nucleus, occur. Indeed, one sometimes finds large cells containing numerous nuclei and a vacuolated protoplasm in which irregular or rounded cellular inclusions are present. These are perhaps best interpreted as evidences of degeneration.

The tumor mass as described above contains in the interstices between the cells very numerous red blood corpuscles in a very well-preserved condition. There is very little evidence of any breaking down of the red corpuscles,—hardly any deposit of hæmatoidin in the tissues, which would certainly be present if the presence of the blood were due to actual hemorrhage. Red corpuscles are found scattered in considerable numbers among the myelocytes and other cells in the normal bone marrow, however, and it seems probable that the condition here is analogous. The walls of the blood-vessels in the tumor are nevertheless of extreme thinness and extravasations might readily occur. So also tumor cells are quite frequently found inside these blood-vessels lying among the red corpuscles, although an examination of the circulating blood a few days before the death of the woman showed only one or two doubtful myelocyte-like cells among a great number of leucocytes, the varieties of which were those of the blood in practically normal relations.

From this description, then, it is seen that in this condition we have multiple new growths from the bone marrow, not very sharply delimited from the marrow and showing very gradual transitions into it. The cells have the form and general characters of the bone-marrow cells, lacking the specific granules of the myelocytes, but possessing the peculiar nuclear structure found in the myelocytes and their formative antecedents. They differ in essential particulars from the plasma cells, and in view of these facts and of the fact that they largely replace the myelocytes in the marrow in the neighborhood of the tumor, there being no sharp boundary between the myeloma-like marrow and the myelocyte marrow, we may consider them directly related to these cells and probably derived from the large non-granular forerunners of the myelocytes.

The exact relations of this condition to others with which we are familiar are difficult to determine. On the one hand, there are none of the anatomical features of the ordinary forms of chronic inflammation, while on the other hand the process differs from that which characterizes the majority of tumors in its simultaneous origin in many bones and in its mode of growth, which while destructive is not of such a nature as to give rise to metastases. We are quite ignorant of any etiological factors, but on the whole the condition seems most analogous to those forms of lymphosarcoma which, arising often simultaneously from many lymphoid structures, invade and destroy the adjacent tissues.

William G. MacCallum.

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[2] Deutsch. Zeitschr. f. Chir., 1873, Bd. iii., S. 162.
[3] Virchow's Archiv, 1894, cxxxvii., p. 280.
[4] Virchow's Archiv, 1900, clxi., p. 252.
[5] Primäre multiple Sarcome der Knochen. Inaug.-Diss., Basel, 1893.
[6] Ergebnisse der allgemeinen Pathologie u. pathologischen Anatomie. Herausgegeben von Lubarsch u. Ostertag, 1896, iii., 1, p. 676.
[7] W. G. MacCallum: Case of Multiple Myeloma. Journal of Experimental Medicine, vol. vi., No. 1, 1901.
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[9] Monatshefte f. prakt. Dermatologie, 1891, xii., p. 296.
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[12] Virchow's Archiv, 1897, cl., H. 197.
[13] Ziegler's Beiträge z. path. Anat., 1898, xxiv., p. 163.
[14] Journal of Experimental Medicine, 1898, iii., p. 401.
[15] Zeitsch. f. klin. Med., 1901, xlii., p. 161.

MYOMA.—The myoma is a tumor composed chiefly of muscle tissue, therefore of mesoblastic origin, and belonging in the connective-tissue group. According to the type of muscle tissue of which myomata are composed, they are divided into leiomyoma (Zenker) or myoma lævicellulare (Virchow), containing smooth muscle fibres, and rhabdomyoma or myoma striocellulare, containing striated muscle fibres.

In general, the term myoma, without further distinction, is used for leiomyoma.

Leiomyoma.—Of the two varieties, the tumor composed of smooth muscular fibres is by far the most frequent and of the most importance clinically.

