. These processes may be replaced by hollow, gland-like tubes, which may be so numerous as to give the growth a glandular or adenomatous appearance—*nevus pigmentosus glandulosus*. Cysts may often develop from the glandular formations, and may reach a large size and cause the nevus to atrophy by pressure—*nevus pigmentosus cysticus*. I have been able to secure several good cases of nevus of the conjunctiva, two of them cases studied by Wintersteiner and one loaned by Dr L Webster Fox, in which the overgrowth of the epithelium and the cyst formation are so marked as to overshadow the original growth of nevus.

From these pigment spots the sarcomas develop slowly into soft, vascular growths, which are usually more prominent than the carcinomas, and occasionally possess a pedicle. When they project over the surface of the cornea they are not ordinarily attached to it, but may be lifted away by means of a probe. Laterally, they are more firmly attached to the bulbar conjunctiva, but can usually be moved freely over the surface of the sclera. If they are not removed they continue to grow, and may reach a large size. In the majority of cases the cornea and sclera offer a remarkable resistance to invasion, and very few cases have been reported in which the tumor had invaded the interior of the eye. At times several nodules may appear at the limbus, or secondary nodules may spring up on the lids (Wadsworth and Verhoeff⁸). Recurrence after removal is very frequent, and may take place in the same position, or at a different portion of the limbus. They are commonly said to be less malignant than sarcomas occurring elsewhere, and Panas⁷ makes a sharp distinction in this respect between the corneoscleral growths, which he terms "epibulbar," and those occurring at a distance from the limbus, which he calls "peribulbar." Verhoeff and Loring,⁹ however, have shown that while the direct involvement of the eyeball is rare, there is a history of recurrence in 81.8 per cent. of the cases in which the patients were subsequently observed, local metastasis in 23 per cent., and general metastasis in 11 per cent. They therefore consider that epibulbar sarcomas are highly malignant, and believe the eyeball should be at once removed, if the patient's consent can be obtained.

Microscopically, the tumor consists of closely packed, spindle-shaped cells, running in definite bundles, or, more frequently, the cells are arranged in distinct alveoli, separated by a connective tissue stroma, and constitute the so-called alveolar sarcoma. In the latter case the cells may be spindle-shaped, but in many they show large, flat forms, which are epithelioid or endothelial in type. The growths are, however, to be distinguished from carcinomas by the absence of any involvement of the surface epithelium. These growths are well represented in the collection of this year. Some possess spindle-shaped cells; others show the epithelioid type.

Primary sarcoma of the conjunctiva of the lids is very rare, although the lid conjunctiva may be involved by implantation or recurrence of an epibulbar growth. Cases of lymphosarcoma of the plica semilunaris and of the fornix have been described as rarities. Lymphoma of the conjunctiva has been found in malignant lymphoma, with general involvement of the lymph glands of the body, and apparently as the first symptom in some instances. Very marked hypertrophy of the adenoid tissue of the conjunctiva, in the transition folds, with the formation of large tumor masses, which may cover the eye and make the opening of the lids difficult, occurs in the condition known as amyloid degeneration of the conjunctiva. Microscopic examination shows, in the beginning stages, great increase of the adenoid cells and the subsequent formation of amorphous masses, which in some instances give the reaction for amyloid, in others for hyaline. Dr. Weeks has loaned a slide which shows amyloid reaction on the surface of such a conjunctival growth, and I am able to exhibit a lymphosarcoma of the transition fold.

