On the arcus senilis : or, fatty degeneration of the cornea / by Edwin Canton.

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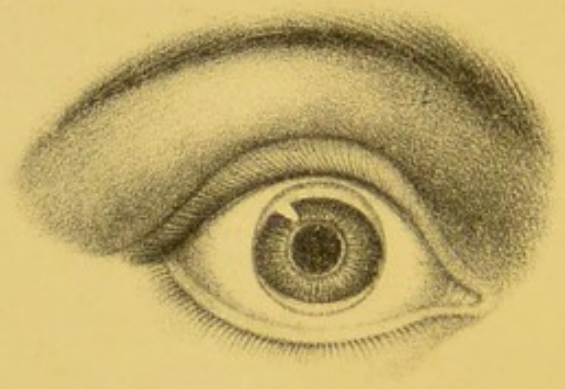
ON

THE ARCUS SENILIS,

OR,

FATTY DEGENERATION OF THE CORNEA.

Fig 1



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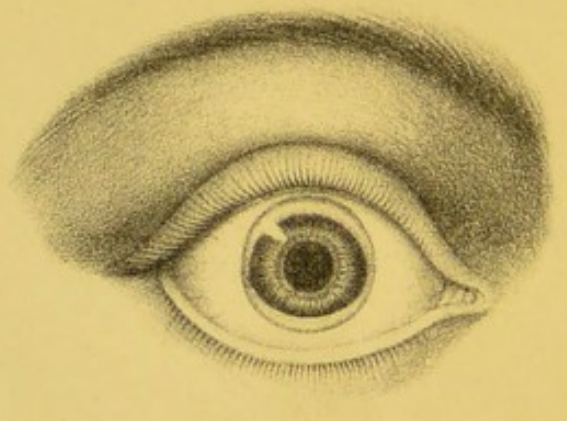

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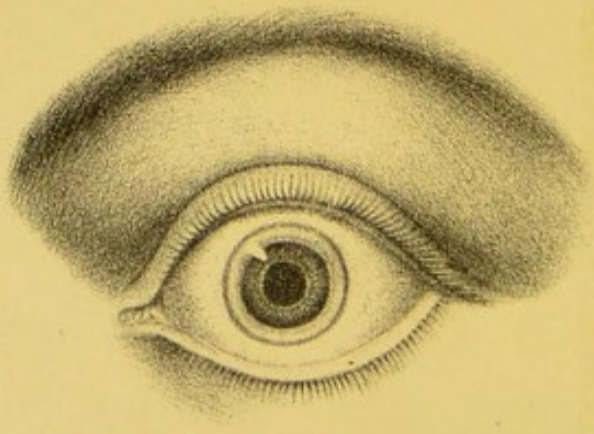

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Printed by Harrison & Sons, St. Martin

ON THE

ARCUS SENILIS,

OR,

FATTY DEGENERATION OF THE CORNEA.

By EDWIN CANTON, F.R.C.S.,

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SURGEON, AND, LECTURER ON SURGICAL ANATOMY TO THE CHARING CROSS HOSPITAL;
SURGEON TO THE BRITISH MUSEUM;
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LATE ASSISTANT-SURGEON TO THE ROYAL WESTMINSTER OPHTHALMIC HOSPITAL.

"Of what vast comprehension may be a single pathological fact, which we have been looking on all our lives as a mere curiosity."

Dr. P. M. Latham. Letter to the Author, Feb. 17th, 1857.

LONDON:

ROBERT HARDWICKE, 192, PICCADILLY.

1863.

LONDON:
PRINTED BY HARRISON AND SONS, ST. MARTIN'S LANE, W.C.

DEDICATED

TO

HENRY HANCOCK, ESQ., F.R.C.S.,

Senior Surgeon to the Charing Cross, and, Royal Westminster Ophthalmic Hospitals; and, Member of the Council of the Royal College of Surgeons of England,

IN ADMIRATION OF HIS

HIGH ATTAINMENTS AS A SURGEON,

AND,

IN ACKNOWLEDGMENT OF HIS

UNIFORM KINDNESS AS A FRIEND.

ADVERTISEMENT.

The ſubſtance of the following pages appeared, originally, as a ſeries of articles in "The Lancet." The author truſts that he has not over-eſtimated the importance of his contributions in, thus, venturing to preſent them to the Profeſſion in the pretentious form of a volume.

30, MONTAGUE PLACE,
RUSSELL SQUARE, W.C.

CONTENTS.

ON

THE ARCUS SENILIS.

" The pulſe, the periphery of the ſkin, the ſecretions, and, excretions cannot be juſtly appreciated in diſeaſes, without taking, at the ſame time, into conſideration the different ſymptoms which the eyes preſent. It is only by ſubmitting the eyes, in diſeaſes, to the ſame examination as we uſe to inveſtigate other parts of the body, that our reſearches will become important, and, fruitful."

Lobſtein, J.E.D., M.D. A Treatiſe on the Semeiology of the Eye, p. 41. New York, 1830.

The Arcus Senilis.

CHAPTER I.

"*Those who have devoted many years of laborious thought and obſervation to the ſtudy of the changes by which the living being is developed from rudiment to perfection, have given fewer hours to the inveſtigation of those by which, from that perfection, it naturally deſcends into decay and death. Almoſt the only eſſays at a general illuſtration of the ſubject have iſſued in the ridiculous notion that as the body grows old, so it retrogrades into a lower ſtation in the ſcale of animal creation. The flattened cornea is ſuppoſed to degrade the old man to the level of the fiſh: while the arcus ſenilis, by a fancied correſpondence with an oſſeous ſclerotic ring, maintains him in the eminence of a bird: his dry, thick cuticle makes him like the pachydermata, and, his ſhrivelled ſpleen approximates him to the humility of the molluſk. One can only commend ſuch day-dreams to the modern ſupporters of the doctrine of the tranſmutation of ſpecies; and, they might, indeed, form an appropriate ſupplement to their ſcheme, if they would maintain that, in theſe later days, our ſpecies is deſtined to degenerate into lower, and, yet lower forms, deſcending through the grades by which, in bygone times, it aſcended to its climax in humanity.*"—PAGET.

SYNON.—*Macula Arcuata.—Maraſmus Senilis corneæ.—Malum corneæ ſenile.—Annulus ſenilis.—Circulus ſenilis.—Gerontoxon.*[1]*—Greiſenbogen.—Arc ſénile.—Cercle ſénile.—Anneau ſénile.—Tache périphérique des vieillards.—Eburnation de la cornée.—Senile arc.—Annular opacity.—Senile zone.*

AMONG the various phenomena which characteriſe the decline of life, is included that remarkable appearance preſented by the cornea, and, ſo generally known by its Latin name of *Arcus Senilis*. As a

[1] "The old man's bow"—γερων, an old man, and τοξον, a bow. The term *gerontoxon* was firſt employed by Taylor. This we learn

common rule, it is not until about the age of fifty that this ſign of accumulating years begins to be formed, and, from that period it continues ſteadily to increaſe in opacity, definition, and extent. The time at which it makes its appearance bears no reference to the *embonpoint*, or, leanneſs of the individual. Although ſo frequent an indication that the meridian of life has been attained, or, paſſed, the arcus may, ſometimes, be noticed at a much earlier period; or, on the other hand, great age ſhall have been gained, or, even a century be arrived at, without the cornea being invaded by *fatty degeneration*. In a few inſtances, I have known the early occurrence of the arcus to be *hereditary:* but, the ſtatement of ſome authors that it is, occaſionally, to be ſeen as a *congenital* peculiarity is founded, I believe, in error,—a remnant of the original corneal opacity, and, which ſimply beſpeaks an arreſt of development, having been miſtaken for it. To this point, however, I ſhall revert, more particularly, hereafter.

In warm climates the arcus becomes ſooner developed than in more temperate latitudes. Furnani[1]

from Mauchart (De maculis corneæ, p. 15, Tubing, 1743), who ſays:—"Miramur à tot celeberr, atque lynceis ocularíis medicis, ipſo etiam Woolhuſio, prætervíſam fuiſſe hanc maculum non minus evidentem, ac ſenibus frequentem. Deprehendimus in ſolo Tayloris libro aliquod hujus obſervationi veſtigium, cujus verba latine reddita ſic ſonat; obtingit aliquando exigua opacitas æqualis alteruto corneæ latere in forma arcus, quæ plus minus ampla eſt, coloriſque ſubflavi ac æqualis. Niſi jam multitudine nationum ſecundarum in ophthalmiatria obrueremur, poſſet novum cum vetus non ſuppletat, nomen huic ſenili maculæ effingi et *gerontoxon*, arcus ſenilis appellari"

1 Voyage Médical dans l'Afrique Septenionale, p. 35. Paris, 1845.

ſtates that in the negroes of Conſtantine, and in ſome other parts of French Africa, alſo, in the inhabitants of certain parts of Spain and Sicily, and, thoſe of the Canary Iſles, this "tache périphérique ſe prononce de bonne heure."

The arcus is not accompanied, in its gradual formation, by redneſs, nor pain, and indeed, is unattended, in the whole progreſs of its development, by any inconvenience: viſion is not impeded by it, and, in its earlier ſtages, it is concealed from obſervation by the eyelids. Inſtances, however, are on record where the ſight has been materially encroached on; thus, Duddell[1] ſays:—"I have ſeen ſome that have had only a little tranſparency oppoſite the pupil and could ſee only right forward." Ware[2] remarks that "the opacity ſometimes extends ſo far forwards as to leave only very little more than the aperture of the pupil quite clear;" and Mackmurdo[3] mentions the caſe of a tall, and, rather ſtout man, about fifty-five years of age, who, "when he firſt applied to me, had the arcus two or three times as broad as we uſually ſee it, but, his viſion was not interfered with. By degrees, the inner edge approached nearer, and, nearer to the pupil, until it left him a ſmall ſpace, only, for viſion."

The arcus may be preſent in one eye only, and, it

[1] A Treatiſe on the Diſeaſes of the Horny Coat of the Eye, and the various kinds of Cataract, p. 67. London, 1729.

[2] Appendix and notes annexed to the third edition of Remarks on the Ophthalmy and Purulent Eye, p. 25. London, 1790.

[3] The Lancet, vol. 2, p. 410. 1850.

is then, commonly, the ſequela of ſome inflammatory affection, or, accident, which has materially interfered with, and, impaired the due nutrition of the organ. When occurring under ordinary circumſtances, both eyes are, as a common rule, ſimultaneouſly, and, ſymmetrically affected. Another obvious index of the ravages committed by Time, and, a not unfrequent aſſociate of the arcus, is a greater, or, leſs degree of grayneſs, and, ſcantineſs of the hair.

Fatty degeneration of the margin of the cornea, conſtituting the true arcus ſenilis, preſents itſelf, at firſt, as a ſlight diminution of the tranſlucency of this texture, and aſſumes, by degrees, a ſemilunar ſhape. Two arches are formed in each eye,—an upper and a lower one,—having their concavities oppoſed to each other. They are ſituated cloſe to the line of junction of the cornea with the ſclerotica, but, between them and, the edge of the latter tunic, there is left a fine curvilinear interſpace of cornea retaining its tranſparency, and, through which the iris is diſtinctly viſible (*Pl.* 1, *fig.* 1). Gradually, the extremities of the two arches become prolonged, and eventually, they meet and coaleſce, ſo as to encloſe an elliptical ſpace of clear cornea (*Pl.* 1, *fig.* 2). This occurs when the central portion of each arch is broader than its extremities: but we, not uncommonly, find that the thickneſs of the former is relatively leſs, and, that of the latter greater than uſual, ſo that, when conjunction of the two takes place, a circle is eſtabliſhed (*Pl.* 1, *fig.* 3). Thus, it will be obſerved, that fatty degeneration of the cornea preſents itſelf, ori-

ginally, as two curves, which, ſubſequently, join to conſtitute an ellipſe, or, a zone.

As a general rule, the firſt-formed arcus is that which occupies the upper ſegment of the cornea: the lower one, however, ſoon becomes apparent, and, both continue ſteadily to increaſe, encroaching, by degrees, ſtill more, and, more on the cornea by their inner edges, or, concavities, as they are prolonged, at the ſame time, at their cornua, or, extremities. Tyrrell[1] obſerves:—"The alteration generally commences at the inferior part, or, a little towards the naſal, or, temporal ſide;" and Walther[2] remarks:—"Dans le principle, on ne l'obſerve d'habitude que dans la moitié du cercle cornéal (principalement la moitié inférieure,—*gerontoxon dimidiatum*:) plus tard elle s'étend auſſi à la moitié ſupérieure." Theſe ſtatements are at variance with the opinions of moſt authors, and, are not in accordance with my own experience.

The colour of the arcus has been well deſcribed by Lawrence,[3] who ſays:—"It is, at firſt, bluiſh-white, and, the opacity ſlight; it becomes more denſe and chalky-white; at laſt, the loſs of tranſparency is complete, and, the affected circle is a yellowiſh, or, grayiſh-white--the tint being deeper towards the circumference, and, gradually ſhaded off towards the centre of the cornea." In coloured races, or, in Europeans

[1] A Practical Work on the Diſeaſes of the Eye, vol. 1, p. 280. London, 1840.

[2] Annales d'Occuliſtique. Tom. xv. 3me Série. Tom. iii. p. 71. Paris, 1846.

[3] A Treatiſe on Diſeaſes of the Eye. 3rd ed. p. 356. Lond. 1844.

with dark complexions, the arcs are moſt conſpicuouſly ſeen, on account of the ſtriking contraſt they preſent to the deep hue of the irides behind them.

The arcus ſenilis, if cloſely examined, will be found to be compoſed of two parts,—the outer having a grayiſh-white, or, duſky tint, the inner one being milky in colour. Theſe are ſeparated from each other by a clear, unaffected line of cornea, and, through which the iris can be diſtinctly ſeen. The conſideration of the arcus, as compoſed of two portions, has not, I believe, been ſufficiently dwelt on by authors. Mackenzie,[1] however, refers to it, and adds, that "the clear portion is probably weaker than natural, for, I have known it burſt by an accidental blow with the perſon's own finger, allowing a large protruſion of the iris." As age advances, the firſt part to preſent opacity is that overlapped by the ſclerotica, which Wharton Jones[2] obſerves, "in certain conſtitutions, and eſpecially, in old perſons, is thicker, and, more opaque than uſual, perhaps, alſo, encroaching more extenſively on the cornea." He adds, "the conjunctiva covering the overlapping ſclerotic, eſpecially when the latter is to any conſiderable extent, appears in its independent form, with its corion fully developed." This extenſion, with increaſed denſity of the ſclerotic, and, encroachment of the conjunctiva, are always greater at the upper than

[1] A Practical Treatiſe on Diſeaſes of the Eye. 4th ed. p. 736. Lond. 1854.

[2] Cyclop. of Anatom. and Phyſiol. *art.* "Lachrymal organs."

at the lower portion of the cornea. After the exiſtence, for a variable period, of this opacity, the inner arch begins to preſent itſelf, purſuing the progreſs already deſcribed, and, conſiſting of a fatty degeneration of the *ſubſtantia propria* of the cornea, as previouſly mentioned.

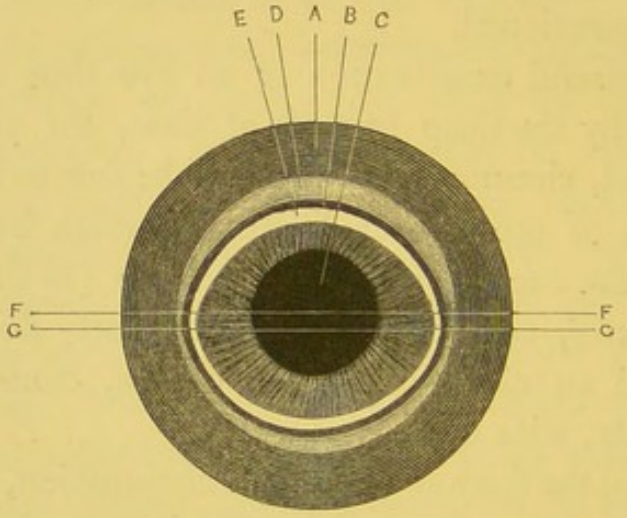
On careful examination of an eye thus ſtrangely ſtamped by the deep impreſs of time, the yet clear, unaffected, circumcorneal ring will be ſeen to be below the level of the opaque ſtructures which bound it; for, on the one hand, the conjunctiva (as ſuch) ſuddenly ceaſes, and, on the other, the fatty depoſit has produced an elevation of the cornea, commencing, apparently, with equal abruptneſs.

When the fatty arcs, by their conjunction, eſtabliſh a ring, this appearance of depreſſed cornea is, at firſt, leſs evident at the temporal, and, naſal ſides than it afterwards becomes, from the circumſtance of the cornua of the arches being compoſed of a ſmaller amount of oil-drops than, by this time, conſtitutes their more early formed parts, and hence, the corneal laminæ are leſs ſeparated, and, raiſed towards the ſurface. Some time afterwards, however, fatty degeneration more completely involves the cornea in theſe ſituations, and, the clear portion of this tunic aſſumes the lower level, though without a groove being formed, inasmuch as, the conjunctiva does not, here, overlap the cornea to the extent that it inclines over it above, and, below. It is not, however, implied in this obſervation that ſuch is an invariable rule, for, we may, ſometimes, obſerve this part to become an

annular groove, from a ſlight lateral encroachment, and, thickening of the conjunctiva.

The annexed diagram may ſerve in illuſtration of the above deſcription :—

Fig. 1.