Histology.—The physiological type of the tissue, the smooth muscular fibre, is widely distributed over the body, and is best seen in the intestinal canal and in the uterus. The smooth muscular fibres are long, fusiform cells, which are connected by a small amount of cement substance. The nucleus is a long rod-shaped body situated in the middle of the cell. The tumor is composed for the most part of such muscular fibre cells, which are arranged in bundles, closely packed together, frequently interlacing, and separated from one another by a small amount of connective tissue which carries the blood-vessels. On section of the tumor these bundles are cut at various angles, and when the nuclei are brightly stained the section often appears peculiar. When a bundle of fibes is cut exactly across, the section of the muscular fibres, with the brightly stained nuclei in the centre, may be mistaken for round cells with a central nucleus, or, still more readily, for a section of a nerve. The nuclei may be mistaken for connective-tissue nuclei and the tumor for a fibroma. In the myoma the nuclei are longer, narrower, and more refractive than connective-tissue nuclei, and in the fibroma the arrangement of the fibres in bands is never so characteristic as in the myoma. In cross-section of the fibres the muscle substance around the nucleus is seen to be denser, more homogeneous, and more refractive than the protoplasm of other cells. When fresh unstained sections are examined the tumor may be mistaken for a sarcoma, in which the cells are often arranged in bundles in the same way, but a careful study of the nuclei will reveal its true character. Th separate cells which compose the tumor may be isolated by macerating small portions in a twenty-per-cent. nitric-acid solution or in a thirty-per-cent. solution of caustic potash. This dissolves the cement substance between the muscular fibres, and they can then readily be teased apart. There is often a considerable difference in size between the tumor cells and the cells of the analogous physiological tissue. The cells may be very much larger or very much smaller than these. Sometimes cells as large as the muscle cells in the rapidly growing pregnant uterus are found. There is always with the muscular tissue a variable amount of connective tissue which is principally found between the larger muscle bundles. From this, smaller septa are given off which run between the smaller bundles of cells. White (*Johns Hopkins Hospital Bulletin*, xi., 114, 1900) has demonstrated that this connective tissue is of the white fibrous and reticular types, and that each muscle cell is surrounded by a connective-tissue capsule. He could demonstrate no elastic fibres. In this connective tissue run the blood-vessels. In some cases the connective tissue is so abundant that it forms a considerable part of the tumor, and in others there is scarcely any present, except around the larger vessels. The amount seems to vary with the age of the growth, being always less in small tumors of recent formation. When there is much connective tissue present the tumor is generally firm and fibrous, but in some places it may have more the character of loose areolar tissue and contain numerous lymphoid cells. In some of the very large myomata of the uterus the development of connective tissue is so great that the tumor appears to be principally composed of this, and it is only after considerable search that the muscular tissue is found. To this form the term *fibro-myoma* is given. In almost every tumor some places will be found where neither muscular tissue nor connective tissue can be made out. There are larger or smaller areas of firm, highly refractive, homogeneous tissue, in which a few rod-shaped nuclei are scattered. Such areas are most abundant in the larger tumors, and represent a hyaline transformation of the tissue. As a rule the myomas have a very poor vascular supply, but cases are sometimes seen in which the blood supply is so abundant that the tumor almost resembles a cavernous tissue. This variety of tumor will be considered more fully in speaking of myoma of the uterus.

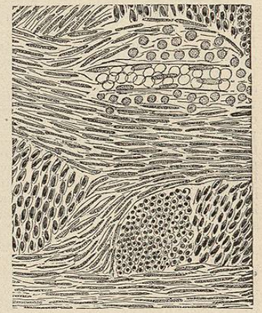

Fig. 3466.—Section of a very Small Myoma of the Uterus, Hardened in Müller's Fluid and Stained with Hæmatoxylin. Bands of muscular fibres are seen cut in various directions. (×175.) (After W. T. Councilman.)

Gross Appearance.—Macroscopically the myoma resembles most the hard fibroma or one of the sarcomas. It is always sharply circumscribed, and generally surrounded by a firm capsule of connective tissue. On section of the tumor it can always be easily separated from the tissue surrounding it. The cut surface has a whitish or yellowish color and glistens. It is not homogeneous, but marked by fissures and lines which represent the spaces between the muscular bundles, and which often have a concentric or spiral direction. Whiter and darker patches are sometimes seen on the surface; these generally depend on degenerative processes in the tumor.

Origin.—The tumor always develops from non-striated muscular tissue. Unlike the rhabdomyoma, it never develops in any locality where this tissue is not found; it is never heterologous. Although its origin from smooth fibres has long been generally accepted, it is interesting to note that Kölliker and his followers believed its origin to be from the connective tissue. The exact histogenesis, however, is not always clear. Keifer (*La Presse médicale*, 1899, No. 10, p. 49) has demonstrated by injection methods small islands of non-vascular tissue in the uterus, which increase peripherally by the addition of smooth muscle fibres. In the centres of these masses was frequently seen an arrangement of cells suggesting obliterated vessels. From these masses about obliterated vascular trunks he believes myomata take their origin. Cohen (Virchow's *Archiv*, 1899, clviii., 524), in a study of the histogenesis of myomata of the uterus and stomach, concludes that in many cases it is impossible to determine the origin. He examined by serial section small tumors, and in many but not in all he found a central blood-vessel without an adventitia, whose muscular coat could not be differentiated from the newly formed muscular fibres.