Carcinoma and sarcoma occur occasionally as primary growths on the caruncle, and show here much the same

2. Panas: *Traité des Maladies des Yeux*, Paris, 1894.

3. Unna: *Berlin. klin. Wochenschr.*, 1893, and *Virchow's Archiv*, vol. 143, 1896.

4. Kromayer: *Beiträge v. Ziegler*, xxii, 1897.

5. Ziegler: *Lehrbuch der Allgemeinen Pathologie und der patholog. Anatomie*.

6. Wintersteiner: *Ber. der ophth. Gesellschaft*, Heidelberg, 1898, p. 253.

7. Panas: *Archives d'Ophthalmologie*, January, 1902.

8. Wadsworth and Verhoeff: *Trans. Am. Ophth. Soc.*, 1901, p. 274.

9. Verhoeff and Loring: *Archives of Ophthalmology*, March, 1903.

characteristics as on the skin surface. Carcinoma has much greater tendency to form "pearly bodies" in this position than on the conjunctiva. A good case of primary carcinoma of the caruncle has been loaned by Dr. de Schweinitz,¹⁰ and one of primary sarcoma by Dr. Veasey.¹¹

The benign growths of the conjunctiva are either congenital or acquired. The congenital forms are sessile, while the acquired forms are usually polypoid in shape, and possess a pedicle. By far the most frequent of the congenital growths are the

DERMOID TUMORS.

Dermoid tumors form flat, dull white growths of firm consistency, usually situated at the corneoscleral junction, on the temporal side, and quite firmly attached to the cornea and sclera. The surface is often dry and may be covered with fine hairs, or, more rarely, with a few long hairs which irritate the eye by their presence. Microscopically, they represent small islands of skin. The epithelium is thickened, cutaneous in character, and covers a mass composed of dense connective tissue, in which hair bulbs, sebaceous glands and sweat glands may be imbedded. Frequently associated with other congenital anomalies, such as coloboma of the lid, they may take on a sudden, rapid growth in later life, and should be carefully removed. Most of the later writers assume a temporary attachment of the amnion to the eyeball during fetal life as the explanation of their origin. A number of such growths are included in the collection.

LIPOMA.

More rarely, subconjunctival lipomas occur beneath the bulbar conjunctiva. They appear as yellowish masses, situated generally in the outer angle of the eye, between the insertions of the external and superior rectus. Microscopically, they consist of lobules of fat, sometimes associated with considerable fibrous tissue. They frequently contain gland tissue, and as they are congenital, may be more properly termed dermolipomas. Some authors have contended that teratoid elements are always present, although they are easily overlooked. A number of cases, however, have been carefully studied in serial sections, and have proved to be pure lipomas. Occasionally they grow to a considerable size at puberty. They can be removed without difficulty, and show no tendency to recur. Two of these growths have been secured.

OSTEOMA.

As rare congenital tumors, about twelve cases of subconjunctival osteoma have been reported. These have been situated usually in the supero-external portion of the eyeball, which is also the position in which the lipomas are most frequently found. They represent small pieces of true osseous tissue, with lacunæ, bone corpuscles, etc., and are best explained as the result of a temporary adhesion of the amnion to the eyeball, and the subsequent development of bone in the tissue thus formed. They are illustrated by one specimen.

Lymphangiomas and telangiectasias have also been described as very rare congenital growths.

The acquired forms of benign growths are, in the majority of cases, polypoid in form. In the older textbooks all tumors of the conjunctiva which had a distinct pedicle were called polyps. Under this term, however, many different forms were included, and we now know that both soft and hard fibroma, adenoma, papilloma,

granuloma, angiosarcoma, and even tubercular conditions, may assume a polypoid appearance, as a result, probably, of the constant movements of the eyelids. As Elschnig¹² states, true polyps, in the strict anatomic sense of the term, i. e., hyperplastic growths of circumscribed portions of the conjunctiva, which include all of its elements, such as are found in the nose, esophagus, intestines, etc., have never been described on the conjunctiva. The term polyp, however, is used by many writers to describe also the soft, edematous fibromas or fibromyxomas which occur in the nose, and although it would seem best, as Axenfeld¹³ says, to drop the term altogether, if we are to use an anatomic classification, such good authorities as Fuchs¹⁴ and Panas² make a separate class of polyps, and the name may be retained and used to designate the fibromas of the conjunctiva.