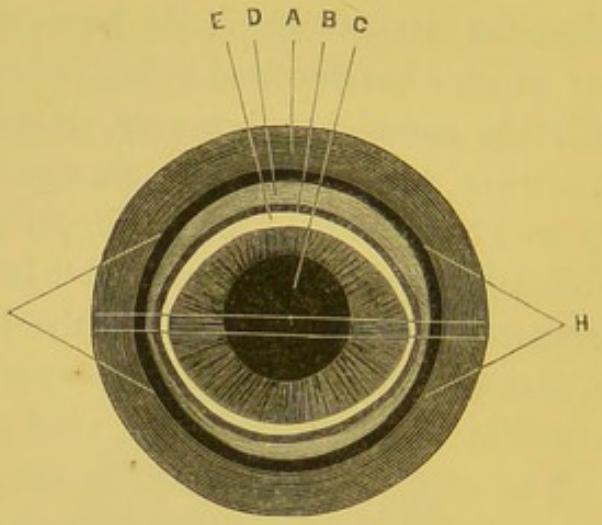
A. The ſclerotica.
B. The unaffected, circumcorneal ring.
C. The pupil.
D. Overlapping conjunctiva and ſclerotica.
E. Fatty degeneration of the cornea.

Of the lines, F and G, the former indicates the transverſe axis of the eye, and, the latter points out the place of union of the fatty arches below that axis. The explanation of this occurrence is, that in conſequence of the upper arc being the one firſt formed, its rate of progreſs is in advance of the lower one, which ſucceeds it ; and, the former has extended to below the transverſe axis of the cornea by the time that the inferior arcus has arrived, by its horns, at that ſpot, to conjoin with it.

We, occaſionally, find the cornea attacked by

ulceration at the ſite of the ſenile zone, the upper ſegment of which I have noticed to be the one, uſually, implicated; the complaint, however, is not of frequent occurrence, and, takes place, for the moſt part, in perſons who have paſſed the middle period of life, are of debilitated conſtitutions, who have led irregular and, intemperate lives, or, who are the ſubjects of gouty, or, chronic rheumatic affections,—perſons whoſe nutritive functions are impaired, and, vital powers enfeebled. The ulceration is ſituated in the portion of cornea changed by fatty degeneration, and following, ordinarily, the curve of this part, extends moſt deeply at its centre; ſmall, ulcerated ſpots may be, ſometimes, ſeen towards the extremities of the arch. The expoſed ſurface is jagged, and, of a grayiſh hue: no blood-veſſels paſs to it, but, ſhould the eye ſuffer from catarrh under theſe circumſtances, a general vaſcularity ſuffuſes the globe, and, cloſely approaches the diſeaſed ſpot by extending into the overlapping conjuctiva (D), but, without implicating the clear, and, immediately ſurrounding portion of cornea (B). There is freedom from pain, and, no intolerance of light is complained of. In ſome caſes, ſlight vaſcular fulneſs is to be obſerved from the onſet of the affection preſenting a duſky red, or, congeſtive hue. The conſiſtence of the eye-ball may be augmented, and, an aching, or, obtuſe pain be a night-ſymptom. The ſclerotic appears to be thinner than natural, and, it is obviouſly ſo over the *ſinus circularis iridis*, where a bluiſh ring (H) marks the ſituation of this canal, immediately external to the whole of the ſenile circle:—

Fig. 2.



This bluiſh ring, however, is not unfrequently, to be ſeen in the aged, where ulceration is abſent in the arcus ſenilis, but, the eye has ſuffered from ſlow, inſidious diſeaſe, and, its functions become, additionally, impaired by the progreſs of time. A faint trace of the circle may be noticed even under more healthy circumſtances, and, is ſtill more apparent, by contraſt, when the overlapping conjunctiva is unuſually opaque. Middlemore[1] has truly remarked: "this ulceration is, by no means ſo manageable by treatment as ſimilar diſeaſes in other parts of the cornea."

The arcus, when occurring prematurely, preſents an excellent illuſtration of that law of the *ſymmetry of diſeaſe*, the principles of which have been ſo clearly ſet forth in the admirable, and, well-known papers of Dr. W. Budd, and, Mr. Paget,[2] and, is equally an example of a ſeries of ſimilar changes which take place

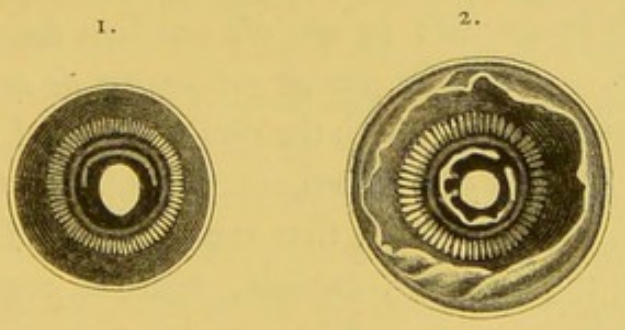
[1] A Treatiſe on Diſeaſes of the Eye and its Appendages. Vol. i. p. 456. Lond. 1835.

[2] Medico-chir. Trans. Vol. xxv.

in other organs when it is formed, and, continues ſteadily to increaſe in extent in thoſe who have paſſed the meridian of life. The coloration of the cryſtalline lenſes, the gray hairs on the temples, fatty degeneration, and, oſſification of the laryngeal, and, coſtal cartilages, interſtitial abſorption of the necks of the thigh-bones, atheroma, and, calcification of the arteries, &c., ſupply us, alſo, with inſtances of this ſymmetry of change, gradually, but, ſurely impreſſing the body, as years ſteal on, and, ſtamp it with the indelible marks of the decline of life.

Lawrence,[1] in quoting from a paper by Schön,[2] ſtates that: "In the diſſection of eyes affected by arcus ſenilis, a correſponding opaque change has been found in the circumference of the lens, or, capſule: more frequently in the latter. When the lower half of the cornea has been affected, the internal opacity has been confined to the inferior portion of the lens, or, capſule." This change in the capſule has been, thus, delineated by Ammon:[3]—

Fig. 3.



[1] Loc. cit. p. 357.

[2] "Ueber den Maraſmus ſenilis der Kapſel und Linſe im menſchlichen Auge." In Ammon's Zeitſchrift für die Ophthalmologie. Vol. i, p. 162. Dreſden, 1831.

[3] Kliniſche Darſtellungen. Part I. Tab. XI. Figs. 1 & 2. Berlin, 1847.

1. An old "arcus ſenilis capſulæ lentis" on the anterior ſurface of the capſule of the lens. This is ſeen through the tranſparent lens, and, capſule which lie in the anterior ſegment of an eye, the poſterior aſpect of which is ſhown in the figure.
2. A true "circulus ſenilis" on the poſterior capſule. It conſiſts of ſingle pieces which, conjoined, form a ring. In this view, the poſterior ſurface of the anterior ſegment of the eye is ſhown.

The obſervations of Schön, and, Ammon are very commonly received, and, adopted by ophthalmic writers, who, for the moſt part, have conceived that in the ſtatements of theſe authors are implied the exiſtence, *as a general rule*, of an arcus in the lens, or, capſule, in accordance with the poſition and extent of the one affecting the cornea. The only adverſe opinion with which I am acquainted is that given by Walther,[1] who ſays: "Il n'eſt pas rare de rencontre avec le gerontoxon un commencement d'altération du cryſtallin. En effet dans la cataracte ſénile l'obſcurciſſement commence, dans la plupart des cas, dans le centre de la lentille, mais, quelquefois auſſi, dans les couches périphériques. Mais le gerontoxon du cristallin, eſt progreſſif: ce qui n'a pas lieu dans celui de la cornée. *Il n'exiſte pas de gerontoxon de la capſule.*" Unacquainted, then, with the obſervations of Walther, I, in the year 1851,[2] ſtated, in reference to the views of Schön, and, Ammon, that the exiſtence of an arcus ſenilis in the lens, or, capſule, muſt be regarded as "extremely rare, and, I believe its occurrence to be purely accidental, for, in the large number of diſſec-

[1] Loc. cit. p. 71.
[2] The Lancet. January 11th, 1851.

tions which I have made of the aged eye, I have never ſeen the capſule of the lens to be otherwiſe than perfectly tranſparent in every part, whilſt the lens itſelf preſented that yellowiſh hue, only, which characteriſes it in an old ſubject, and, having its deepeſt tint at the central part." Since this period, extended obſervation enables me to corroborate the above remarks: but, though I have, two or three times, ſeen cloſely aggregated, and, opaque radii occupying, to a greater or leſs extent, the circumference of the lens in old ſubjects, and, correſponding, or not, to an arcus ſenilis of the cornea, I have never found the capſule of the lens to be affected, even in theſe inſtances, with opacity.

Beſides the preſence of the corneal arcus ſenilis, there are other peculiarities to be noticed in the diſſection of the eyes of elderly people, deſerving of mention in this place. The globe is, more or leſs, ſunken, and, diminiſhed in ſize. The cornea, leſs tranſparent, and, more denſe than formerly, has its degree of convexity gradually leſſened, and, the eye becomes preſbyopic. This change in the refractive power of the cornea is aſſociated with a loſs of tranſparency, and, diminution in the quantity of aqueous humour, "affording another inſtance," obſerves Dr. Roget,[1] "of the tendency to a general diminution in the aqueous conſtituents of the body, occurring in the progreſs of age." Dr. Kitchener[2] has well remarked:

[1] Cyclop. of Anatom. and Phyſiol. *art.* Age. p. 38.

[2] The Economy of the Eyes. p. 25. Lond. 1824.

"It is ſaid of the heart, it is *primum vivens*, and *ultimum moriens*;

" The firſt indication of the eye beginning to be impaired by age, is, that when you wiſh to read a ſmall print you are obliged to remove it further from your eye than you have been accuſtomed to do, and, deſire the aid of plenty of light, and, on looking at a near object it becomes confuſed, and, appears to have a kind of miſt before it, and, the letters of a book run into one another, and, appear double, &c., and, by candle-light you catch yourſelf holding a book, &c., cloſe behind the candle, and, that you begin to admire the ingenuity of that gentleman who invented ſnuffers." The ſclerotic becomes whiter, and, denſer. The colour of the iris is leſs pronounced than formerly, and, with a decreaſed ſenſibility of this membrane to the ſtimulus of light, there is, ordinarily, to be found a ſomewhat dilated pupil. The membrana pigmenti

but, contrarywiſe, it may be well ſaid of the eye, that it is *ultimum vivens*, and *primum moriens*. The inſenſible encroach of age is nowhere ſo ſoon diſcovered as in the eye; and men are loth to think themſelves declining in age ſo ſoon as the eye gives warning thereof; and we have ſcarce any deſcription of an old man by his infirmities, wherein thoſe of the eye are not principally mentioned: when *Iſaac*, *Jacob*, *Eli* and others are recorded as old, it is ſaid of them, *Their eyes were dim and they could not ſee*; for, whatever may either incraſſate the diaphanous bodies, and render them leſs tranſparent, or ſtop the ſeveral perforations and ſo hinder that open view, muſt, of neceſſity, cauſe a diminution, and, in time, a perfect abolition of the ſight; and here give me leave to name one or two principal ſymptoms of viſion that are the chief attendants of this declining ſtate. The firſt is *Caligo*, which is the obſcurity of viſion by reaſon of the craſſitude or thickneſs of the *Tunica Cornea*; which, by reaſon of the dryneſs of age, doth, together with the nails of the fingers, grow darker and thicker, and, conſequently, loſe daily ſomewhat of its perſpicuity."—The Pourtract of Old Age, wherein is contained a Sacred Anatomy, both of Soul and Body, by John Smith, M.D. 2nd ed. p. 99. Lond. 1666.

aſſumes a much paler hue, and, its colouring matter is often abſorbed in patches, or, ſometimes, even almoſt wholly removed. This choroidal, and, iridal diſcoloration accord with the loſs of colouring matter in the hair at this period of life. It has been remarked that "this condition of the pigmentum nigrum, as well as the larger aperture of the pupil, have been conſidered as ſpecial proviſions of nature for admitting more light to the retina, in compenſation for the diminiſhed ſenſibility of the nerves of viſion." The retina is conſiderably attenuated, but, has increaſed in firmneſs. The yellow ſpot of Soemmerring is thus ſpoken of by its diſcoverer,[1] after a deſcription of its peculiarities in the infant, and, at puberty: "In more advanced age the colour is leſs intenſe, principally on account of the diminiſhed whiteneſs of the retina, which alſo appears extenuated at that period. Even the choroid, where it correſponds to the *foramen centrale*, ſometimes appears a little deeper coloured." The diminution in the brightneſs of the colour of the *punctum luteum* bears, according to Meckel,[2] a direct ratio to the diminution of the tranſparency of the cornea. The cryſtalline lens becomes ſmaller, flatter on both ſurfaces, and, more and more denſe, and, tough, eſpecially the central portion. Its ſpecific gravity is augmented, it loſes its clearneſs, and, colourleſſneſs, becoming of an amber hue, and, is often diplochromatic, ſo as to ſeem green when viewed in the eye by reflected light.

[1] Comment. Soc. Regiæ Gotting. quoted by Dr. Jacob, in the Cyclop. of Anatom. and Phyſiol. *art.* Eye. p. 189.

[2] Man. d'Anatom. Tom. III, p. 261.

According to Meckel, the liquor Morgagni, becomes of a yellowiſh hue. The vitreous humour is leſſened in quantity, and, a ſimilar tint pervades it.

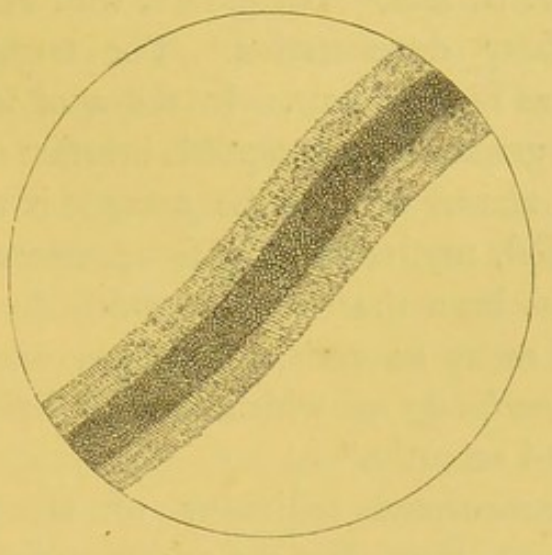
In aſſociation with well-marked arcs, or, circles occurring in the eyes of elderly perſons, I have, very commonly, found the ophthalmic arteries, and, their branches to preſent atheromatous patches, affording an admirable illuſtration of that law of ſymmetrical change, which, in reſpect of the arterial ſyſtem, has been ſo ably dwelt on by Bizot.[1] An analogous condition of the blood-veſſels going to a part affected by fatty degeneration, will be found in regard to many other organs of the body when they have ſuffered this change: and, no more appoſite illuſtration can be adduced than that of the coronary arteries, and, heart-fibre. The well-known, and, excellent paper of Dr. R. Quain,[2] and, the Tranſactions of the Pathological Society of London, ſupply numerous inſtances of this concomitance.

I find, too, that with the well-defined arches, or, rings in the corneæ of old people, there exiſts fatty degeneration, to a greater or leſs extent, of the muſcles of the eye-ball. The annexed drawing exhibits faſciculi of the *recti oculi*, from a ſubject, æt. 70, in whom a circulus ſenilis was preſent, with an atheromatous ſtate of the ophthalmic artery, and, the cartilages of whoſe ribs, and, larynx, were extenſively calcified:—

[1] Mém. de la Soc. Médic. d'Emulation.

[2] Med.-chir. Trans. Vol. XXXIII. 1850.

Fig. 4.



My obſervation has been repeated by Strube,[1] who, in an inſtance where the arcus ſenilis was preſent, found the eye-muſcles "ſo fattily degenerated that, in many places, no trace of muſcular ſubſtance was left, but, large fat-globules, only, were to be ſeen." Virchow[2] likewiſe remarks:—"Whenever there has exiſted a well-marked arcus, I have always been ſurpriſed at the extenſive fatty degeneration of the muſcles of the eye,—a fact which muſt certainly be regarded as of importance in relation to the phyſiology of the aged eye."

I ſhall have occaſion to point out, hereafter, how generally diffuſed through many textures is this condition which has involved the cornea in old age,—"*old age*, which, conſidered as a ſtate of the ſyſtem,"

[1] Der Normale Bau der Cornea und die Pathologiſchen Abweichungen in Demſelben. *Diſſ. inaug.* Wurzburg, 1851.

[2] Archiv. für Patholog. Anatom. und Phyſiol. p. 288. Vol. 4. Berlin, 1852.

obſerves Dr. B. Lee,[1] "*is*, in fact, with very few exceptions, fatty degeneration. The terms may be conſidered as ſynonymous. In the *aged* we look for it, and, its gradual, imperceptible invaſion neither ſurpriſes, nor, alarms us. In the *young* it is that much-to-be-dreaded, myſterious diſeaſe—premature old age—which has been the theme on which the *deſcriptive* powers of many an author has been exerted, but, upon the *pathology* of which ſo little light has been thrown until recently."

The concurrent teſtimony of all ophthalmic writers proves, that, after the operation for extraction of cataract, no difficulty is experienced in healing the corneal wound, when the inciſion has been made through an arcus ſenilis.

Dr. His,[2] in regarding the arcus as an example of ſimple atrophy, ſays:—"This view of it being taken,—how is it that it is juſt in the margin of the cornea (which is in the moſt favourable poſition for nutrition,) that ſuch atrophy ſhould occur, and, how does it happen, in connection with ſuch an atrophied margin, the centre of the cornea can preſerve its complete integrity through years? Theſe are queſtions which, at preſent, appear to be quite inſoluble." The only explanation of the occurrence of the arcus at the edge of the cornea with which I was acquainted, is one offered by Dr. C. J. B. Williams, who, in a letter with which he favoured me in 1850, ſays: "the arcus ſenilis owes its poſition on the upper ſegment

[1] The American Medical Monthly. Sept. 1856.