In myomata of the skin the origin of the new growth is supposed to be the muscular coat of the blood-vessels and the erector muscles of the hair shaft (Jadassohn).

Nature.—The leiomyoma is a benign tumor, distinctly encapsulated and of slow growth. Although not in itself a dangerous tumor, it may, mechanically, cause serious complications; thus submucous myomata of the uterus may become eroded and be the source of a serious hemorrhage. Pedunculated tumors may be forced into the cervix uteri, causing a spurious labor; or if of large size they may perhaps produce prolapse of the uterus. Similar tumors beneath the peritoneum may exert pressure on the rectum or bladder, or by their weight bring about displacement of the uterus and other pelvic organs. They may form adhesions to other organs and thus induce strangulation; or they may themselves, if pedunculated, become strangulated and form free masses in the peritoneal cavity. Myomata of the digestive tract may cause occlusion or serious results may follow the traction superinduced by their mere weight.

Etiology.—Little is known in regard to the etiology of the myomata. In the uterus they are found most frequently after middle life and are much more frequent in blacks than in whites. On the other hand, the analogous tumor of the prostate in man is much more common in the white race than in the black. It cannot be shown that irritation exerts any influence. Some uterine tumors containing glandular acini suggest a congenital origin, the result of misplaced uterine fragments, thus supporting Cohnheim's theory.

Seats.—The more common situations are the uterus, gastro-intestinal tract, and prostate; the less common are the bladder, skin, nipple, and walls of blood-vessels.

Uterus.—The most frequent place of the formation of the tumor is the uterus. Every variety of the tumor is found, and it can be studied best here. The new growth may spring from any part of the uterine wall, but usually from the portion above the cervix; and it may vary in size from a microscopic nodule to a mass or masses weighing over a hundred pounds and entirely filling the abdominal cavity. The chief mass of these tumors is composed of muscle fibres, which are generally much larger than those of the normal uterus. The increase in size affects principally the width of the cell and the nucleus. Cells are often seen which are wider than the diameter of a red blood corpuscle. The muscle fibres are arranged in bundles, which are surrounded by wide capillary vessels. The walls of these vessels consist of a single layer of endothelial cells with large nuclei, supported by a thin layer of connective tissue. Both between the muscle bundles, and between these and the connective tissue of the vessels, are small spaces which contain white corpuscles and are surrounded by a fine tissue in which here and there nuclei are enclosed. In this way a cavernous structure is formed, which is not present in the normal uterus. Klebs supposed that these spaces represent lymphatic cavities, in which the whole tissue, muscular fibres, and blood-vessels are suspended by the small bands of connective tissue. Larger blood-vessels, with thick walls and a wide adventitia, are but seldom found, and then in the broad partitions between the larger bundles of muscular fibres.

The tumors may increase in size by the joining together of the neighboring growths, but this mode of increase is rare. Generally it appears that the same process of new formation, in consequence of which the smallest and most simple myoma was formed, repeats itself. Every single vessel, with the muscular and connective tissue belonging to it, proliferates again and forms a second generation of nodules, which are situated in the original tumor. These different centres of growth can, as a rule, be easily made out, and sometimes the arrangement is such that the tumor appears to be composed of triangular masses, the apices of which point to the centre and the base is along the periphery of the tumors. In other cases, the formation of secondary nodules takes place only in certain parts of the tumor, and in this way very irregular, uneven masses arise. This peculiar process of growth leads to the displacement of the tumor, which originally is enclosed in the walls of the uterus. If the growth takes place most rapidly in the part of the tumor nearest the mucous or the serous membrane, that part escapes from the muscular tissue and projects into the uterine cavity or on the surface of the organ, and finally the whole tumor becomes separated from the uterine walls. In this way the submucous and subserous varieties of the tumors arise, which are either connected with the uterus by a narrow pedicle or have a wider attachment. This attachment often contains dilated venous vessels in the loose connective tissue. The tumors which remain within the muscular coat are termed interstitial or intramural. When the connective tissue is much developed the tumor is denser and harder, and on section the lines and fissures are not so evident. The lymph spaces and blood-vessels become narrower and partly obliterated. The smooth muscular fibres remain preserved, but the single fibre cells can no longer be recognized, and in place of them small, long, rod-shaped nuclei are found embedded in a substance which appears more or less fibrillar (fibromyoma). The