FIBROMA.

Fibromas are represented by two forms, soft and hard. The soft fibromas occur chiefly in the fornix, or in the palpebral conjunctiva, grow quite rapidly and possess long pedicles. They are composed of parallel bundles of spindle cells in a finely fibrillar tissue, and often contain many blood vessels. The presence of these vessels is the cause of a characteristic symptom that is often observed in connection with the soft fibromas, viz., severe bleeding on the slightest traumatism. Removal and cauterization of the base with nitrate of silver, or with the actual cautery, usually prevent any recurrence. Less frequent are the hard fibromas, which arise chiefly from the palpebral conjunctiva and from the caruncle. Their surface is smooth and covered with a thin layer of epithelium. The histologic structure is that of fibrous connective tissue, with comparatively few cells and blood vessels. They cause no inconvenience unless large, and when removed have no tendency to recur.

GRANULOMA.

Quite closely related to the soft fibromas are the granulomas which develop in places where a superficial loss of conjunctival tissue has existed, most frequently after tenotomies and enucleations, and also after rupture of chalazia on the internal surface of the lid. They are composed of naked masses of pure granulation tissue: closely packed polynuclear cells in a fine reticulum, which contain numerous capillary blood vessels. There is no epithelial covering, and the little growths may be snipped off, or, if left alone, will finally be constricted off by the contraction of the conjunctival tissue surrounding their base.

The fibromas must also be distinguished from the small growths on the tarsal conjunctiva and about the limbus in spring catarrh. These present themselves in the form of broad, flattened papillæ, which have been likened to paving stones, and while they can not strictly be included among tumors of the conjunctiva, as they occur in the course of an inflammatory process and disappear without leaving any trace, they nevertheless resemble the fibromas very closely in their histologic structure. They consist of dense fibrous connective tissue, the fibers of which may show a peculiar glassy degeneration, and are covered with a thickened layer of epithelium, which, especially in the circumcorneal growths, shows a marked tendency to send invaginating processes of cells into the depth of the tissue, so that the appearance is very similar to that found in canceroid.

12. Elschnig: *Archiv f. Augenhellk.*, vol. xix, 1889, p. 64.

13. Axenfeld: *Ergebnisse der allg. Path. u. patholog. Anatomie* von Lubarsch-Ostertag, vol. ii, p. 38.

14. Fuchs: *Lehrbuch der Augenheilk.*, 7th ed., p. 140.

10. de Schweinitz: *Trans. Am. Ophth. Soc.*, 1898, p. 324.

11. Veasey: *Archives of Ophthalmology*, xxvi, No. 2, 1897.

Fibromas are represented by sections loaned by Drs. Weeks and Thomson. There are a number of sections of granuloma, and Drs. Posey and de Schweinitz have sent sections of tarsal growths in spring catarrh.

PAPILLOMA.

Another form of polypoid tumor of still greater importance is papilloma, or papillary fibroma. Elschig,¹² in his very excellent article, stated that this was comparatively infrequent, but the subsequent papers by S. Fuchs,¹⁵ Wagenmann,¹⁶ Lagrange,¹⁷ Zimmermann,¹⁸ Grunert,¹⁹ Kopetzky von Rechtperg²⁰ and others have shown that they are among the most common tumors of the conjunctiva. They form small growths, which may be distinguished clinically from the fibromas by the fact that their surface is not smooth, but is covered with tiny papillæ, like the surface of a raspberry. Frequently multiple, they occur chiefly in the neighborhood of the caruncle and semilunar fold, but also on the tarsal and bulbar conjunctiva, and unless removed very thoroughly show a decided tendency to recur. They are composed of branching papillæ of connective tissue, surrounded by thick mantles of epithelial cells, the preponderance of the epithelial cells showing that it is essentially an epithelial proliferation with which we have to deal. The connective tissue may be so little developed that the epithelial cells are found almost in contact with the walls of the capillary vessels. At times they are low and wart-like, at others they show long, villous processes and have a structure resembling a cluster of feathers. The latter appearance is well shown in two cases in the collection—one a case reported by Ayres of Cincinnati, and one obtained from Mr. Treacher Collins in London. When the papilloma originates on the caruncle, the surface epithelium partakes more of the character of skin epithelium, while on the conjunctiva it frequently contains numerous goblet cells. A number of very excellent specimens in the collection testify to the comparative frequency of the growth. The question as to their malignancy is often difficult to determine. When situated on the conjunctiva near the limbus they may be mistaken for an early stage of carcinoma, but on the other hand, while usually benign, they do unquestionably show at times a tendency to undergo carcinomatous degeneration and involve the tissues of the eyeball and lid, as cases by Horner,²¹ Lagrange and Mazet,²² Kopetzky von Rechtperg²⁰ and Risley and Shumway²³ have shown. Their removal should therefore be complete.