[2] Hiſtologie der Cornea. p. 138. Baſel, 1856.

of the cornea to the preſſure of the upper eyelid, which, ſlight as it is, is ſufficient to promote that change which reſults from weakened circulation." In the year 1857, M. Caſtorani communicated a paper[1] to the Académie des Sciences, on the ſenile circle, wherein he ſtates his experiments, and, reſearches upon this ſubject lead him to the concluſions:— 1. That, the arcus ſenilis is the reſult of an immediate imbibition at the circumference of the cornea, of the more, or, leſs abundant ſecretions of the conjunctiva. 2. That, the more, or, leſs permanent contact of the eyelids with the cornea is an indiſpenſable condition for this imbibition. 3. That, the proceſs of imbibition is in an inverſed ratio to the reſiſtance of the cornea, and, the denſity of the ſecreted fluids.

After detailing ſome experiments he had made in illuſtration of theſe points, the author proceeds to a conſideration of the arcus ſenilis as obſerved in man, remarking that aged perſons combine the three conditions favourable to its production, viz.,—an increaſe of the conjuctival ſecretion: a leſſened mobility of the eyelids, and, a diminution of the reſiſtance of the cornea. Everybody muſt have obſerved that the ſecretions are increaſed as age advances. The eyelids, alſo, are contracted, and, leſs movable: ſo, alſo, the fat of the orbits becomes abſorbed, and, the globes recede: the eyelids being more cloſely applied to the eye, and, covering the cornea more than ordinarily, eſpecially at the upper part. The arcus is moſt fre-

[1] *Vide* abſtract in the Gazette Médicale. Nov. 14, 1857.

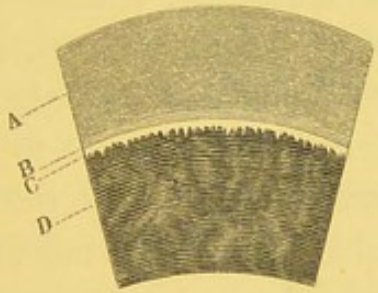
quently found at this latter ſituation, becauſe, the correſponding eyelid being larger, keeps this part conſtantly covered, and, protected from evaporation. The form of the arcus is that of the edge of the eyelid cloſely applied againſt the periphery of the cornea. The reſiſtance of the cornea in the aged is leſſened through the diminution of the current of the aqueous humour. The anterior chamber is, in fact, ſmaller,—the iris having become ſlightly convex in front, whilſt the cornea has loſt ſomewhat of its convexity.

By ſome authors it has been ſtated that the arcus may be ſeen, occaſionally in the lower animals. Walter, and, Wardrop report that they have found it in horſes, and, Dr. Karl Himly affirms that it may be obſerved in birds. After ſeeking, for ſeveral years to verify theſe ſtatements, I have completely failed to do ſo. On enquiring of Profeſſor Spooner in regard to the horſe, that gentleman, obligingly, ſent me the following reply: "I have not ſeen an arcus ſenilis as a pathological condition of the eye of this animal. There is a narrow, white line which, ſometimes, extends around the cornea, and ſometimes, only, partially ſo, to be ſeen in the eyes of almoſt all horſes—both old and young,—which is normal, although, I believe, by ſome has been deſcribed as the reſult of diſeaſed action." With the above note, I received the recent eyes of a horſe, thirty years of age.[1] On firſt view of

[1] There is nothing in the ſyſtem of nature, which, in the preſent ſtate of our knowledge, appears ſo unintelligible as the ſcale of longevity. It muſt be admitted, indeed, that our knowledge upon this ſubject is

them, the ſenile zone appeared to be preſent, but, diſſection ſhowed the white ring to be due to an abſence of pigment from the outer circumference of a very dark iris, and, which being ſeen through a perfectly clear cornea, preſented a ſtriking reſemblance to the conjoined fatty arches of man. This iridal ring was about a line in breadth, and, irregularly ſerrated at its inner edge, as ſhown in the ſubjoined diagram :—

Fig. 5.



A, Sclerotic.
B, Line of attachment of cornea.
C, White iridal ring.
D, Iris.

The late Mr. Yarrell informed me that he had not met with an annulus in birds ſimilar to that ſeen

very imperfect; for all that is known of domeſticated animals, and, the accidental facts which have been preſerved concerning others, tend to the ſtrange reſult, that longevity bears no relation either to ſtrength, ſize, complexity of organization, or, intellectual power. True it is that birds, which ſeem to rank higher than beaſts in the ſcale of being, are alſo much longer lived. *Thirty years is a great age for a horſe*; dogs uſually live from fourteen years to twenty: but it is known that the gooſe, and, hawk exceed a century. But fiſh, evidently a lower rank in creation than either, are longer-lived than birds: it has been ſaid of some ſpecies, and, of certain ſnakes, alſo, that they grow as long as they live, and, as far as we know, live till ſome accident puts an end to their indefinite term of life. And the toad! it cannot, indeed, be ſaid that the toad lives for ever, but, many of theſe animals who were caſed up at the general deluge are likely to live till they are baked in their cells at the general conflagration."—SOUTHEY.

in the human ſubject, but, added that his attention had never been drawn, particularly, to the ſubject.

At page 2 I have referred to the opinion of certain authors, who ſtate that the arcus may, ſometimes, be ſeen as a congenital affection of the cornea. In explanation of ſuch caſes, and, in accounting for the preſence of congenital opacities of the cornea, bearing reſemblance to, and, in ſome inſtances, miſtaken for an arcus, or, circulus ſenilis, it muſt be remembered that, during the earlier periods of intra-uterine life, the cornea is completely opaque, and, eventually, clears from its centre to its circumference, probably commencing at about the third, or, fourth month. Should this proceſs fail to occur, the child will be born with *complete*, or, *total* corneal opacity: in other inſtances the peripheral portion of this tunic remains clouded whilſt the part it encloſes is tranſparent—the arreſt of development having occurred at a later date—and the opacity is then ſpoken of as *incomplete*, or, *partial*. To this form of the affection, —the *Hornhauttrubung* of the Germans,—Keiſer[1] has given the name *Sclerophthalmos*.

Wardrop,[2] in deſcribing the various forms of *Speck* to which the cornea is ſubject, remarks:— "There is another variety of it which appears at birth, and, which may, therefore, with propriety, be denominated *congenital*. In this diſeaſe, the whole

[1] Himly, and, Schmid's Ophthal. Bibliothek. Vol. 3, p. 79. Jena, 1805.

[2] The Morbid Anatomy of the Human Eye. 2nd ed. Vol. 1 p. 90. Lond. 1843.

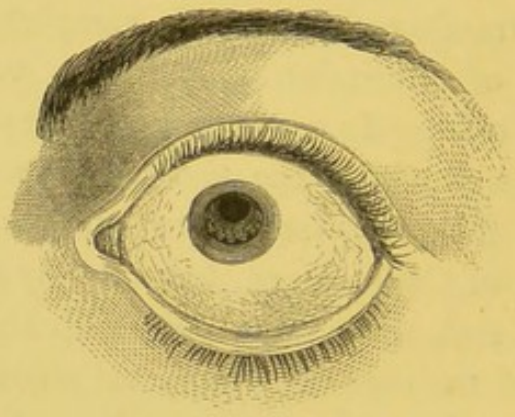
anterior chamber is, more or leſs, clouded, accompanied by no apparent inflammation. As the child affected with this diſeaſe advances in life, the obſcurity is gradually diminiſhed, ſo that, generally, in one or two years, the tranſparent cornea is completely reſtored. The period of reſtoration is, however, very different in different caſes. In one inſtance, the eye had nearly quite recovered about the eighteenth month, while the other, ſtill, remained very obſcure. Profeſſor Withauſen, of Copenhagen, ſaw a family conſiſting of three boys, and, three girls, born with this congenital obſcurity of the cornea. They all recovered perfect viſion when about four years of age." Rognetta[1] remarks: "L'organe augmente a la vérité de dimenſion, mais faiblement: de là, la coincidence de ce défaut congénital avec la *micropthalmie*: preſque toujours il y a, en même temps, manque de devéloppement de l'iris et d'autres organes." Dalrymple[2] gives the annexed repreſentation of "a caſe of Microphthalmus, or, rather, defective development of the cornea. In true microphthalmus the whole of the globe is defective in ſize, though the relative proportions of the various tiſſues to each other do not much differ; but, in this caſe, the cornea and iris, alone, appear to have been arreſted in their growth, and, probably, the lens alſo. The diſeaſe was *congenital*, and, from the ſize of the cornea it would appear that the arreſt of growth had taken place about the fifth,

[1] Traité Philoſoph., et, Clinique d'Ophthalmologie. p. 227. Paris, 1844.

[2] Pathology of the Human Eye. Pl. XXXII, fig. 2. Lond. 1852.

or, ſixth month of fœtal life. The ſclerotic ſeems to be prolonged conſiderably over the edge, or, circumference of the cornea, giving much the aſpect of *arcus ſenilis* :—

Fig. 6.



Like other vices of original conformation, *microphthalmus is ſometimes hereditary*, and, I have ſeen inſtances where two children of the ſame family were ſimilarly affected. In theſe caſes there exiſted, alſo, congenital cataract—the lens being opaque, with an early arreſt of its development. Wilde[1] obſerves: "Sometimes an opaque ring, exactly reſembling the *arcus ſenilis*, is ſeen at birth. I have lately ſeen an inſtance of this peculiarity in a young gentleman from the Iſle of Man: in one eye the opacity completely encircled the cornea: in the other it was interrupted." Sybel[2] ſays: "I know a man, aged thirty-two, who has this pearl-coloured ring in both eyes, and, which is, probably, congenital." Eggert[3] notices the ap-

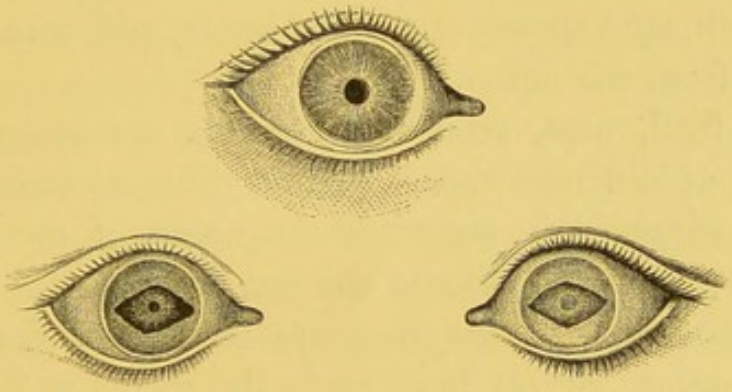
[1] On the Malformations and Congenital Diſeaſes of the Organs of Viſion. The Dublin Quarterly Journal of Med. Science.

[2] Reil's Archiv. für die Phyſiol.

[3] Grafe and Walther's Journal. Vol. XVIII, p. 415.

pearance of the arcus (?) in newly-born children. Keiſer's caſe[1] is the one moſt commonly appealed to as preſenting an inſtance of *congenital*, and, *hereditary arcus*. The ſubjoined cloſe copy, however, of the engraving which the author gives of the eye of the mother, and, thoſe of the child, will ſhow how unfounded are the data on which ſuch belief is baſed—a partially cleared up congenital opacity of the cornea, here, conſtituting the true morbid anatomy of the affection :—

Fig. 7.



It need ſcarcely be mentioned that treatment can be of no avail when the arcus ſenilis is preſent as a ſymptom of age; Chelius,[2] however, ſays: "An appropriate ſupport of vital activity in general, combined with a due care of the eyes, the uſe of tonics, and, ſpirituous embrocations to the parts ſurrounding the eye, may, perhaps, delay the progreſs of the

[1] Loc. cit. Vol. 3, p. 79.

[2] Handbuch der Augenheilkunde. Vol. 1, p. 539. Stuttgart, 1839.

evil." With Plenck,[1] nevertheleſs, we may truly ſay, *Eſt vitium incurabile*, though Duddell[2] ſeriouſly affirms that, "if the eyes of perſons who are turn'd of ſixty were to be ſcarified every three months, it would, in a good meaſure, maintain the fluidity of the juices, and, prevent opacity."—A piece of advice comparable only with that given by Avicenna, who is, thus, quoted by the author of "A briefe Treatiſe touching the Preſervation of the Eie-ſight:"[3]—"Avicenna writeth that the combing of the heade is not of leaſt force, which ought to be done every morning faſting, backwards againſt the haire, for it draweth the vapours out of the heade, and, removeth them from the ſighte."

I ſhall, now, refer to the various opinions which have, at different times, and, in different countries, been advanced in regard to the nature of the arcus ſenilis: and, whilſt ſome authors, as Tyrrell,[4] have openly confeſſed that they are unable to offer any explanation, others have made ſtatements as ſtrange as incorrect reſpecting it; a third claſs of writers, however, has very cloſely approached the truth in conſidering it as an example of atrophy, and, degeneration, nearly allied to thoſe changes which are taking place in the coats of arteries as age advances.

Duddell[5]:—"I take this opacity to proceed from

[1] Doctrina de Morb. Oculor. p. 95. Vienna, 1783.
[2] Loc. cit. p. 67.
[3] 6th ed. p. 17. Oxford, 1602.
[4] Loc. cit. Vol. 1, p. 280.
[5] Loc. cit. p. 67.

the dryneſs of the parts: the pores being too cloſe do not admit a ſufficient quantity of fluid into the parts to maintain their tranſparency."

Plenck[1]:—"Videtur a vaſis pellucidis in ſenio concreſcentibus oriri."

Meckel[2]:—"It undoubtedly depends on the ſlowneſs with which the ſubſtance of the cornea is renewed, whence the fluids have more tendency to coagulate."

Walker[3]:—"It is compoſed of a firmer, and, more opaque ſubſtance than that of which the cornea is originally formed, ariſing from an impaired action of the ſecernent veſſels, which ceaſe to pour out healthy corneal tiſſue."

Hays[4]:—"A depoſit of lymph formed, perhaps, by a ſlow, chronic inflammation."

Seiler[5]:—"It ariſes from the approximation, and, cloſer attachment of the individual laminæ of the cornea, owing to the removal of the interſtitial moiſture."

Velpeau[6]:—"It cannot properly be attributed to diſeaſe of the cornea, the ſtructure of that membrane not being altered, nor, its thickneſs increaſed."

Jeaffreſon[7]:—"It is, probably, due to degeneration of the cornea itſelf, and, not to any inflammatory depoſit."

[1] Loc. cit. p. 95.
[2] Loc. cit.
[3] Principles of Ophthalmic Surgery. p. 74. Lond. 1834.
[4] Americ. Jour. of Med. Science. Vol. 3, p. 337.
[5] Reil's Archiv. für die Phyſiol. Vol. 6, p. 72. Halle, 1802.
[6] Lectures in Med. Gaz. Vol. 1, p. 105. 1839-40.
[7] A Practical Treatiſe on Diſeaſes of the Eye, p. 122. Lond. 1844.

Lawrence[1] :—"No eſſential difference has been found in the part: there is no new growth, nor, any deficiency of its uſual denſity. I can only compare it to the changes which take place in the internal coat of the arteries in old age."

Middlemore[2] :—"If it be not a mere alteration effected by age, I am quite unprepared to ſay what it really is,—no circumſtance with which I am acquainted, except age, ſeems capable of producing it. The changes wrought in the arteries by age preſent the only analogy which, now, occurs to my mind."

Schön[3] has "often examined the cornea affected with arcus, and, found the affected portion changed into a homogeneous—ſometimes, fat-like (*ſpekartige*) maſs, often of conſiderable firmneſs. The laminated ſtructure has entirely diſappeared—the laminæ being conſolidated into one maſs; this was more particularly the caſe with the external than the internal laminæ."

The laſt opinion I ſhall quote as being the one which appeared only a ſhort time previous to that which I, myſelf, had arrived at, is from the pen of Dr. Artha,[4] who ſtates the cornea, at its periphery, to be converted into a tiſſue analogous to that of the ſclerotic, in conſequence of an atrophy of its fibres incidental to old age, and, likens the change to a condition of the cornea, which, he ſays, is to be ſeen,

[1] Loc. cit. p. 356.

[2] Loc. cit. Vol. 1, p. 455.

[3] Quoted by Lawrence. loc. cit. p. 356.

[4] Entwurf einer Anatomiſchen Begrundung der Augenkrankeſten, p. 121. Prague, 1847.

under the microſcope, when this part is affected with nebula. In nebula he has obſerved that there is a greater degree of interlacement,—an approximation, or, contraction of the fibres of the cornea. The fibres paſs, uninterruptedly, from the healthy to the diſeaſed part, and, beyond it. There is no viſible alteration in their form, but, they lie, at the diſeaſed part, much cloſer together, are opaque, and, from this it ſeems, as alſo after inflammation of the conjunctiva, contraction of the elementary fibres takes place, in conſequence of which they loſe their tranſparency,—a condition which, in this ſtate, the cornea has in common with the conjunctiva, and, might be beſt termed *ſclerotic tranſformation* of the cornea. The old view, that nebuloſity conſiſted in an exudation between the fibres of the cornea, is, Dr. Artha ſays, erroneous, inaſmuch as, the contrary is ſeen under the microſcope. The exuded matter which, in the inflammatory ſtage, was effuſed between the fibres of the cornea, is re-abſorbed, but, has rendered them opaque: they are contracted, and, their interſtices obliterated.