best conditions of nutrition are found in the small tumors of the uterus, which sometimes are composed entirely of muscle fibres and blood-vessels. Such tumors have the grayish-red, dull appearance which the uterus shows on section, and microscopically they cannot be distinguished from the uterine tissue. The small lymph spaces which were spoken of may become widened to form large cysts filled with a clear fluid analogous to serum and coagulating spontaneously on exposure to air. Often these do not seem to have a special lining membrane. Small processes of connective tissue sometimes grow from the walls of these cysts, which penetrate between the adjoining bands of muscular tissue, and in this way a series of smaller cysts may arise. These *cystomyomata* of the uterus may attain a large size, especially when, as often happens, heterologous formations of a myxomatous or sarcomatous character arise in them. Single cysts of large size, entirely surrounded by muscular tissue, are sometimes found. Their contents are fluid, generally more or less colored with blood pigment from numerous hemorrhages which have taken place into them. The contents of all of these cysts will usually coagulate spontaneously. The walls often contain a layer of fibrin of variable thickness, and the cysts may be traversed by bundles of muscle tissue. Dilated blood-vessels are often found in the neighborhood of the tumor, and in the extramural forms they run in the loose connective tissue of the attachment. These are the most frequent source of the hemorrhages which so often accompany this form of tumor, they being often torn across by the traction of the tumor. The dilatation of these vessels is nothing but a passive process, but in some cases there is a very abundant formation of vessels in the tumor itself. Virchow distinguishes this variety under the name *telangiectatic myoma* or *cavernous myoma*. There is little or no development of connective tissue, and the vessels are immediately in contact with the muscular bundles. It is in such tumors that marked variations in size are seen, the tumor appearing sometimes double its usual size. It is probable that this variability in size may be due both to changes in the amount of blood in the dilated vessels and to different degrees of contraction of the muscle cells.

There may be mixed forms of myomata. The most frequent combinations are with myxomatous and sarcomatous tissue. The myxomatous degeneration occurs when much fibrous tissue is present. Sarcomatous change is much less frequent. Such tissue develops around the vessels in the septa between the bundles of muscles. The myxomatous tissue in the tumor can be recognized as patches of grayish, gelatinous material, while the sarcomatous portions are whiter and less refractive than other parts. Combinations with other forms of tumors do not take place. In the uterus carcinoma may coexist with myoma, and the carcinoma may erode and grow into the myoma in the same way that it grows into the muscle tissue of the uterus itself.

Of the degenerative processes the most frequent is calcification, which may affect the whole tumor or only parts of it. When the calcification is complete the whole tumor may be changed into a hard, stony substance, in which no tissue or blood-vessels can be made out. Generally the process is not so complete as this, and a network of calcified tissue traverses the tumor, in the meshes of which small bands of muscle tissue and vessels are seen. In some cases a true formation of osseous tissue has been made out in the tumor, and in one tumor the writer has observed areas of adipose or true fat-bearing connective tissue. Occasionally complete gangrene may result from interference with the blood supply of large areas. Suppuration is rare but may occur. After the menopause these growths are said to undergo atrophy.

An interesting form which occasionally occurs is one which contains glandular structure of the type of the uterine mucosa and is known as adenomyoma. It is distinctly a benign tumor, though its growth may be diffuse. It is usually situated in the inner layers of the muscular wall. Opinions vary as to the origin of this growth. Von Recklinghausen believes that it develops from remnants of the Wolffian body, but admits the possibility of its origin from the uterine mucosa. Cullen (Johns Hopkins Hospital Reports, vol. vi., 1897), who has studied carefully two cases, believes the latter to be the only possible origin.

The presence of a myoma usually produces more or less hypertrophy of the muscular coat. This is especially true of the mucous form. Distortion of the uterus is common. The mucosa is usually atrophied over submucous myomata, but elsewhere is unaltered (Cullen).

Broad Ligament.—It is very doubtful if myomata ever arise in the broad ligament. Tumors found there are in reality subserous forms which have developed in the lateral wall of the uterus, and have finally become separated from it.