ADENOMA.

Adenomas occur occasionally on the eyeball, in the neighborhood of the caruncle, as pale red, isolated tumors, which may possess a pedicle or have a broad attachment. Only five cases have been reported, four of which have had their origin on the caruncle itself, arising from the tubular gland in this position, as in Veasey's²⁴ case, sections of which he has loaned, while Schirmer's²⁵ case on the semilunar fold probably developed from a misplaced gland, as there is normally no glandular tissue in this position. On the conjunctival surface of the lids, adenomas have been found originat-

ing in Krause's glands, at the border of the tarsal cartilage in the meibomian glands, and in the modified sweat glands of Moll. At times they show by their rapid growth and involvement of the surrounding structures that they are essentially malignant, or adenocarcinomas. The greater number of such cases originate in the meibomian glands, and show alveoli of large epithelial cells, which degenerate quickly and form large, poorly-staining masses in the center of the alveoli, as illustrated by two cases in the exhibit, one of which was loaned by Dr. Thomson of New York. Of course, these growths are not really conjunctival tumors, but since they may appear as tumors on the conjunctival surface of the lid, they must be mentioned for the purpose of differential diagnosis.

HEMANGIOMA.

Fifty-two cases of hemangioma have been collected by Pergens.²⁶ They consist of newly-formed capillary vessels, and should be sharply distinguished from varices and aneurisms. If they contain much fibrous tissue they may be termed angiofibromas, and are then closely related to the vascular fibromas. They may be congenital or develop in later life, and occur as primary growths on the palpebral conjunctiva, in the fornix, on the bulbar conjunctiva and plica semilunaris, as round, polypoid and occasionally sausage-shaped growths, the surface of which is sometimes smooth and sometimes nodular. They may remain stationary; at times they grow slowly, at others rapidly, without any apparent cause. When combined with sarcoma, the angiomatous formation is of secondary importance, and their course depends on the sarcomatous character of the tumor. Their histologic structure consists of twisted capillary vessels, which may also be dilated. If large blood cavities are present, we have cavernous angiomas, which are more rare. In their treatment the best results have been obtained by excision.

CYSTS.

Finally, as comparatively rare forms of new growths, we have the cysts of the conjunctiva. These develop in three chief places: on the bulbar conjunctiva, in the fornix and on the palpebral conjunctiva, in the form of transparent vesicles filled with a clear, serous fluid. Those of the bulbar conjunctiva represent usually small dilatactions of the lymph vessels, and are hence lymphangiectasias or lymphangiomas. They occur in the neighborhood of the cornea, and are generally multiple, like strings of small, transparent pearls. Sometimes they communicate with each other, and more rarely they form isolated, yellowish cysts, which, however, remain comparatively small, and are thus to be differentiated from the cysts which originate in the conjunctival glands. Very rarely cysts on the bulbar conjunctiva develop from invaginated processes of epithelial cells. These processes, first described by Henle²⁷ and later by Iwanoff²⁸ as true glands of the conjunctiva, and known as Henle's glands, are now considered to be, as a rule, folds of the conjunctiva which are lined with epithelium. They are very frequent in chronic catarrh, and especially in trachoma. If the opening of these minute gland-like depressions becomes closed, there may be retention of the secretion from the cells and the formation of cysts. Cysts also originate in the head of the pterygia, by the same process of invagination of the surface epithelium, and subsequent isolation of the cells from the surface. A few cases have been reported of the introduction by