I have found the following to be a very ſimple mode of ſhowing the arcus ſenilis to be produced by fatty degeneration of the cornea:—having ſelected a perfectly freſh eye in which the arches are well marked, or, a circle exiſts, cut, circularly through the ſclerotic at the diſtance of a few lines from its junction with the cornea, and, detach the two, conjoined, from the iris, ciliary muſcle, &c. The piece removed is to be divided into four equal parts, by two inciſions interſecting at the centre of the cornea.

Pin each triangular portion to a wax tablet, and, let all become dry in a current of air. After drying, remove, carefully, with a ſharp kniſe, a very thin "ſhaving" from the edge of the preparation; place it on a ſlide, in a drop of water to which has been added a little acetic acid, and, having (after a few minutes) covered the object, proceed to its inveſtigation.

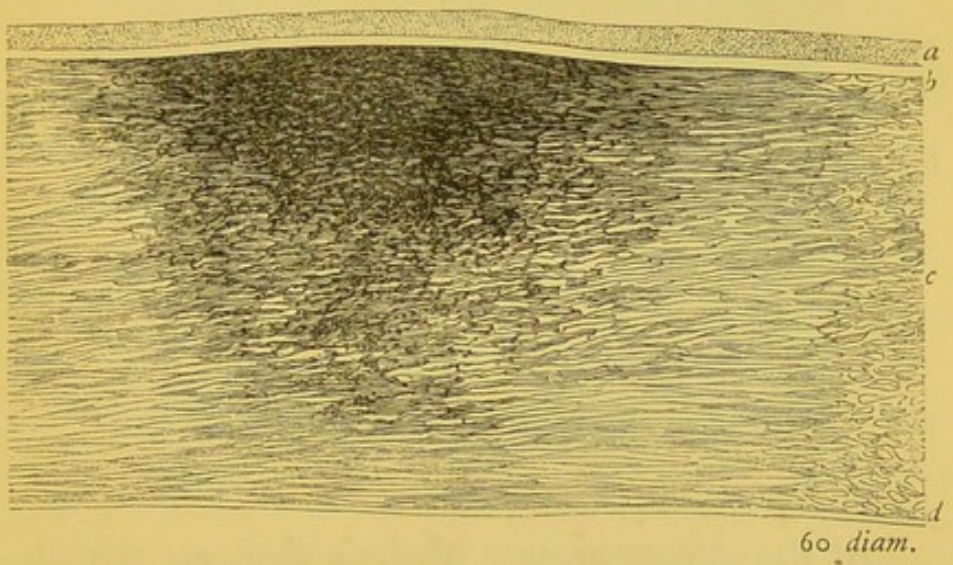
Examined by the microſcope, firſt, with a power of 60 diameters, the ſpecimen ſhows the *ſubſtantia propria*, at a ſhort diſtance from the ſclerotic, to be of a very light-browniſh hue, and, its fibres appear as though matted, or, confuſed together. The depth of this tint is, ordinarily, greateſt towards the anterior, elaſtic lamina, and thence, declines, more and more, as it approaches the membrane of Deſcemet. This is ſeen to be the caſe, more eſpecially, if the arcus, ſtill, retains the bluiſh, or, bluiſh-white colour which is characteriſtic of it in the earlier ſtages of its formation, and, when fatty degeneration has not, as yet, involved the entire thickneſs of the proper ſubſtance of the cornea. In proportion, however, as this part becomes more invaded, and, the colour is ſeen to have changed to that of a denſe white, or, ochery-white, ſo will it be found, under the microſcope, that fatty degeneration has extended to the deeper lamellæ of the cornea, and, in its whole thickneſs it, now, preſents the light-browniſh tint I have already referred to.

It would, thus, appear that the change, ordinarily, commences in the ſuperficial laminæ, and thence, ex-

tends, by degrees, through the whole of the ſubſtantia propria at this ſpot.

I have never ſeen Bowman's membrane (*ant. elaſt. lam.*) nor, that of Deſcemet (*poſt. elaſt. lam.*) to be otherwiſe than unaltered :—

Fig. 8.



60 *diam.*

a. Corneal epithelium.
b. Bowman's membrane (ant. elaſt. lam.).
c. Subſtantia propria.
d. Deſcemet's membrane (poſt. elaſt. lam.).

If the microſcopic examination be continued with a power of 200 diameters, we ſhall obſerve myriads of fine oil-globules in the ſituation of, and, conſtituting, the arcus. Many larger globules are preſent, and, this magnitude has, doubtleſs, been attained by the coaleſcence of the ſmaller ſpherules. We notice, alſo, that the oil-drops are arranged in two ways:—1ſt, In the direction of ſuch of the lamellæ as have diſappeared, and, which they replace,

—a fatty degeneration, or, converſion—and, 2nd, in the interſtices, or, between the lamellæ—a fatty depoſition. The ſlight elevation which the cornea preſents at the ſite of the arcus is due to this latter condition :—

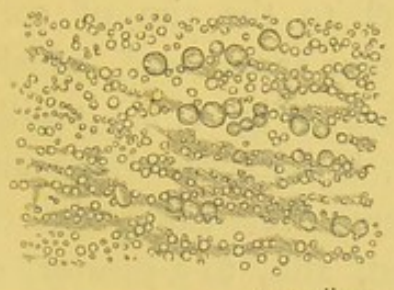
Fig. 9.

200 *diam.*

At the commencement of theſe changes, the oil-drops will be found in the corneal cells, and, often too, are they preſent in the fine branches, or, proceſſes prolonged from theſe cells ; in the ſame manner as the contents of the cellular elements of other organs are, primarily, affected where fatty degeneration occurs, and where, in the further progreſs of the affection, we may notice, alſo, the intercellular depoſit.

By increaſing our magniſying power to 500 diameters, much of that which, previouſly, appeared in the arcus to poſſeſs a fine granular character, only, is ſhown, now, to conſiſt of oil-drops :—

Fig. 10.



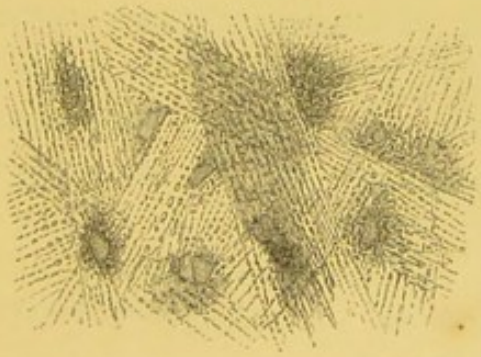
500 *diam.*

Theſe oil-drops preſent the characteriſtic globular form, refrangibility, and, diſappearance on the application of ether.

Beſides the above-deſcribed mode of preparing the cornea (by firſt drying, &c.), another excellent method is that employed by His, viz., to treat the thin ſlices with dilute, pyroligneous acid. By this proceſs, the cellular elements are beſt diſplayed; and, to obſerve the changes which have taken place in their contents, ſome of the deeper lamellæ ſhould be ſelected in an inſtance of the arcus in an early ſtage of its formation.

The annexed is a cloſe copy of the drawing ſupplied by His to illuſtrate the appearance preſented under the microſcope, where a ſection of the cornea has been made parallel to its ſurface, and, extending through the arcus :—

Fig. 11.



With reſpect to the rim of cornea lying juſt external to the true arcus, and, which, as a general rule, is unaffected, (Fig. 1, B.) it will be, not unfrequently, found, in inſtances where an arcus is very broad, or, a denſe circle exiſts, that this part has become implicated, alſo, to a greater, or, leſs degree, by a continuity of fatty degeneration from the arcus itſelf. This occurs, more commonly, above, and, below, than at the ſides of the cornea.

In proportion to the extent of loſs of tranſlucency ſuffered by this part of the cornea, from the above cauſe, ſo, will be the amount of obſcurity it preſents to impede our view, through it, of the ſubjacent iris.

I have, in ſome caſes, found the fatty degeneration to extend completely into the line of junction of cornea, and, ſclerotic; and have, occaſionally, ſeen the interſtices of the ſclerotic fibres as they are becoming corneal laminæ, in many places, loaded with oil-drops.

CHAPTER II.

"Mille fois j'ai eu le plus grand regret d'ignore l'hiſtoire des maladies des familles qui étaient confiées à mes ſoins. Je ne doute pas que cette conſidération m'eut été utile pour les traiter mieux."—PORTAL.

IT has been truly obſerved by Dr. Barnes[1] that "our acquaintance with fatty degeneration is too recent, and, too little advanced to admit of any extended inveſtigation into the tranſmiſſion of this diſeaſe to ſucceſſive generations;" and, I propoſe, now, to adduce a few facts which, whilſt they appear to bear cloſely on the hereditarineſs of this peculiar affection, under certain circumſtances, may ſtimulate to further enquiry into a branch of pathology upon which ſo much light has recently been ſhed, and, from the yet deeper inveſtigation of which ſo much practical advantage may be, reaſonably, anticipated.

In the words of Sir H. Holland,[2] I may remark that it is unneceſſary to point out the important relation to practice of all that concerns hereditary

[1] Medico-Chirur. Trans. Vol. XXXIV., p. 192.
[2] Med. Notes, and Reflections. p. 42. Lond. 1840.

tendency to diſeaſe. The ſubject meets us at every ſtep, and is one to which our attention is, perpetually, required, as an exponent of ſymptoms, and, as affording ſome of the moſt certain means of prognoſis, and, in directing us, in many particulars, to the right course of treatment. No judicious phyſician will neglect the reſources, hence, derived, which are, in truth, eſſential to ſound, and ſucceſsful practice.

The category of hereditary diſeaſes, unhappily, includes many maladies, as phthiſis, cancer, &c., which, yet, defy the beſt directed ſkill of the moſt able practitioners, though aided by the extended improvement of modern medicine. There occur, alſo, other affections which, whilſt owning hereditary origin, are found to be leſs certainly fatal, and, more amenable to treatment, *e. g.*, gout, rheumatiſm, &c. Theſe complaints,—as ſuch,—are not *connate*, but, that particular blood-craſis of the parent is inherited by the child, which, at a certain period of life, and, according to the nature of the affection tranſmitted, ſhall be, eventually, developed into the malady itſelf, which, as it were, gradually budding forth, now, flowers from thoſe latent, but, ſecurely ſown ſeeds of diſeaſe, the germination of which, though tardy, is not the leſs certain. The progreſſive ſteps which had led, inſenſibly, to the perfectly formed diſeaſe in the parent, have only been repeated in the offspring,—have only "grown with his growth, and, ſtrengthened with his ſtrength." The various periods of his exiſtence have not been more regularly attained than the different ſtages of the in-

grafted, and, now, matured malady have become developed. The offspring is born in likeneſs to the ſire; inherited health impreſſes him, and, time only ſtrengthens the reſemblance of facial lineament, bodily form, and, vigorous conſtitution. Muſt we not, then, at once, accord a blood-likeneſs, alſo, both in its development, and, its growth? In the ſubſtitution of *diſeaſe* for *health*, the propoſition, equally, applies,—the blood-likeneſs muſt be, equally, acknowledged. The word *conſanguinity* admirably expreſſes the *phyſiological*, and, *pathological* bearings of cloſe relationſhip. Mr. Simon[1] has well obſerved: —"And, whereas, it is in the blood, more ſtrikingly, and, more conſtantly than in any ingredient in the organiſm that development is, ever, in progreſs: whereas, it is eminently in the blood that we have, at each moment, an epitome of the whole development of the body, and, find the earlieſt rudiments, and, the lateſt reliques of every organized tiſſue,

[1] Lectures on General Pathology, p. 171. Lond. 1850.

"Native, or, congenital peculiarities of form, like thoſe of colour, are tranſmitted by generation. Hence, we ſee a general ſimilitude in perſons of the ſame blood, and, can diſtinguiſh one brother by his reſemblance to another; or, know a ſon by his likeneſs to his father, or, mother, or, even to the grandfather, or, grandmother. All individuals of the ſame family are characteriſed by particular lines of countenance, and we frequently obſerve a particular feature continued in a family for many generations. The thick lip introduced into the imperial houſe of Auſtria by the marriage of the Emperor Maximilian with Mary of Burgundy, is viſible in their deſcendants to this day, after a lapſe of three centuries. Haller obſerves that his own family had been diſtinguiſhed by tallneſs of ſtature for three generations, without excepting one, out of numerous grandſons deſcended from one grandfather."—Lawrence. W. Lectures on Man, p. 384. Lond. 1819.

naſcent, or, in decay. So, ſurely, it would be in this fluid,—the ſcene, or, the ſubject of ſo many developmental metamorphoſes,—that one would expect to find the material explanation of many hereditary diſeaſes."

It is very generally acknowledged that in proportion as the offspring more nearly reſembles the father, or, the mother in features, form, diſpoſition, &c., ſo, will he be more likely to partake of his or her conſtitution,—whether it be of a healthy, or, unhealthy character. On his arrival at the period of life when that parent ſuffered from any ſuch affection as finds place amongſt the hereditary diſeaſes, he, also, will, *not improbably*, be, ſimilarly, affected. It is, nevertheleſs, true that the child may eſcape the threatened evil, but, ſuch inſtances ſhould, perhaps, be regarded as exceptions. Should, however, both parents be the ſubjects of the ſame form of hereditarily-tranſmiſſible malady, the chance of immunity from it is ſo far diminiſhed for the offspring that the inheritance of the taint becomes, as nearly as may be, certain.

That which is true of the curtailment of life through communicated diſpoſition to diſeaſe is, equally, a fact, on the other hand, in regard to unuſual prolongation of exiſtence where hereditary longevity characteriſes the progenitors, or, that parent eſpecially, to whom the child bears the cloſer reſemblance.[1] "The ſlow, and, ſilent work of de-

1 "Et mihi videtur, ſi pater major fuerit, plus de patre; ſi major mater, plus de matre ſupereſſe."—Haller. Phyſiol.

terioration begins earlier in ſome conſtitutions than in others," obſerves a late eminent writer,[1] "and, varies in families, as in individuals, notwithſtanding wide differences in the habits, and, modes of life, as if from an original conformation; and, it is, thus, we muſt account for the well-known, and, well-eſtabliſhed fact that, barring accidents, the general duration of life tallies in families, with few exceptions; ſome reaching three-ſcore years, only, others five years over that, and others, again, reaching ſeventy, and from thence, to longevity."

With reſpect to certain congenital abnormalities, —whether conſiſting of exceſs, or, deficiency,—it is well known that they manifeſt a ſtrong tendency to become hereditary, and, are often repeated in ſucceſſive generations. Familiar illuſtrations may be ſeen in inſtances of ſupernumerary fingers, or, toes; or, the junction of two, or, more of them where the number is normal. I have lately had an old man under my care, in hoſpital, in whom the ſecond, and, third toes of both feet are united together. He is the father of four ſons, and, four daughters: in all the former, preciſely the ſame peculiarity exiſts as in himſelf: the girls, however, are exempt from the malformation, and, equally ſo are their parental

The doctrine of anceſtral longevity is of great antiquity. Hippocrates, and, Pliny have remarked that, though there are ſome exceptions, owing to the child ſuffering in the womb of the mother, or, to other cauſes, yet, it is a general rule that healthy parents will have healthy children, provided they are brought up well.

[1] Travers. B. A further Enquiry concerning Conſtitutional Irritation, p. 11. Lond. 1835.

uncles, and, aunts. It is not known whether the father, and, mother of my patient had this conjunction of toes. Dr. Watson[1] ſtates that a great number of individuals of the family of Zerah Colburn, the American calculating boy, deſcended from a common anceſtor, have ſix toes, and, ſix fingers. The peculiarity was tranſmitted through four generations. "I am acquainted," ſays this author, "with a gentleman who had the misfortune, ſome years ago, to have a baſtard child laid to his charge. At firſt, he had ſome miſgivings on the ſubject, and, ſuſpected that he might have no real title to the credit, (or, rather, I ſhould ſay, diſcredit) of the imputed paternity: but, all his ſcruples were ſatisfied when he found that the child had ſix fingers on each hand: for, he himſelf had preſented two ſupernumerary fingers, which had been amputated when he was an infant." Space will not permit me to do more

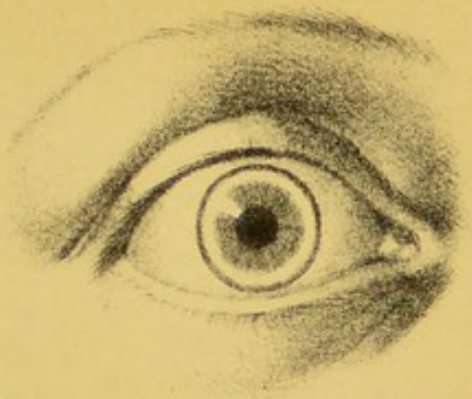
[1] Lectures. Med. Gaz. p. 232. Lond. 1840.

In the *Phil. Trans.*, Part I, 1814, is an account of a caſe in which ſupernumerary toes, and, fingers, could be traced in a family for four generations. They were introduced by a female who had ſix fingers on each hand, and ſix toes on each foot. From her intermarriage with a man, naturally formed, were produced ten children, with a ſupernumerary member on each limb, and, an eleventh, in whom the peculiarity exiſted in both feet, and, one hand, the other hand being naturally formed. This latter married a man of the ordinary formation, and, had four children, of which, three had one, or, two limbs natural, and, the others with the ſupernumerary parts; while, the fourth child had ſix fingers on each hand, and, ſix toes on each foot. He married a woman naturally formed, and, had eight children, four with the uſual ſtructure, and the ſame number with ſupernumerary fingers, or, toes Two of theſe were twins, of which one was naturally formed, and, the other ſix-fingered, and, ſix-toed.

Æt 56.

1.

Æt 53.