Prostate.—The myomata of the prostate come next in importance to those of the uterus, and are most frequently found in advanced age. Some of these enlargements of the prostate depend on an actual hypertrophy, in which all parts of the gland participate. In others, the enlargement is principally due to hyperplasia of the glandular elements, and this form passes most readily into adenoma. In the third class Virchow has shown that the enlargement is principally due to a hyperplasia of the smooth muscle fibres, which make up a large part of the gland.

This new formation is sometimes diffuse, but more often is in the form of distinct nodules. The favorite seat for their formation is on the posterior upper portion of the gland, and this distinct tumor formation is generally spoken of as hypertrophy of the third lobe of the prostate. The lateral halves of the gland are the next most frequent seat of this formation. It is rather rare that the anterior part of the gland is affected, although Thompson has described a tumor here as large as a walnut.

Digestive Tract.—The myomata of the digestive tract are, next in order, most frequent. Their microscopic characters do not present any differences from those of the uterine myomata. Cyst-formation and degenerative processes are not commonly found. They occur in the œsophagus, generally near the cardiac end, in the stomach, and in the intestine. Myoma of the appendix has also been reported. They are comparatively rare in all these localities, they seldom attain a large size, and usually do not give rise to symptoms, unless of sufficient size to produce obstruction or invagination. In the duodenum such tumors may obstruct the common bile duct (Delafield and Prudden). These tumors develop from the muscular coats of the canal, soon project into the lumen, are covered only by the mucous membrane, and may become pedunculated. Less frequently they project outward beneath the peritoneum.

Skin.—Myomata in this location are divided by Besnier (Hyde) into two groups: simple and dartoic. The former are rare, less than a dozen cases having been reported. They are generally multiple, occurring chiefly on the upper extremities and in old people, especially men. They are supposed to arise from the erector pili muscles.

The dartoic type is more common, generally occurs singly, and is found most frequently in the skin of the mammæ, scrotum, and labia majora. They may be sessile or pedunculated, and vary from the size of a nut to that of an orange. Mixed forms may occur, as fibromyoma, angiomyoma, and lymphangiomyoma.

Bladder.—Myoma of this organ is rare. It was first described by Virchow, who supposed it to be an outgrowth of the prostate; but a myoma of the bladder pure and simple, arising from the muscularis and extending beneath the peritoneum, has since been described by Belfield (*Wien. klin. Woch.*, 1881, 329), and a somewhat similar one by Verhoogen (Kelly, "Operative Gynæcology"). These tumors may be sessile, but are usually pedunculated. They may be submucous or subserous, and vary greatly in size. In Verhoogen's case it was the size of a child's head. They are usually quite vascular.

Urethra.—Myoma in this location is rare. Büttner (quoted by Kelly) found an ulcerated myoma the size of a hen's egg in a woman of forty years of age.

Veins.—Small leiomyomata have been found in the saphenous and ulnar veins. A large myosarcoma of the inferior vena cava has been reported.

Kidney.—Minute myomata, usually multiple, are occasionally found in the kidney. They are generally found in the cortex, close beneath the capsule, and may arise either from the capsule or from blood-vessels (Lartigau and Larkin, *Journal of Medical Research*, N. S., vol. I., No. 1, 1901). They give rise to no symptoms during life.

Other locations in which leiomyoma is occasionally found are the spermatic cord (the growth occurring here sometimes as a myolipoma), the liver (where these growths are of slight significance), the Fallopian tubes, ovaries, vagina, and vulva; in all of which locations the type is generally that of a fibromyoma. In mixed tumors of the mammary gland small masses of both smooth and striated fibres are occasionally seen.

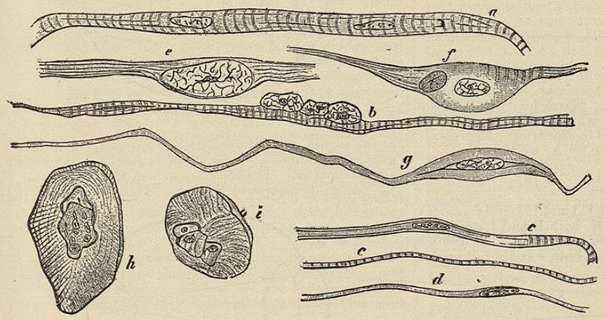

FIG. 3467.—Cells from a Rhabdomyoma. (From Ribbert and Wolfensberger.) *a*, *b*, *c*, Fibres of various sizes with transverse striation; *d*, small nucleated fibre without striæ; *e*, spindle cell with longitudinal striæ; *f*, spindle cell with longitudinal and transverse striæ; *g*, spindle cells, non-striated, with elongated processes; *h*, *i*, round cells with concentric and radial striation.