15. S. Fuchs: *Archiv f. Augenheilk.*, vol. xx, 1889.

16. Wagenmann: v. Graefe's *Archiv*, vol. xl, p. 2, 1894.

17. Lagrange: *Archives d'Opht.*, April, 1899.

18. Zimmermann: *Klin. Monatsbl. f. Augenheilk.*, vol. xxxii, 1894, p. 371.

19. Grunert: *Klin. Monatsbl. f. Augenheilk.*, April, 1899.

20. Kopetzky v. Rechtperg: v. Graefe's *Archiv*, vol. li, p. 115.

21. Horner: *Zehender's Monatsbl. f. Augenheilk.*, vol. ix, 1871.

22. Lagrange and Mazet: *Annales d'Oculistique*, vol. cxix, 1898.

23. Risley and Shumway: *Annals of Ophthalmology*, July, 1901.

24. Veasey: *Annals of Ophthalmology*, July, 1902.

25. Schirmer: v. Graefe's *Archiv*, vol. xxxvii, i, p. 218.

26. Pergens: *Klin. Monatsbl. f. Augenheilk.*, vol. xxxix, January, 1901.

27. Henle: *Handbuch der Eingeweidelehre des Menschen*.

28. Iwanoff: *Heidelberger ophthalm. Gesellschaft*, 1878.

traumatism of epithelial portions of the skin, cilia, etc., beneath the conjunctiva and the formation of cysts from these included particles.

Cysts of the fornix may arise from the so-called Henle glands, and less frequently from the accessory lachrymal glands, or glands of Krause, in this position. The excretory ducts of these glands, forty-two or more in number, in the upper lid, and from two to six in the lower lid, may be closed by chronic inflammatory processes, and the retained secretion then widens out the ducts into cysts, which may reach considerable size, in contrast to the lymphatic cysts of the bulbar conjunctiva. When the cysts originate in Krause's glands some of the acini of the gland will usually be found in the neighborhood of the cyst, but this is not always the case, and as their size, position and contents are not diagnostic, the determination of their origin may be very difficult.

From these glandular cysts must be distinguished those due to the presence of the cysticercus. These occur in early life, and constitute, according to Ballaban's statistics, one-sixth of the number of cases of ocular cysticercus. They occur frequently as quite large, pale red, or more often whitish or yellowish vesicles, which are usually movable, but are occasionally attached firmly to the sclera, or to an eye muscle. If the wall of the cyst is thin, the embryo may be seen as a white spot within. Histologically, the wall of the cyst is composed of a thick connective tissue capsule lined with several layers of young cells, and the surrounding conjunctiva shows evidences of reaction due to the presence of the foreign body. Within the cyst wall is the characteristic cysticercus bladder projecting from one side. In the glandular cysts, on the other hand, the wall of the cyst is composed of a single, or at most, a double, layer of epithelial cells.

The cysts from the glands of Henle are quite frequent, both in the transition folds and in the palpebral conjunctiva in chronic catarrh, and in trachoma. They have been studied of late, especially by Fuchs²⁹ and Wintersteiner,³⁰ who have described concretions within the cysts, which arise either from the altered secretions of the cells lining the cyst walls, or from conglomerated masses of the dead cells themselves. Fuchs believes that in some cases the concretions are masses of actinomycetic threads. The collection contains the section of a large epithelial cyst of the upper fornix, one of subconjunctival cysticercus, and a very good example of cyst formation in old trachoma, with concretions within the cyst cavity.