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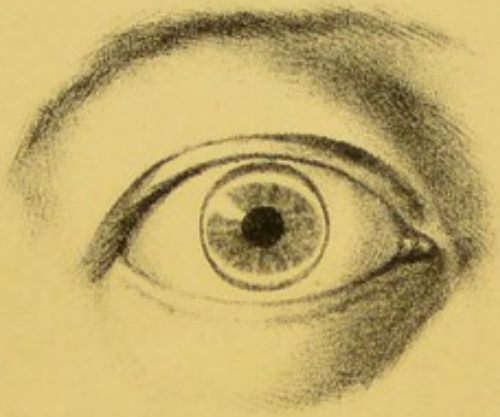
Æt 25.



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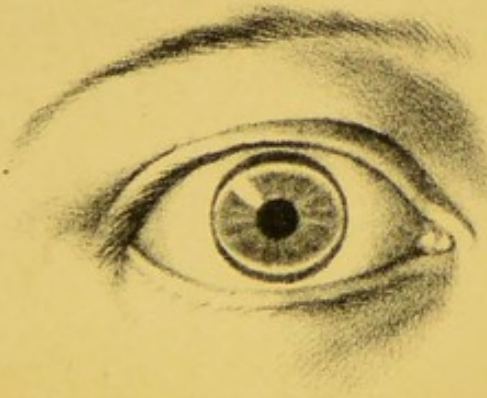
Æt 20



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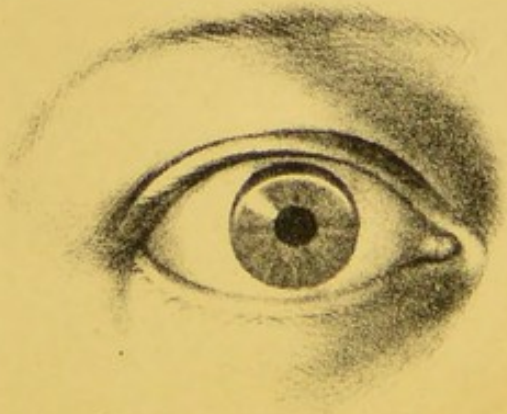
Æt 12.



5.

than remind the reader of that ſingular variety in the general law of the hereditarineſs of congenital malformations, which has been ſtyled by Ducheſne—Ataviſm.

Defects of viſion, as, cataract, amauroſis, leucoſis, chromatodyſopia, &c., are, not uncommonly, tranſmitted. The eyelids, and, eyes preſent us with many curious examples of congenital malformations, which are, in a large number of inſtances, hereditary. The *arcus* is ſaid to have been ſeen *at birth:* I doubt, however, the correctneſs of the obſervation; but, believe, as I have already remarked, that an arciform, or, circumferential opacity of the cornea has been miſtaken for it,—the remains of the originally ſclerous, and, clouded condition of the part, and, which, in the perſiſtence of this partial opacity, implies, only, an arreſt of development. But, that the arcus may be *hereditarily* conferred, and, appear at remarkably early ages, the following intereſting inſtance would ſeem to prove:—

Nine years ago, W. B— (Pl. II. fi. 3) (then, ſixteen years of age) became a patient of mine at the Royal Weſtminſter Ophthalmic Hoſpital. He was a ſlim, and, rather, delicate-looking lad, complaining of dimneſs of viſion, which was always worſe by gas-light The pupils were more dilated than natural, and, the iris ſluggiſh in its movements, the eyes free from undue vaſcularity: the ſclerotic æ ſomewhat more bluiſh than uſual: tenſion of globes normal, and, no hallucinations of ſight were experienced. In both eyes the *arcus* was preſent,—each

cornea preſenting a well-marked half-circle of fatty degeneration in the upper ſegment, and, an arch, to leſs extent developed, in the lower one, but, perfectly diſtinct. The rim of cornea external to the arches, *i. e.*, placed between them, and, the edge of the ſclerotica, is perfectly tranſlucent, and, through it the iris is clearly viſible. The lad is not aware for how long a period theſe arcs have been exiſting, but, there is no doubt they muſt have been for ſome years forming to have arrived at their preſent degree of development.

The patient complained of debility: ſhortneſs of breath on going up-ſtairs, and, occaſionally, had a ſharpiſh, twitching pain in the ſternal region, eſpecially after exertion. The hands and feet are cold, and, the pulſe more feeble than natural. Sleep ſound, and, dreamleſs: appetite good. Under a courſe of tonic medicine, viſion became conſiderably improved, and, the general health much amended. I have, occaſionally, ſeen W. B—— ſince the above date, and, in December of 1856 he came to me in great diſtreſs of mind in conſequence of the dragging, and, dull, heavy pains he experienced in the teſtes, which he fancied were becoming atrophied. Dr. Hyde Salter kindly ſaw him for me, and, favoured me with the following account:—W. B——, aged twenty: under the middle height: weight 8 ſt. 10 lb.: has well-marked arcus ſenilis in both eyes: complexion veiney: lips tumid, and, rather congeſted: voice feeble: expreſſion ſombre, and, ſomewhat depreſſed. Suffers occaſionally from languor, but,

chiefly, from depreſſion, and, lowneſs of ſpirits, and, eaſy excitability. Pulſe 72, of tolerable power: no intermiſſion, nor, irregularity. The effect of poſition is as follows, in a quarter of a minute; lying, 18; ſitting 21: ſtanding 24. *Heart*: poſition of impulſe natural: appearance ſharp: ſounds normal, but, rather ſhort: no irregularity of any kind.

With regard to family hiſtory I learnt that his paternal grandfather died, aged 72, of old age: paternal grandmother, aged 54, of "internal cauſes:" maternal grandfather, aged 67, of aſthma: maternal grandmother, aged 63, of "grief."

Father of W. B—— (Pl. II., fig. 1) *aged fifty-ſix:* of middle height: weight eight ſtone: a ſpare, careworn, flabby man, with a deeply-furrowed countenance, and, thoughtful, anxious expreſſion. In each eye there is a *circulus ſenilis*, as deeply-pronounced in colour, and, broad in extent, as in the oldeſt ſubject in whom I ever examined it.

He was well-to-do in buſineſs until twenty-ſeven years ago, when, a failure reduced him to penury, and, for many years, afterwards, his ſtruggles for ſubſiſtence, and, the maintenance of a wife, and, increaſing family were numerous, varied, and, arduous. In converſing with him, his manner is apathetic, and, occaſionally, I have found that when he becomes a little animated the pulſe intermits.

From his having, latterly, been ſuffering under cough, and, dyſpnœa, he has received the advice of

Dr. Hyde Salter, to whom I owe the following ſtatement:—"This patient, though conſidering himſelf tolerably well, complains—as his principal ſymptom—of a cough, from which he has ſuffered from his boyhood. It is, at times, better, but, never completely leaves him for long together. His preſent attack dates from about five weeks ago. It is accompanied, generally, with a good deal of expectoration, which he characteriſes as a 'white froth,' but, ſometimes, it is thick, and, yellow. He complains, alſo, of pain in the ſcrobiculus cordis, and, which appears to be aſſociated with the cough, and, greatly aggravated by it: but, whether the pain there is the cauſe of the cough, or, the cough of the pain, he cannot ſay. The pain is, ſometimes, ſevere when the cough is not ſo. He ſays that he has, ſometimes, a wheezing, or, rattling in his cheſt, but, is now free from it.

"*Phyſical examination.*—Reſpiratory movements feeble: cheſt collapſed, and, ſmall, but, ſymmetrical. Reſonance on percuſſion, everywhere, perfect. Reſpiratory murmur very feeble, but, without any great difference in correſponding parts of the oppoſite ſides: rather ſtronger, however, at the lower than the upper parts of the cheſt, and, feebleſt of all at the right apex, where there is a little expiratory ſound of a ſlightly bronchial character. No moiſt, nor, dry ſounds. *Heart.*—Apex-beat not viſible in the uſual ſituation, but, ſtrongly marked at the ſcrobiculus: nor, to be felt between the fifth, and, ſixth ribs, but, in the ſcrobiculus forcibly: the

percuſſion-dulneſs marking its ſituation, proportionately, lowered. Heart-ſounds ſhort, and, clear: impulſe ſufficiently ſtrong: no irregularities, nor, intermiſſions.

"What ſtruck me, particularly, was the general appearance of the patient, and, eſpecially, the expreſſion of countenance. It had an appearance of fatigue, depreſſion, and, *fag:* was furrowed, and, ſhrunk, and, gave me the idea of exhauſtion,—of overtax of powers: and the, unvaryingly, favourable anſwers reſpecting his condition, and, feelings, together with a ſort of forced energy of movement, gave me the impreſſion that he was putting the beſt face on matters. I conclude from this man's ſymptoms,—the occaſional attacks, ever ſince his childhood, of ſhortneſs of breath, and, cough, attended by wheezing, and, expectoration,—that he has been, throughout life, ſubject to bronchitis, and, that the attacks have left his lungs, permanently, though ſlightly, damaged. The reſonant percuſſion: abſence of bronchial ſounds, and, diſplacement of the heart towards the ſcrobiculus, would make me think that this damage is emphyſematous, were it not for the ſmall, collapſed cheſt,—the very reverſe, in his figure, of emphyſema."

Mother of W. B——, (Pl. 11, fig. 2) *aged fifty-three:* weight 7 ſt. 10 lb.; of darkiſh complexion, with eyes ſunken, and, ſurrounded by broad, deep-coloured areolæ. The countenance is wrinkled by premature age, and, wears an expreſſion of care, and, diſtreſs, though ſhe has no complaint to make of

bodily ailment, or, mental ſuffering. Each cornea preſents a *circulus ſenilis*, peculiarly ſtriking from its great breadth, and, denſe opacity.

Her hiſtory is, to ſome extent, told in that of her huſband, to whom ſhe was married when twenty-ſeven years of age: a family of ſeven children enſued. The firſt child ſhe ſuckled for twelve months: the ſecond, for fifteen months: the third, for two years, and, three months: the fourth, for two years: the fifth, for thirteen months: the ſixth, for two years, and, four months, and, the ſeventh lived to be only five months old. When misfortune befell her huſband, ſhe reſorted to needlework for a livelihood, and, was, commonly, ſo engaged from daylight to darkneſs. During all this time, ſhe ſays, ſhe felt weak, and, languid: and, the ſupply of work, not unfrequently, failing, ſhe was often in want of the neceſſary amount of food to ſatisfy hunger: ſhe could, ſeldom, obtain beer, and, her beverage conſiſted, for the moſt part, of tea, and, coffee. She has loſt three of her children: the one above-mentioned died from inflammation of the lungs: another at the age of three years, from ſcarlet fever, and, the third, from convulſions. Four children yet remain to her,—three boys, and, one girl,—of the reſpective ages of twenty: fourteen: eleven, and, ſix years. The hiſtory of the eldeſt (W. B——) has been given.

Children.—H. B——, (Pl. II., fig. 4) aged twenty: a well-grown, comely, and, apparently, healthy young man. *Arcus* very diſtinct in both

eyes: moſt pronounced in the lower ſegment of the cornea.

F. B——, (Pl. II, fig. 5) aged twelve, apparently in good health. *Arcus* well-defined in each eye in the lower, and, upper part of the cornea: but, to a leſs degree than in either of his brothers.

J. B——, aged ſix: a pretty, ſlimly-built, and, delicate-looking girl. *Arcus*, abſent from both eyes

Congenital junction of toes.—The mother has the ſecond, and, third toes conjoined in both feet, and, preciſely the ſame condition obtains in H. B——, and, J. B——. None of the other children had, or, have, this peculiarity.

In the year 1851 I became acquainted with a gentleman, of thirty-four years of age, in whoſe left eye there was a complete circle of fatty degeneration, and, in the right one the circle was equally perfect. He had become aware of the exiſtence of this peculiarity for, at leaſt, twelve years, previouſly, and, ſtated to me that his father, and, grandfather had, each, the annulus formed at as early an age as it had occurred in himſelf: a brother, and, ſiſter, however, are free from it.

Of the premature development of the arcus, unconnected with hereditarineſs, and, where the eyes are ſymmetrically affected, I ſhall have to ſpeak more at length, hereafter; but, may now obſerve that many authors have made mention of its occurrence at, comparatively, early ages, *e. g.*:—Middlemore[1]

[1] Loc. cit. Vol. I, p. 455.

obſerves that it, ſometimes, appears as early as at the age of 40. Lawrence[1] ſays, it is, occaſionally, to be ſeen between 30, and, 40. Sybel[2] ſaw it in a man 32 years of age. Dixon[3] has in his "caſe-book a note of a perfectly circular, and, ſtrongly-marked depoſit in both corneæ of an apparently healthy girl of eighteen:" and, Wardrop[4] has "met with it at *all* (?) periods of life." Dr. Laycock[5] deſcribes a caſe of conſecutive diathetic pneumonia, accompanied by articular rheumatiſm, and, rheumatic perioſtitis, and, in which there was mitral inſufficiency. A ſyphilitic taint prevailed. In commenting on this caſe, the narrator obſerves,—"A point of intereſt in this man's hiſtory is the early appearance of the arcus ſenilis (at the age of twenty-eight). This ſtructural change is one of common occurrence in perſons of a gouty habit. When it appears early in life it is, uſually, indicative of a feeble type of the arthritic conſtitution, and, is not unfrequently, coincident with fatty degeneration of the heart." Dr. Watſon[6] is acquainted with a gentleman, under 40 years of age, who preſents the arcus, and, in whom it has been known to exiſt ſince he was 24 years old. Dr. Haſkins[7] mentions the caſe of

[1] Loc. cit. p. 356.

[2] Deſſen. Beſbachtungen. I. Thl. S. 9.

[3] A Guide to the Practical Study of the Diſeaſes of the Eye. p. 88. Lond. 1834.

[4] Loc. cit. p. 736.

[5] Eding. Med. Jour. Aug. 1857. p. 116.

[6] Practice of Phyſic. 4th ed. Vol. 2, p. 272.

[7] American Quar. Jour. of Med. Science. Jan. 1853. p. 109.

a man, æt. 27, where there was a well-defined arc on the *lower* border of both corneæ. Several examples of the occurrence of the arcus before the age of twenty are ſtated by Dr. Groſs[1] to have been ſeen by him.

[1] Pathology. 3rd ed. p. 377.

CHAPTER III.

"*Fatty degeneration affecting a* PARTICULAR ORGAN, *(except in the peculiar caſe of the liver), is, commonly, the reſult of previous diſeaſe having impaired the freedom of the circulation through it, and often, of its having left a granular, or, other cacoplaſtic depoſit in its interſtices, which, not becoming fully organized, nor, receiving the renovating, and, oxidating influence of the circulating blood, gradually paſſes into the condition of fat, the loweſt principle in the ſcale of animal compounds, and, one that approaches to the nature of the ſimpler vegetable matters in the entire abſence of azote. The ſame change may enſue, more gradually, from the failing circulation, and, reſpiration which attains in advancing age; and, it will be accelerated in any texture, or, organ, whoſe ſtructure has been injured by previous diſeaſe, accident, or, diſuſe.*"—WILLIAMS.

I PASS, now, to the more particular conſideration of certain caſes to which reference has, already, been made: thoſe, namely, where an arcus, or, annulus is formed, in proceſs of time, as a ſequela of diſeaſe of the eye, or, of injury befalling it. Theſe inſtances are, commonly, to be noticed as exceptions to the general rule of ſymmetrical arrangement where the eyes become involved in degenerative changes occurring in the body as years accumulate, and, may

be cited as illuſtrative examples of *local atrophy*, and, *degeneration*.

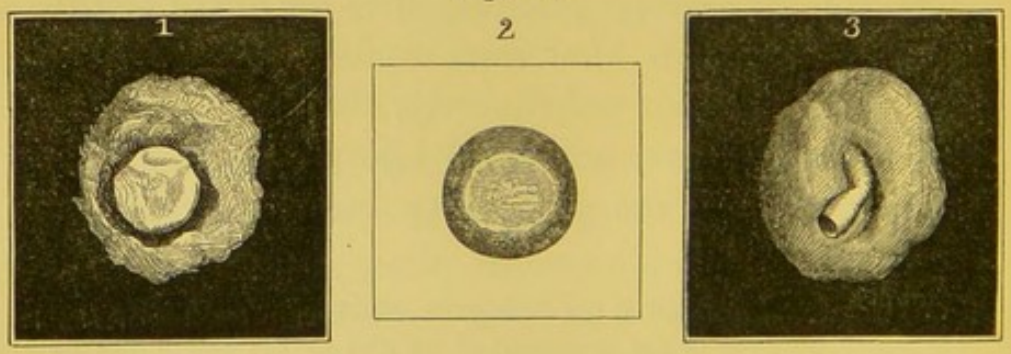
It is an acknowledged law that where the functions of a part have ceaſed, the organ through the medium of which thoſe functions had been carried on, becomes atrophied, and, may almoſt entirely, or, indeed, wholly diſappear.[1] All periods of life furniſh illuſtrations of this fact: *e. g.*—the Wolffian bodies: ductus arterioſus, and, venoſus: the thymus gland: the poſtpartum changes in the uterine fibres: the ovaria: the mammæ, &c. The eye, likewiſe, ſupplies examples in reſpect of the veſſels of the cornea; the cryſtalline capſule, and, the hyaloid membrane.