Rhabdomyoma.—This form of myoma, into whose structure striated muscle fibres enter, must be considered one of the rarest of tumors. The first of these tumors was described by Rokitansky, and since then not more than thirty or forty cases have been reported. Von Recklinghausen found in the hearts of newly born children, in a few instances, small tumor masses which contained striated muscle fibres. Generally the tumors are not pure forms, but are mixed with sarcoma. The muscle fibres are, as a rule, not straight and arranged in masses, but are separated from one another and irregularly distributed in the tumor. The character of the fibres varies. The well-developed fibres appear as nuclear bands of varying width and may have both longitudinal and transverse striations. The poorly developed forms are narrow bands without transverse striations, or spindle cells with long processes and imperfect or no striations; also there may be seen irregular round or oval cells, varying in size, with radial or concentric striation. Associated with these are numerous cells of indefinite origin. (See Fig. 3467.) A sarcolemma is not always demonstrable, but has been described.

The most frequent place of formation of these tumors is in the genito-urinary system, especially in the kidney or testicle, and frequently in the uterus, vagina, bladder, or ovaries. They occur occasionally, however, in other locations, as in the skeletal muscles, parotid gland (Prudden), subcutaneous tissues, mediastinum, and œsophagus. They are found almost exclusively in children, and may reach a very large size; as in the case described by Marchand, in which such a tumor of the left kidney extended from the diaphragm to the pelvis and weighed 2,770 gm. Most probably the explanation given by Cohnheim of their origin, which refers them to unused embryonic material, is the correct one. Their presence in such parts where complications in the embryonic formations take place, and where there is a mingling of the germinal layers, speaks in favor of this. *Richard Mills Pearce.*

MYOPIA—M—(*μυωπία, μυωπίασις*, also *μυωπός, μυώψ*—from *μύω* and *ὤψ*, signifying winking or contracting the eyelids—German, *Kurzsichtigkeit*; French, *vue courte*; English, short- or near-sightedness)—is mentioned by Aristotle, in the Galenical writings, and by the Byzantine medical authors—Oribasius, Aëtius, Paulus Ægineta, and Actuarius. It is described as a congenital condition, in which small near objects are seen distinctly, but distant objects imperfectly or not at all; also as the opposite condition to that occurring in old persons who distinguish small near objects, such as written characters, imperfectly, but see well at a distance. It is further recognized as incurable.

These brief statements, which comprehend practically the sum of the teaching of the earlier writers on medicine, and which were not seriously questioned until after the middle of the last century, include, nevertheless, two fundamental errors: (*a*) M, although very common in children, and dependent in many cases on inherited tendencies or conditions, is very rarely congenital; and (*b*) M is not the opposite condition to presbyopia—which is a disability resulting from impairment of the function of accommodation incident to advancing age—but is really the opposite of hypermetropia—H—(see *Hypermetropia*), which is a congenital condition, and which, like M, consists essentially in a faulty proportion between the radii of curvature of the refracting surfaces of the eye and the length of the antero-posterior axis of the eyeball.

As in H the axis of the eyeball is, as a rule, actually shorter than in the normally proportioned (emmetropic) eye, so in M the axis of the eye is, as a rule, longer than in the emmetropic eye. These two opposite anatomical conditions constitute, in fact, the essential variations from the normal in typical H and M respectively, namely, *axial* H and *axial* M.

Fig. 3468 represents, in section, a myopic eye, the dotted outline indicating the section of the emmetropic eye (*cf.* Fig. 2758, vol. iv., p. 796). It has been explained (see *Accommodation and Refraction*, vol. i., p. 56) that the sum of the successive refractions at the cornea and the two surfaces of the crystalline lens is just sufficient to focus pencils of parallel rays upon the retina at its normal position *E*, and that, through the exercise of its accommodation, the emmetropic eye is able to focus, upon its retina, pencils of divergent rays, such as are received from near objects (*cf.* Fig. 2762, vol. iv., p. 797). In the myopic eye the principal focus—*i.e.*, the focus for pencils of parallel rays—is in front of the actual position of the retina, so that the retinal image of any distant object is made up of overlapping circles of confusion and is, therefore, imperfectly defined.

The unaccommodated myopic eye is, however, adapted for the correct focussing of pencils of divergent rays emanating from an object at some particular short distance, as shown in Fig. 3469, in which a pencil of rays