29. Fuchs: v. Graefe's Archiv, vol. xlv. 1, p. 103.

30. Wintersteiner: v. Graefe's Archiv, vol. xlv. 2, p. 324.

Good Lay Advice to Young Physicians.—If your patients were all reasonable men and women, your task would be easy; but they are not. Even in their best estate they are not all reasonable men and women, and you will have to deal with them when they are not in their best estate, but are morbid. You will have to deal with patients who throw your medicine out of the window, and still expect you to cure them; in one house with a mother busy with other things and careless of the sick child; in another house with a mother whose weak and tearful sympathy does much to negative the influence of your presence and the effect of your medicines. It is not enough for you to know physiology and anatomy and therapeutics; not enough for you to know what your medical school has told you; you must know men and women—their physical constitutions, their mental and moral constitutions. You must understand them—their life, their narrownesses, their prejudices, their unreasonableness. You must see into them, that you may minister to them.—*The Outlook*.

PARAFFIN INJECTED SUBCUTANEOUSLY FOR THE CORRECTION OF NASAL AND OTHER DEFORMITIES.*

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HISTORY.

"To Dr. J. Leonard Corning of New York belongs the credit of first experimenting along the lines of subcutaneous injection of oils"; and, although applied to an entirely different purpose to that which paraffin is now devoted, yet of much import, since it was demonstrated that sterilized oils could be used subcutaneously, without resultant inflammation. Following this same idea, directed in a different channel, Gersuny of Vienna, in 1900, published an article stating that melted vaselin, when injected into a yielding tissue, forms a small tumor which remains *in situ*, causing no appreciable reaction. He used this method to overcome the deformity resulting from castration, blemishes due to cavities, depressed scars, and also for narrowing orifices.

Drs. Lynch and Heath appear to be the pioneers in America in the use of subcutaneous injection of paraffin for the correction of nasal deformities.

In 1901, I began a series of investigations on the cadaver to ascertain the action of paraffin beneath the skin. Before injecting the paraffin the temperature of the tissues was raised to 99 F., by hot applications, then I injected beneath the skin, on the dorsum of the nose, an amount of paraffin varying from a half to two drams, without exerting any restraining pressure on adjacent tissues. I found that small injections of the paraffin would remain *in situ*, and assume the conformity of the solid parts over which it was injected; but when the larger quantities were used, a portion would force its way into the soft tissues at the inner canthus of the eyes and along the course of the angular veins. This could be prevented by pressure over these areas. It was also demonstrated that an intimate adherence exists between the skin and the lateral cartilages at the tip of the nose, and hence was noted the importance of liberating the tissues between the skin and cartilages at this point before injecting the paraffin in the living subject. Later I injected melted paraffin into the back, ears and nose of a rabbit, without anesthesia, and with slight apparent pain to the animal. Ten days later, the examination of the tissues around the injected paraffin gave no evidence of acute inflammation. There had been some attempt on the part of the tissues to encapsulate the injected mass, but the paraffin itself had undergone no obvious change. Later another injection was made into the peritoneal cavity of a rabbit, and after a 22 days' period the animal was killed. Here no evidence of inflammation was present—not even the formation of adhesions. The mass had moved about the peritoneal cavity and become rounded in shape, and had finally lodged between the liver and diaphragm. From this I concluded that paraffin must be inert if injected into the tissues under proper surgical precautions. The paraffin used in these cases melted at 110 F.

Dr. A. E. Comstock¹ of St. Paul, Minn., has described the results of his experiments with rabbits along the pathologic line of injected paraffin. He demonstrated the changes in the tissue after injections varying from

* Read at the Fifty-fourth Annual Session of the American Medical Association, in the Section on Laryngology and Otology, and approved for publication by the Executive Committee: Drs. George L. Richards, O. Joachim and G. V. Woollen.

1. On Paraffin, New York Medical Record, Nov. 1, 1902.