That which occurs under normal circumſtances may take place, equally, under thoſe which are abnormal, and, atrophy, following the diſuſe of parts, is well exemplified in the waſted muſcles of a palſied limb, or, anchyloſed joint: a main artery after deligation: the alveolar proceſſes after the loſs of teeth: the cervix femoris after intra-capſular fracture, &c. We find, alſo, not unfrequently, that when an eye has ſuffered ſevere, accidental injury, and, ſight is, eventually, loſt, the globe may become atrophied,

[1] "A limb long kept at reſt undergoes partial atrophy, as may be conſtantly obſerved in the treatment of injuries of the extremities by ſurgical apparatus, which prevents, or, greatly reſtrains motion. Preſſure, alſo, induces atrophy, as in the caſe juſt mentioned, and, in thoſe more numerous ones, where an interſtitial effuſion of fibrin, or, ſome pſeudo-plaſtic matter, ſuch as tubercle, or, cancer, compreſſes the adjacent ſtructure, and, ſuſpends its functions."—Stillé, A., M. D. Elements of General Pathol. p. 444. Philadel. 1848.

and, its ſurrounding muſcles participate in the ſame change together with the optic nerve, and, the ophthalmic artery. It is not unuſual, in ſuch caſes, to diſcover fatty, and, calcareous degeneration of various tiſſues entering into the compoſition of the eyeball. In the laſt ſpecimen of this deſcription that I diſſected, I found calcareous particles in a puckered, tranſverſe cicatrix of the cornea which preſented, alſo, an irregular-edged circle of fatty degeneration at its circumference (2): the optic nerve was much diminiſhed in ſize, and, in a ſtate, likewiſe, of fatty degeneration (3): the capſule of the cryſtalline lens had become a bony envelope; the choroidal pigment was, to a great extent, abſorbed, and, very little trace of retina remained,—its place being occupied by a cup-ſhaped ſhell of calcareous material (1). The vitreous humor was denſely clouded, and, of ſtiff, jelly-like conſiſtence:[1]—

Fig. 12.



[1] In Haller's Pathological Obſervations (Obſ. LIII.) an inſtance is deſcribed of "A bone in the form of a cup found in the eye," and, it is remarked:—"Whether it was the retina, as I am fully convinced it was, or, whatever elſe you pleaſe, that was changed into that hollow, bony hemiſphere, it is plain that there was a perfect induration formed

Caſes are, not unfrequently, ſeen during life where the viſion of one eye has been wholly, or, partially loſt as a conſequence of accident which befell the organ many years, previouſly; and, atrophy ſupervening, the cornea is, ultimately, invaded by fatty degeneration in the form of arches: whereas, the other eye, continuing to be ſound, remains free from ſuch appearance if the perſon be under fifty years of age: but, when the arcus ſenilis becomes, at length, eſtabliſhed, the progreſs of this form of degeneration in the affected eye will proceed at a quicker rate than in the uninjured one, and, it may preſent, even, a complete annulus by the time that the latter ſhows, only well-formed arches.

Of the eſtabliſhment of fatty degeneration of the cornea as a reſult of inflammation of the eye, I ſhall, now, adduce a few illuſtrative caſes, and, ſubſequently, offer ſome further remarks on their pathology:—Several years ago, a ſickly-looking girl, ſixteen years of age, became a patient of mine at the Royal Weſtminſter Ophthalmic Hoſpital, ſuffering from a ſevere, and, protracted form of choroiditis in the left eye. In the progreſs of the complaint, the ſclerotic, and, cornea became, to ſome extent, implicated in the diſeaſe. Many months elapſed before

in one of the tendereſt parts of the human body, viz.: the eye; and, therefore, there is no part in the body that is not capable of being indurated."

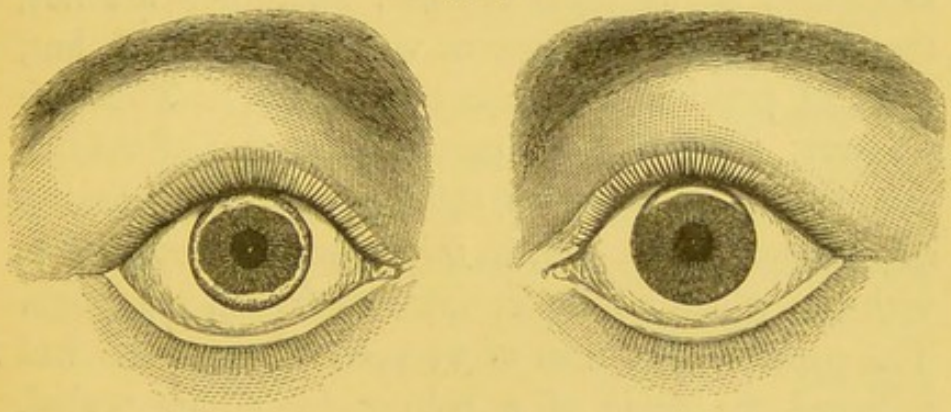
Scarpa, in his "Pract. Obſ. on the Principal Diſeaſes of the Eye," (tranſl. by Briggs) mentions a ſimilar caſe, and, gives an engraving of the ſpecimen (Pl. 2, fig. VIII.). Lond. 1806.

relief was obtained, ſince which ſhe experienced two, or, three attacks of the ſame affection. The right eye, during the whole period, remained healthy. When I laſt ſaw this patient the following was the condition of the diſeaſed organ,—abnormal tenſion of the globe: thinning of the ſclerotica: a few large, and, tortuous veſſels in the conjunctiva: cornea ſomewhat prominent, with ſome minute, nebulous ſpecks in it, and, at its upper part, a commencing arcus, of bluiſh colour, about three or four lines in length, and, ſeparated from the edge of the ſclerotic by a well-defined interval of clear cornea: iris ſluggiſh, and, pupil ſlightly hazy: viſion materially impaired, and, dull pain is, occaſionally, felt in the eye-ball. Mr. White Cooper has informed me of a female who came under his care, of about twenty-eight years of age, and, in whoſe eye an arcus was commencing at diſtinct points. Choroiditis from overwork, with general debility, were the complaints for which ſhe required treatment.

When, under the ordinary conditions of age, the arcus is formed, an unſound eye may diſplay, with great diſtinctneſs—by contraſt—the peculiarity of the fatty degeneration of the cornea arising from diſeaſe, together with the increaſed degree to which this change has extended from the ſupervention of ſenile atrophy of the part. The following illuſtrative caſe has fallen under my obſervation:—S. J——, æt. 53, a widow. About twenty-ſix years ago, ſhe had "a very ſtrong inflammation of the right eye, for which ſhe was leeched, bliſtered, and, had her mouth made

ſore." It was a very long time before ſhe regained her viſion, which, nevertheleſs, has not become fully reſtored, and, is ſtill miſty. Her general health has always been pretty good. In the right eye the pupil is ſeen to be ſomewhat irregular, and, the cornea preſents an *annulus* which is of a denſe white colour at the upper, lower, and, inner part; towards the temporal ſide, however, it is of leſs breadth, and, of a lighter hue. The eye is rather more prominent than the oppoſite organ, and, the eye-laſhes are perfectly white, whereas, thoſe of the left lids are quite dark :—

Fig. 13.



The following caſes have been recorded by Dr. B. Lee :[1]—" Diana Lane, æt. 65, preſents in the right eye a complete circle, though very narrow for its entire circumference, and, wanting that proportional increaſe of breadth, above and below, which ſhould characteriſe the union of the two arcs : while, in the left we have but a ſlight upper arc. Upon

[1] Loc. cit. p. 170.

enquiry we find that ſhe has ſuffered from repeated attacks of inflammation in the right eye, while, the left has always eſcaped. In the latter, then, we ſee the arc as the index of the ſtate of the ſyſtem, developed in the uſual manner, while that in the former has no ſuch ſignificance."

"Eliz. Joſephs, a woman of 77, ſhows in the right eye, an irregular circle compoſed of broken ſegments, and, in the left an arc,—not in its uſual place above, —but, on one ſide of the cornea. In this caſe, there has been an ophthalmia of both eyes, at intervals, for a long period, though they are, at preſent, free from it. Neither of theſe arcs could be conſidered as formed in the uſual manner, and, they are not, therefore, indices of preſent vice in the ſyſtem, but, only, of previous diſeaſe in the locality." This caſe preſents, amongſt other peculiarities, that of the diſeaſe which led to the eſtabliſhment of arcs, having affected both eyes, and, in this reſpect, is comparable with one which fell under my care ſeveral years ago. The patient was a man of 33 years of age, who had followed the trade of a painter for a long period, during which he had thrice been the ſubject of *colica pictonum*, and, been once ſalivated for ſyphilis. The gums had, ſlightly, receded from the teeth, and, preſented, ſtill, a bluiſh margin. He is pale, thin, feeble, and, complains of being "generally out of health." As the reſult of repeated attacks of a low grade of inflammation of the eyes, I found the ſcleroticæ to be, abnormally, thin: corneæ more prominent than natural: iris ſluggiſh: dull pain in the

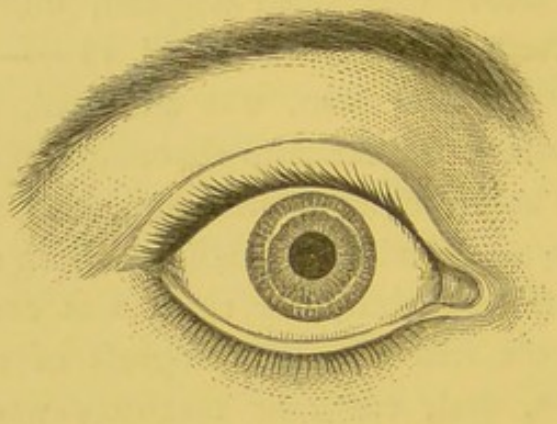
eye-balls, and, obſcurity of viſion. In each eye there are arcs of a denſe white colour, and, they appear as though formed by the confluence of ſmall, opaque patches, ſo as to confer irregularity of margins upon the completed arches.

In the year 1842, I attended to the following caſe in the above-mentioned hoſpital, under the direction of the late Mr. Guthrie. J. H——, æt. 32: a thick-ſet, muſcular man, was admitted, labouring under an attack of catarrho-rheumatic ophthalmia. He had led an intemperate life, and, was much expoſed to the viciſſitudes of weather. Both eyes were, ſimilarly, affected: but, the right was conſiderably worſe than the left. In the progreſs of treatment, very prompt, and, energetic meaſures were obliged to be had recourſe to. Bleeding from the arm was practiſed, and, aconite, and, colchicum were given: ſubſequently, the gums were made tender by mercury. Strong ſolutions, and, *the* ointment of nitrate of ſilver were applied to the eyes: the vaſcular chemoſis became, at one time, ſo great as to threaten the vitality of the cornea, when, ſcarifications of the conjunctiva had, on three occaſions, to be practiſed. The ſymptoms became, very ſlowly mitigated, and, at the expiration of five months, the patient left the hoſpital: but, a long period elapſed before he regained uſeful viſion.

After the lapſe of fifteen years, I conſider myſelf fortunate in having had the opportunity of again, ſeeing this patient, and, obtaining a drawing of the appearance preſented by the right eye, where nothing

abnormal is to be ſeen except an irregularly-formed, and, incomplete annulus. Viſion in this eye is tolerably good, but, the ſight of the oppoſite one is obſcured by the preſence of a ſlight central nebuloſity :—

Fig. 14.



The following remarkable caſe fell under the care of Dr. Mackenzie, of Glaſgow, to whoſe kind conſideration I am indebted for an opportunity of ſeeing it. The peculiarities attending it are ſo fraught with intereſt that I ſhall offer no apology for quoting the account of them *in extenſo*, and, they conſtitute, collectively, an example of what this author[1] has termed "intermittent ophthalmia:"—A gentleman came from a diſtance to conſult me, in July, 1835. His age was twenty-four, and, he ſtated that he had been troubled with ſtrumous ophthalmia till he was ten. After that age he remained free from

[1] Loc. cit. 4th ed. Caſe 299. p. 662. Lond. 1854.

ophthalmia till within ten months of the period when he conſulted me. For theſe ten months the conjunctivæ had been affected with conſiderable redneſs, and, this ſymptom preſented exacerbations of a diſtinctly periodic character. The redneſs was of a carmine hue, and, different from that of any ordinary ophthalmia. His eyes were never entirely free from redneſs: but, regularly every ſix, or, ſeven days, there was an exacerbation, firſt in one eye, and, then, in the other. A patch of redneſs was firſt obſerved in one of the conjunctivæ: the redneſs ſpread rapidly, until, the whole membrane was affected, and, then, the other eye underwent the ſame proceſs. Some ſwelling of the conjunctivæ attended theſe attacks, along with a degree of heat, and, pain in the eyes. There were no rigors, nor, head-ache. There was not much intolerance of light. The blood-veſſels of the conjunctivæ ſhowed a tendency to paſs over the edge of the corneæ. There were no phlyctenulæ, and, no increaſed diſcharge from the conjunctivæ. The ſcleroticæ appeared neither thickened, nor, thinned. There was no affection of the corneæ except ſome minute ſpecks of opacity at the edge of the right one. There was no diſeaſe in either iris, and, viſion was perfect. The attacks came to a criſis in about thirty-ſix hours from their commencement, —the redneſs after this, gradually, diminiſhing, till the eyes recovered ſomething like their colour, and, the whole proceſs occupying, generally, ſix, or, ſeven days. There ſeemed, the patient remarked, to be ſome cauſe reſiding in the eye itſelf which produced

inflammation, excluſive of any external irritant, and, which no care could counteract: for, when the eyes were at the paleſt, he was ſenſible of a pricking ſenſation,—the certain forerunner of another attack. Thus, matters had gone on for ten months.

The remedies which had been tried were leeches round the eyes: mercury, ſulphate of quina, and, arſenic, internally, along with ſolution of zinc, and, wine of opium, externally,—all without effect. Veneſection was, now, had recourſe to, and, ſeemed to do good, for ſome time, but, the benefit was only temporary.

The patient conſulted me in March, 1838. His diſeaſe had continued with little change. Perhaps, the intervals between the exacerbations were a little longer, approaching to ſeven rather than ſix days. There was, now, a remarkable increaſe of the opacity formerly obſerved at the edge of the corneæ. On each cornea there was, now, a ſort of arcus, deficient above, but, occupying, to a conſiderable extent, the reſt of the circumference. The rings were of a peculiar, yellowiſh-white colour, ſo as to reſemble pus, or, bone, in appearance. They had been increaſing for eighteen months.

The patient had conſulted ſome of the moſt eminent ſurgeons, and, oculiſts, but, without deriving any benefit from their preſcriptions. He had been cupped by the advice of one, and, was uſing ſteel by the advice of another. My friend, Dr. Staberoth, of Berlin, ſaw him along with me, and, recommended a trial of iodine, internally, with a tartar emetic erup-

tion on the neck. The patient wrote to me, ſome time after, to ſay that theſe remedies had, likewiſe, been fruitleſs.

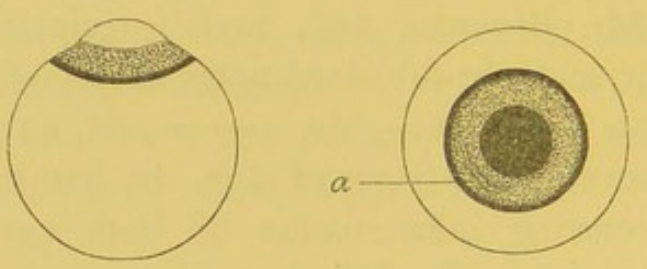
On the 10th of July, 1839, his medical attendant wrote to me that "the diſeaſe continued to make progreſs."

In 1854, Dr. Mackenzie adviſed his patient to conſult Mr. Bowman, and, myſelf, reſpecting his complaint, and, the ſubjoined notes were made at the time of his viſit to us:—Mr. ———, æt. 42. Since he was twenty-two years of age, he has had conſtantly-recurring inflammation of both eyes: not uſually painful. The ſight is good, now, but it has been feeble for the paſt ſix months. Reads well with the right eye, but, leſs clearly with the left. Scleroticæ muddy, brown-red: irides perfectly natural, nut-brown. Very ſtrongly-marked, broad *annulus* in both eyes, leaving only the central third of the cornea clear, and, that *not quite* clear. Pupils active: has always muſcæ. The clearer parts of the corneæ bulge forwards, while the annulus ſeems, as it were, to conſtrict the remaining portions. The front of the ſcleroticæ ſhows inky thickening, correſponding to the width of the poſterior chamber. Tenſion of the globes natural.

The corneal rings are chiefly opaque white, minutely mottled, and, in the left one there is, in the centre of the opacity, a yellowiſh tract, following the curvature for the eighth of an inch, and, looking like calcareous, or, oſſeous depoſit. On applying the point of a fine inſtrument to this latter part, a ſlight

ſenſation is communicated, as though gritty material were being felt. In the annexed diagrams the bulging of the cornea is ſeen in profile, likewiſe, the breadth of, and, the conſtriction produced by, the arcus: *a* points out the ſituation, and, extent of the —probably— calcareous depoſit:—

Fig. 15.



In aſſociation with the above caſe, I may quote an obſervation from the pen of the late Mr. Barlow:[1] —"Inflammation, too, diſturbing, and, weakening nutrition, may, even in parts eſpecially prone to fatty degeneration, lead to that which is calcareous. Whether it ever does ſo in the cornea I am unable to ſtate, yet, this is an intereſting matter for enquiry."

With regard to the pathology of the caſes I have related, where chronic, internal ophthalmiæ have led, eventually, to the eſtabliſhment of an arcus, or, annulus, they preſent us with marked examples of changes well known to reſult from continued impairment of nutritional activity in a part, conſequent on embarraſſed circulation: and, though the cornea is quite deſtitute of blood-veſſels, it, nevertheleſs, im-

[1] On Fatty Degeneration, p. 67. Lond. 1853.

mediately adjoins thoſe ſtructures in which they are numerous, and, from whoſe contents it receives ſupplies which are quite adequate to the completion of its growth, and, the maintenance of its nutrition. And, although the cornea appears, at firſt view, to be nouriſhed in a peculiar manner, it muſt, nevertheleſs, be conſidered as being, in ſuch reſpect, nowiſe anomalous, inaſmuch as, it is found with the various other textures of the body, that their blood-veſſels are, alſo, diſpoſed external to, and, not within, the proper ſubſtance of the part to which they are directed, *e. g.*, on the myolemma, neurilemma, perichondrium, &c., whilſt, they are altogether wanting in the myoline, neurine, and, chondrin: and, when inflammatory action interferes with the due exerciſe of nutritive force, atrophy, and, degeneration of muſcle, nerve, and, cartilage, is liable to enſue. Equally, too, do theſe changes affect the cornea when impediment to its nutrition ariſes from an arreſt of the freedom of circulation through thoſe neighbouring veſſels, upon the ſupply from which this tiſſue is, in ſo great a meaſure, dependent for the preſervation of its vital integrity. Mr. Paget[1] has briefly ſtated the particulars of a caſe which may, appropriately, be here cited, of fatty degeneration of the muſcular ſubſtance of the heart, where this organ was punctured with a needle, and, the patient died four days, afterwards. There were found evident ſigns of pericarditis, and, of inflammation of the

[1] Loc. cit. Vol. I. p. 413.

portion of the heart close by the wound: and, both in this portion, and, in a less degree, in all other parts of the heart, there was such a fatty degeneration as could not be distinguished from that which occurs in the corresponding atrophous degeneration. "The same changes," Mr. Paget remarks, "may be, oftener, observed at later periods after inflammation of the substance of the heart: and, in some of these cases, the interstitial deposits of lymph are organized into fibrous tissue, while, the muscular fibres themselves are degenerate."

With respect to the changes which take place in choroidal inflammation, and, which, in process of time, lead to fatty degeneration of the circumferential part of the cornea, it must, in the first place, be borne in mind that this tunic receives its chief nutritive supply from the anterior ciliary arteries which run in the substance of the forepart of the sclerotica, and, likewise, from adjoining conjunctival vessels. Under inflammation, the choroid becomes swollen from vascular turgescence, and, interstitial effusion; and, though exudation occurs more readily on its inner surface, or, between it, and, the retina, with the establishment of adhesions, and, alteration in the texture of both, exudation takes place, also, between the choroid, and, sclerotica; and, pressure being, thus, exercised upon the vessels running in the latter for the supply of the cornea, imperfect nutrition of this part occurs, followed by its degeneration,—in the same manner as when lymph is deposited between the fasciculi of the heart-tissue, and, which, in com-

preſſing the veſſels in this ſituation, leads to fatty change in the muſcular fibrillæ: the ſarcous elements are replaced by oil-drops, whilſt, the myolemma remains unaffected, in the like way the *ſubſtantia propria* of the cornea ſuffers fatty degeneration whilſt the ſtructureleſs anterior, and, poſterior lamellæ which encloſe it, continue unaltered.

The caſe deſcribed by Dr. Mackenzie is one of very unuſual occurrence, and, poſſeſſed of great intereſt, whether we conſider it in reſpect of its remittent character: its prolonged continuance: its intractable nature, or, the formation of the broad corneal circles, which, in courſe of time, conferred upon it ſo novel, and, peculiar a feature. To this latter circumſtance, however, I muſt, now, more eſpecially, confine attention, and, ſhall premiſe further obſervation upon it with the following remark by Mr. Wharton Jones:[1]—"By repeated congeſtions the ſclerotica is left in a ſomewhat altered ſtate, but, it is the cornea, or, iris which is, principally, the ſeat of the exudation of lymph, and, the changes conſequent upon it,—as the joints are in articular rheumatiſm."

It is well known that the continuance of inflammation interferes with thoſe conditions which are held to be eſſential to the due maintenance of the nutrition of the part so attacked. One of the earlieſt effects of the inflammatory proceſs is to render tranſparent parts opaque. To this proceſs, if acute, will

[1] Britiſh, and, Foreign Quarterly Review. Vol. xx.

ſucceed a ſoftening down, and, diſintegration of the textures invaded: or, if chronic, it may thicken, and, condenſe, or, enlarge, and, ſuperadd to them. The lymph effuſed may, by degrees, be abſorbed, and, the part reſume, proportionately, its normal functions. The exuded material may, however, remain, and, undergoing, or not, vaſcularization, becomes converted into new tiſſue: or, paſſing into low forms of fluid, or, ſolid is, now, to be regarded as *degenerate:* and, amongſt other phaſes determined in this degeneration, we recogniſe the *fatty*, and, *calcareous*. Now, in the inſtance under conſideration, might not the order of changes taking place be, probably, as follows:—conſequent on the frequent recurrence of a low grade of inflammatory action, involving thoſe veſſels from whoſe contents the cornea receives its nutritive ſupply, exudation takes place into the ſubſtance of this tunic, whilſt, the perſiſtence of the inflammation is inimical to the work of abſorption, and, repair, and, the cornea at the ſite of the exuded matter is rendered opaque. The fibrin of the lymph undergoes fatty degeneration, and, probably, too, the lymph corpuſcles become charged with oil. With reſpect to the elements of the cornea proper,—cells, and, fibres,—the former become, more or leſs, charged with fatty matter, and, the latter are rendered denſer, and, opaque, at the ſame time that they become more irregular in their courſe, and, more cloſely aggregated together.

I ſuggeſt, only, that the changes may, not improbably, be of the above nature; but, in the

abſence of immediate obſervation to ſubſtantiate this view, I am led to infer from analogy, only, though the inveſtigations of Strube,[1] made under the ſuperintendence of Virchow, upon the effects of inflammation of the cornea itſelf, and, purpoſely excited by cauſtic alkalis, might lead, perhaps, to modification of the opinion, here, advanced. Strube found that the changes conſiſted, in the firſt place, of ſwelling, enlargement of the corpuſcles, and, the multiplication, and, enlargement of the nuclei: the intercellular ſubſtance became clouded, and, even opaque, denſer, fibrillated, acquiring a ſtill more fibrous conſtitution, ſimilar to the ſclerotic: occaſionally, it was rendered more granular, or, finely molecular, as if dotted, and, in ſome caſes, even fat-molecules were ſeen in it. In many inſtances, theſe changes were permanent, conſtituting various kinds of opacity. This author adds:—"In two nebulous, human eyes which I examined, I ſaw ſimilar changes."

With regard to the oſſific depoſit (*a*) in one ſmall portion of the annulus in Dr. Mackenzie's caſe, it is to be obſerved, that, though the occurrence is rare, in ſo far as reſpects its connection with this fatty condition of the cornea, there are, nevertheleſs, numerous inſtances on record where calcareous degeneration has occurred in the part, and, the not unfrequent aſſociation of the two forms of change, in many other ſituations, is a matter of familiar obſervation, and, is, ſtrikingly, exemplified in the arterial ſyſtem. De-

[1] Loc. cit.

poſition of bone-ſalts is prone to take place in thoſe parts whoſe vitality has been conſiderably leſſened by previous morbid proceſſes within them; and, in the caſe of the eye, there is ſcarcely a part of the organ which has not been the ſubject of calcareous degeneration. The earthy matters depoſited conſiſt, for the moſt part, of phoſphate of lime, and, magneſia, and carbonate of lime, and, are generally, preſent as amorphous bone, or, miſ-ſhapen, and, ill-formed lacunæ may, ſometimes, be diſcovered in patches, and, plates of the calcified tiſſue. Valentin, and, Wagner have deſcribed, however, true oſſeous tiſſue in plates taken from the eye: and, more recently, the ſame obſervation has been made by Taylor,[1] Hulke,[2] and, Hart.[3]

"Oſſification, or, calculous depoſit," obſerves Dr. Mackenzie,[4] "is an occaſional ſequela of long-continued ophthalmia; and, indeed, it may be ſuſpected that, in all inſtances, and, in whatever texture of the body abnormal formation of bone takes place, it is preceded by a certain degree, or, kind of inflammatory action."

Vogel[5] mentions that in the Walterian Muſeum, of Berlin, there was a piece of cornea preſerved which had been converted into bone. Chelius[6] ſtates that

[1] Tranſ. Pathol. Soc. of Lond. Vol. vi, p. 300.
[2] Ibid. Vol. viii, p. 319.
[3] Ibid. Vol. xiii, p. 212.
[4] Loc. cit. p. 675.
[5] Handbuch der Patholog. Anatom. Vol. ii., p. 92. Halle, 1804.
[6] Uber der durchſichtige Hornhaut des Auges, p. 56. Karl, 1818.

in leucomata, of old ſtanding, it is not uncommon to find depoſition of phoſphate of lime. In the centre of an albuginious cornea of a ſoldier who had ſuffered from Egyptian ophthalmia, D'Arcet found, on diſſection, a very hard, brittle oſſification, about the ſize of a lentil, which implicated the whole thickneſs of the part, and, projected, ſlightly, towards the cryſtalline lens. The other textures of the eye were healthy.[1] In diſſecting an eye, of which no hiſtory could be obtained, Wardrop[2] found gritty particles, and, irregularities on the internal ſurface of the cornea.

Obſervation of caſes ſuch as I have deſcribed, teaches us that, where an arcus is eſtabliſhed as the reſult of diſeaſe, or, accident, it, not unfrequently, ſhows itſelf, at firſt, as larger, or, ſmaller ſpecks, or, ſpots towards the circumference of the cornea, and, which, by degrees, coaleſce to form an irregularly-ſhaped ſemi-circle, or, complete ring, the outer margin of which, however, is generally more defined than the inner one, which may be ſlightly undulatory, or, even, jagged. This inner margin, too, is commonly more ſharp than it is found to be in the arcus ſenilis, and, the colour, is, uſually, of a more denſe white than what is, ordinarily, obſerved in the aged arches. Often, the upper arch, alone, exiſts; and, when a lower one is, alſo, formed, it is, for the moſt part, the more ſlender one. Other peculiarities

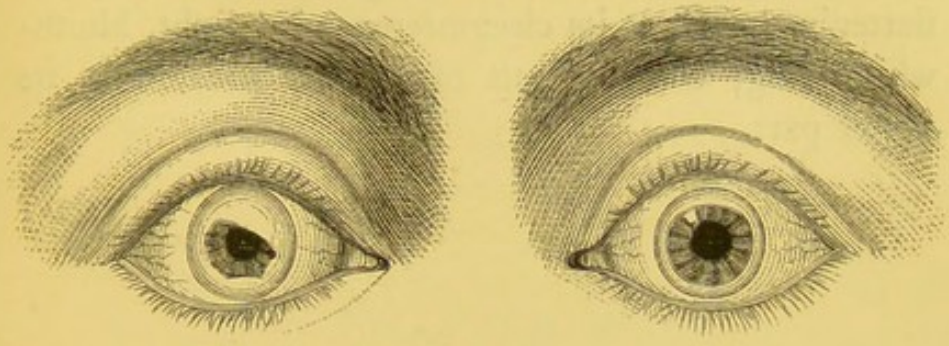
[1] Jour. Hebdom. de Méd. Sept. 19, p. 482. 1829.
[2] Loc. cit. Vol. i, p. 74.

are, that the arches are, very frequently, placed at a greater diſtance than uſual from the edge of the ſclerotica, and, the chief breadth of an annulus may be on the temporal, or, naſal ſide of the cornea,—moſt frequently, however, in the latter ſituation.

Since writing the above, the following caſe has been kindly brought under my notice by Dr. Hyde Salter :—Eliz. P——, æt. 53, a ſhort, rather ſtout woman, whoſe hair has been quite grey for the laſt ten years, and, with a countenance prematurely wrinkled, ſtates, that during the laſt three years ſhe has obtained a precarious livelihood by working with her needle, but, previous to that time, ſhe had a little property which was ſufficient for an humble maintenance.

When a child, ſhe ſuffered, ſeverely, from an attack of ophthalmia in the right eye, only, and was, for a long period, under treatment. Great fear was entertained that ſight would be, permanently, loſt; and, viſion was, at laſt, only partially, regained. Since this time no improvement has taken place; and, within the laſt ſix, or, ſeven years, the ſight has become, materially, worſe, ſo that, at preſent, ſhe ſees objects very indiſtinctly, and, is unable to read, or, write with the affected eye. Viſion, however, is good in the oppoſite organ, if aided by a lens. The right upper eyelid droops to the extent of entirely concealing from view the correſponding, clouded portion of the cornea :—

Fig. 16.



Since the occurrence of the diſeaſe by which the right eye was affected in childhood, the patient has never ſuffered from any further complaint in either organ, and, ſhe is quite ſure that recovery from the above attack had left the eye perfectly clear, and, it has remained so until within the laſt few years.

On examination of the right eye, a denſe white circle is ſeen to ſurround the cornea, but, having a tolerably clear zone of this tunic external to it. The colour of the former is, denſely, white, with a ſlight ochery tint admixed, in the upper part, from which there deſcends an opacity to the extent of covering the ſuperior portion of a moderately dilated pupil. The lower edge of this cloudineſs is tolerably well-defined, curvilinear, and, obliquely inclined to the naſal ſide of the cornea,—correſponding, accurately, to the degree to which the eyelid has dropped. The pupil, and, iris are, in appearance, normal; but, the motions of the latter are very ſluggiſh. The cryſtalline lens is unaffected.

The ſight of the left eye is good for reading, and, ſewing, when aſſiſted by a glaſs. The cornea is flattening, and, at its circumference is a light, bluiſh-white ring, with a depth of opacity greateſt at its upper part.

CHAPTER IV.

"Old age ſteals upon us by ſlow, and, imperceptible degrees, which, even when obvious to others, are, often, unknown to ourſelves. The changes which are going on, though inſidious, are not leſs real. Nature, when the ſyſtem is entruſted, wholly, to her laws, thus, kindly, ſmooths the path along which we deſcend the vale of life, and, conducts us, by eaſy ſteps, to our deſtined place of repoſe. But, the number of thoſe who, thus, gently, glide along the ſtream of years, is ſmall, indeed, compared with thoſe whoſe declining years are withered by infirmity, or, embittered by diſeaſe. The 'age that melts in unperceived decay' is, rarely, met with amidſt the numerous, and, diverſified cauſes of premature decrepitude to which man, in his civiliſed condition, is obnoxious."—ROGET.

OLD AGE *(ſenectus)* may be regarded as the period of natural decline; but, the particular time at which this decline commences is differently ſtated by various authors:—Hippocrates fixed it at ſeven times ſeven years, or, forty-nine; and, its termination, or, old age, at ten times ſeven, or, ſeventy years. Riverus ſubdivided it into three minor periods:—1, *ſenectus prima*, extending from the fiftieth to the ſixtieth year: 2, *ætas ingraveſcens*, from the ſixtieth to the ſeventieth: and, 3, *decrepitudo*, or, the days of labour, and, ſorrow mentioned by the pſalmiſt, and, which fill up the interval between the age of ſeventy,

and, the grave, when, as Reveillé-Pariſe[1] has expreſſed it:—"L'homme accablé par le vieilleſſe, briſé, plié par le temps, n'a plus les yeux tournés vers le ciel, ou, l'horizon, il reſte penché vers la terre, d'ou il ſort, et, où il va bientôt rentrer, vaincu par les années."

To determine, with accuracy, the time at which old age becomes extreme, and, thence, merges into decrepitude, were impoſſible when we conſider how imperceptible are the gradations from the one to the other ſtate,—how cloſely allied, and, curiouſly, interwoven are the links of time which form the intricate chain of exiſtence. The ancient doctrine of the diviſion of life into *ſeptenaries*, and, which was the reſult of the not leſs antiquated dogma of *criſes*, has paſſed away, and, more modern authors, in ſubſtituting other views, have, nevertheleſs, found themſelves conſtrained to inſtitute a certain arrangement of the ſubject which, though ſufficiently tenable in its broader phaſes of infancy, youth, manhood, age, old age, and, decrepitude, has been ſubmitted, yet, to ſuch refinement of ſubdiviſion as would tend more to confuſe than elucidate the enquiry. The ſeven ages, according to Hoffman[2] are, *Infantia*, to the end of the ſeventh year: *Pueritia*, to the fourteenth: *Adoleſcentia*, the twenty-firſt; *Juventus*, the thirty-fifth: *Virilis-ætas*, the forty-ninth; *Senectus*, the ſixty-third: and, *Decrepita-ætas*, to the end of life.

[1] Traité de la Vieilleſſe. Paris, 1853.

[2] Oper. om. Annor. Climact. Vol. v, p. 91. Genev. 1761.

Flourens[1] propoſes to determine the preciſe duration of each age, and, ſub-age, as follows :—For the firſt infancy, which extends from birth to the tenth year, this is infancy, properly ſo called : and, for the ſecond, from ten to twenty,—this is adoleſcence :[2] for the firſt youth, from twenty to thirty, and, for the ſecond, from thirty to forty : for the firſt manhood, from forty to forty-five, and, for the ſecond from fifty-five to ſeventy. Manhood, taken as a whole, is the period of ſtrength, and, as the word ſo well expreſſes it, the *virile* epoch of the life of man. At ſeventy, the firſt old age begins, and, continues to eighty-five, and, at eighty-five begins the ſecond, and, laſt.[3]

Some writers, as Dr. J. Johnſon,[4] and, Reveillé-Pariſe,[5] have compared the life of man to an arch ; and, Dr. Canſtatt,[6] in ſtating that old age is the period of natural decline, ſpeaks of plants, and, animals deſcribing an imaginary ſemi-circle. They com-

[1] On Human Longevity. Tranſl. by Martel, p. 24. Lond. 1855.

[2] Or, puberty. Strictly ſpeaking, puberty is only a very important phenomenon of adoleſcence.

[3] "But, for extreme old age which extends to eighty, or, one hundred years, it is ſo cold, and, dry, that thoſe which arrive at that decrepit age are troubleſome, harſh, touchy, froward, crabby, and, often, complaining ; until at length, deprived of all their ſenſes, tongue, feet, and, underſtanding, they doting return, again, to childiſhneſs,—as from the ſtaff to the ſtart."—Ambroſe Paré. Works tranſlated, p. 7. Lond. 1649.

[4] The Economy of Health : or, the Stream of Human Life from the Cradle to the Grave. Lond. 1836.

[5] Loc. cit. p. 9.

[6] Die Krankheiten des höheren Alters und ihre Heilung dargeſtellt. Erlangen, 1839.

mence from a vital point: are, gradually, evolved until they attain their climax, and, then, they as gradually decline to death. The ſegment of the circle from the climacteric point to death is old age, or, as this author terms it, the *Involution-period*, as the antagoniſtic ſegment is the *Evolution-period*. This involution-period is characteriſed, phyſiologically, by a return of the organiſm to the commencement of the evolution-period, although, its direct courſe is to its mother-earth. No one has written more beautifully, or, expreſſively on the ſubject of the declenſion of the life of man to his death,—ſymbolically, illuſtrating it by the decay, and, fall of a plant,—than Sterne:[1]—"If man eſcapes the danger which threatens his tender years, he is ſoon got into the full maturity, and, ſtrength of life: and, if he is ſo fortunate as not to be hurried out of it, then, by accident, by his own folly, and, intemperance,—if he eſcapes theſe, he, naturally, decays of himſelf,—a period comes faſt upon him beyond which he was not made to laſt. Like a flower, or, fruit which may be plucked by force before the time of their maturity, yet, cannot be made to outgrow the period when they are to fade, and, drop of themſelves: when that comes, the hand of Nature, then, plucks them both off; and, no art of the botaniſt can uphold the one, or, the ſkill of the phyſician preſerve the other beyond the periods

[1] Sermons, No. X. "Man that is born of woman is of few days, and, full of trouble. He cometh forth like a flower, and, is cut down: he fleeth, alſo, as a ſhadow, and, continueth not."—Job xiv, 1, 2.

to which their original frames, and, conſtitutions were made to extend. As God has appointed, and, determined the ſeveral growths, and, decays of the vegetable race, ſo, he ſeems, as evidently, to have preſcribed the ſame laws to man, as well as all living creatures, in the firſt rudiments of which there are contained the ſpecific powers of their growth, duration, and, extinction: and, when the evolutions of theſe animal powers are exhauſted, and, run down, the creature expires, and, dies of itſelf,—as ripe fruit falls from the tree, or, a flower preſerved beyond its bloom drops, and, periſhes upon the ſtalk."

Are we, then, to believe that a certain time is allotted to conſtitute the life of man?—can any determinate limit be aſſigned as the abſolute duration of human exiſtence? *Everything that lives is born dying*,—but, can we name, with any approach to certainty, the period when the vital energies ſhall have become, naturally, exhauſted, and, "the creature expire, and, die of itſelf?" A modern author,[1] unheſitatingly, replies to the queſtion which has engaged the anxious attention of many talented, medical philoſophers, and, avers that, "An individual would ſcarcely be ſuppoſed to be in poſſeſſion of common ſenſe, or, information, who would hope, by any modes of diet, or, any advantages of conſtitution, to exceed the age of a hundred." Haller,[2] who was very curious on the ſubject of longevity, and, moſt

[1] Cyclop. of Pract. Med., *art.* Medical Statiſtics. Vol. iv, p. 62.
[2] Element. Phyſiolog. Vol. viii, lib. xxx.

induſtrious in its inveſtigation, aſſigns the limit of human life to little leſs than two centuries. Hufeland[1] entertained the ſame opinion. Bacon[2] conſidered it to be a rule of nature that animals, in general, ſhould live eight times the number of years which is requiſite for the attainment of their perfect growth: and, on the belief that man arrives at complete maturity at twenty years, a ſtrong preſumption ariſes that the age of the human species might be extended to one hundred, and, ſixty years. Buffon[3] ſays:—"The total duration of life can be meaſured, in ſome ſort, by the period of growth. . . . Man increaſes in height until his ſixteenth, or, eighteenth year; but, the development of every part of his body, in ſize, is not completed till his thirtieth year. . . . Man, who is thirty years growing, lives ninety, or, a hundred years." The lateſt writer on this intereſting ſubject,—Flourens,[4]—teaches us that man was intended to accompliſh a hundred years of life. This aſſertion, that a century is the common human limit, is baſed upon the following circumſtance:—Children, and, other young animals, continue to grow until the epiphyſes, permanently, unite with the bone. After that period growth ceaſes. Calculate the number of years that have elapſed between the birth, and, this union, multiply it by five, and,

[1] The Art of Prolonging Life. Tranſl. by Wilſon, p. 88. Lond. 1853.

[2] Hiſtoria vitæ, et, mortis.

[3] Works. Vol. ii, p. 74.

[4] Loc. cit., p. 64.

the product gives the number of years the animal—human, or, brute,—is deſtined to live, unleſs chance, or, careleſſneſs, or, deliberately-made aſſault againſt the tenement of life, obviate the intention. The union referred to occurs, in the human being, at the age of twenty, and, 20 × 5 = 100: Q. E. D. The author proceeds to ſhow that the union of the bones, and, epiphyſes, takes place, in the camel, at 8 years old, and the camel lives, (commonly) to 40. In the horſe it takes place at 5, and, the horſe rarely ſurvives 25. In the lion, and, the ox, at 4, and, from 15 to 20 are their, naturally, allotted years, cut ſhort by hunters, and, human appetites. In the dog, the union of the epiphyſes, and, bone, takes place when it is 2 years old; in the cat, at a year, and, a half; in the rabbit, at twelve months; in the guinea-pig at ſeven. "Now," ſays the author, "the dog lives 10, or, 12 years; the cat, 9, or, 10; the rabbit, 8; and, the guinea-pig, from 6 to 7 years.... We have then, finally, a preciſe characteriſtic which gives us, accurately, the duration of growth; the duration of growth gives us the duration of life. All the phenomena of life are united by the following chain of relations:—the duration of life is given by the duration of growth; the duration of growth is given by the duration of geſtation; the duration of geſtation by the height, &c. The larger the animal the longer is the time of geſtation. The geſtation of the rabbit is thirty days; that of man is nine months; that of the elephant is, nearly, two years, &c."

In further conſidering this ſubject, the queſtions, naturally, ſuggeſt themſelves,—if man be deſtined to accompliſh a century of life, on what depends the fact that the majority of mankind die before the age of 70?—Is the cauſe to be found in peculiarities which the knife of the anatomiſt may diſcloſe, or, the needles of hiſtology unravel?—Can the pſychologiſt aid the inveſtigation in explaining the myſterious agency of mind on matter?—Muſt we look into the lives of parents for the ſeeds of death to the offſpring?—or, born with vigorous frame, and, healthy conſtitution, is the ſource of man's early death to be diſcovered in the operation of extrinſic circumſtances? To anſwer theſe queſtions, fully, were to write a volume; and, ſufficient has already been penned on "Health, and, Longevity," "The Art of Prolonging Life," &c. Suffice it, for my preſent purpoſe, that in this, and, the following pages, I glance, only, at the ſubject before us, in recalling to the reader's mind ſome of the more ſalient points of the enquiry.

The rules laid down by ſyſtematic writers for the attainment of longevity are very preciſe: and, there can be little doubt that, were they ſtrictly carried out, we ſhould, more frequently, have to notice the record of the deaths of centenarians than is, at preſent, the caſe:—the artificial lives we lead: the exceſſes we commit: the ſanitary laws we violate: the paſſions we indulge: the ſorrows we feel, &c., are ſo many corroding cares, which, in perpetually, undermining the ſtock of health with which nature has ſupplied

us, lead inſenſibly, but, ſurely, to the early tomb.[1] The reply of the Cardinal de Salis,[2] who died at the age of 110, when aſked what ſyſtem he obſerved, is replete with hygienic philoſophy :—" By being old when I was young, I find myſelf young, now, I am old." And it has been, aptly, remarked by Adam Ferguſon, that, if we are to live wiſely for the ſake of longevity, our ſyſtem is doubly fortunate : the end is good, and, the means are better. Even, if we miſs the end, we are happy in uſing the means. To the improvements, now, ſo rapidly gaining ground in the ſyſtems of education, and, which ſhould, in including, particularly, an acquaintance with the general anatomy, and, phyſiology of the human body, may we fairly look, as the ſtarting-point, for much of that information in the practical application of which will be found the ſureſt means for attaining longevity : and, inſtruction, in unfolding the reaſoning faculties, will bring in its train that due obſervation of, and, attention to ſelf, which, as Galen[3] remarks,—whether perſons underſtand phyſic, or not, by conſulting that

[1] " Danger, long travel, want and woe
Soon change the form that beſt we know;
And, deadly fear can time outgo,
And, blanch, at once, the hair :
Hard toil can roughen form, and, face,
And, want can quench the eye's bright grace,
Nor, does old age a wrinkle trace
More deeply than deſpair."—*Marmion.*

[2] Archbiſhop of Seville. 1785.

[3] De Sanat. Tuend. lib. v. c. 2.

" Is there anyone, in any ſituation of life, to whom it would not be a benefit to know ſomething of phyſiology ; of the functions of his own body ?—and, the influence which his bodily condition exerciſes over

reaſon, and, obſerving what agrees, and, what does not agree with them, like wiſe men, they may adhere to the uſe of ſuch things as conduce to their health, and, forbear everything which, by their own experience, they find to do them hurt: and, let them be aſſured, he adds, that by a diligent obſervation, and, practice of this rule, they may enjoy a good ſhare of health, and, ſeldom ſtand in need of phyſic, or, phyſicians.

It is a melancholy circumſtance, that, in our own profeſſion, there ſhould occur ſo few inſtances of longevity, and, it is curious, too, that men who are ſo well-informed on all the points which aid moſt in ſtrengthening the natural tendency to exiſt, ſhould ſo commonly be unmindful of ſelf-attention to thoſe very rules of prophylaxis which they, judiciouſly, enforce on their patients; and, whilſt dogmatiſing on the old adage of "prevention is better than cure," they preſent, in themſelves, but ſorry exponents of the value of their own counſel, and, entirely, overlook the trite maxim which ſhould remind them that "example is better than precept." Early ſtruggles for practice:[1] frequent expoſure to noxious effluvia,

thoſe moral, and, intellectual faculties by which he is diſtinguiſhed from the reſt of the animal creation? If it did not teach him how to cure himſelf, it might be uſeful for him to know how far diſeaſe may depart of itſelf, and, what are the limits of nature in this reſpect. To man, looking at himſelf, there is no art so important as that of underſtanding, and, managing himſelf."—Sir B. Brodie. Addreſs to the Royal Society.

[1] A phyſician in a great city ſeems to be the mere plaything of Fortune; his degree of reputation is, for the moſt part, totally caſual;

and, contagion: irregularities in meals: ſleep-broken nights, &c., are a few, only, amongſt many cauſes which tend to premature failure of the ſtaminal powers. Wear, and, tear of body, however, though playing a prominent part in this deadly havoc, is ſlight in its operation, when compared with the effects of that anxiety of mind, which, making unceaſing calls on the *vis vitæ*, is inſeparable from the honeſt fulfilment of thoſe onerous duties which the practice of our profeſſion entails:—"That ſenſe of reſponſibility," obſerves Thackrah,[1] "which every conſcientious practitioner muſt feel,—the anxious zeal which makes him throw his mind, and, feelings into caſes of eſpecial danger, and, difficulty,—break down the frames, change the face of hilarity to that of ſeriouſneſs, and, care, and, bring on premature age. As a

they that employ him know not his excellence; they that reject him know not his deficiency. By an acute obſerver who had looked on the tranſactions of the medical world for half a century, a very curious book might be written on 'the fortunes of a phyſician.'"—Dr. Johnſon. Life of Akenſide.

My readers will, doubtleſs, recollect what is related of Abernethy, who, having to deliver the introductory addreſs on the opening of a winter ſeſſion, looked round him on the upturned faces of the many ſtudents gazing at him, and, exclaimed with a look of compaſſion, "God help you all! What is to become of you?"

[1] The Effects of the Principal Arts, Trades, and, Profeſſions, on Health, and, Longevity, p. 91. Lond. 1831.

Neiſon, who read a paper before the Statiſtical Society of London (March 15th, 1862) on "The Rate of Mortality in the Medical Profeſſion," ſtates, that, in the courſe of his analyſis, he diſcovered that the ſocial condition of the members had an important influence on the rate of mortality, which rendered it, finally, neceſſary to exhibit the rate of mortality in connection with theſe conditions.—Quart. Jour. Stat. Soc. Vol. xv, p. 193.

profeſſion we are, by no means, healthy." Of medical men, in general, it may be truly ſaid:—*Aliis inſerviendo conſumuntur; aliis medendo moriuntur.* Caſpar, of Berlin, in eſtimating the influence of profeſſional avocations on longevity, calculates that clergymen are, on the whole, the longeſt, and, medical men are the ſhorteſt livers. This is in accordance with the opinion of Hufeland, who ſtates that the greateſt mortality prevails during the firſt ten years of the phyſician's practice. Bellefroid,[1] writing on the ſame ſubject, remarks:—"To lead a life which is to endure, one muſt be neither king, nor, beggar: have enough to ſatisfy the wants of nature, and, little that is ſuperfluous. He muſt be regulated by the rules, and, precepts of piety: poſſeſs but little imagination, and, as a conſequence, be but little troubled with the paſſions, and, vices. *He muſt not be a phyſician.*"

Comparatively early mortality in poets diſplays the conſuming force of fervent imagination; and, writers on natural religion, dramatiſts, and, noveliſts, are undiſtinguiſhed for age in the records of longevity.[2]

It will be found, on the other hand, that, the moſt remarkable inſtances of long life have occurred in thoſe who have been unnoted for particular intelligence, and, have moved in a comparatively humble

[1] De la durée de la vie humaine. Bulletin Médicale Belge. Aug. and, Nov. Bruſſels, 1839.

[2] "There is ſcarcely any book which does not ſavour of painful compoſition in ſome parts of it, becauſe, the author has written when he ſhould have reſted."—Pope Gangarelli.

ſphere of ſociety ; whoſe daily bread has been earned by toil, and, fatigue, in expoſure to the viciſſitudes of weather ; and, whoſe fare has been of a ſimple, and, frugal character. This, and, the preceding claſs of men well illuſtrate the Chineſe maxim :—*If a man's wiſhes be few his health will be flouriſhing : if he has many anxious thoughts his conſtitution will decay.*

Climate exerciſes a material influence on the length of life. Sweden, Norway, and, Denmark have furniſhed numerous examples of centenarians, and, ſupra-centenarians ; and, Ruſſia, in the preſent day, affords a longer liſt of perſons who have attained the age of a hundred than any other country. "However favourable," obſerves Hufeland,[1] "a northern climate may be to longevity, too great a degree of cold is, on the other hand, prejudicial to it. In Iceland, and, the northern parts of Aſia, ſuch as Siberia, men attain, at moſt, to the age of ſixty, or, ſeventy."

Hot latitudes are inimical to long life, and, various circumſtances might be mentioned, tending to the production, therefrom, of this, comparatively, early mortality. "In regard to the variety of races," remarks Dr. Millengen,[2] "it has been obſerved that thoſe perſons who ſooner attain pubeſcence are the ſhorteſt lived. Precocious excitement muſt bring on premature old age. Negroes ſeldom attain an ad-

[1] Loc cit. p. 76.

[2] Curioſities of Medical Experience, p. 45. Lond. 1839.

vanced period of life; and, the progreſs of years is more rapidly deſcried in their features, and, their form than in Europeans who have migrated to their clime. The negroes of Congo, Mozambique, and, Zanguebar, ſeldom reach their fiftieth year." There would ſeem to be little doubt but that the average duration of life is the ſame in the various races of mankind; but, a hot climate entails many circumſtances which exert a prejudicial influence on health, and, tend, materially, to ſhorten the period of human exiſtence. Sir J. Sinclair[1] quotes the following circumſtance from "Mémoires concernant les Chinois," in proof of the above ſtatement:—"When Kien Long, Emperor of China, in the year 1784, ordered all the old men in his extenſive dominions, through the greater part of which the climate may be denominated hot, to be collected together, yet, only four could be diſcovered who exceeded a hundred years of age, and, perhaps, the age of ſome of theſe might not be, properly, authenticated. Theſe old men were aſſembled that the Emperor might ſhow them ſome marks of his parental benevolence." In ſuch eſtimation are thoſe held by the Chineſe who exceed the age of a hundred years, that triumphal, or, honorary arches are erected to them,—their large age being conſidered as a proof of a ſober, temperate, and, virtuous life. One of their own maxims is:—*Virtue is the ſureſt road to longevity: but, Vice meets with an early doom.*

[1] The Code of Health, and, Longevity. Vol. i, p. 69. Eding. 1807.

There are, yet, ſome points to be taken notice of in conſidering, fully, this ſubject,—*e. g.*, parentage, ſex, the married ſtate,[1] &c.; but, the ſcope of theſe obſervations will not require more than a ſhort ſpace to be devoted to each of them.

Inaſmuch as, children, commonly, inherit various peculiarities which diſtinguiſh their parents, it is, naturally, to be expected that longevity would form no exception to ſo general a rule, and, it is, hence, found that many remarkable inſtances are recorded where great length of years have,—ſo to ſpeak,—been engrafted on the offspring. Eaſton's[2] curious work on longevity affords us numerous examples. The correctneſs of the converſe of this propoſition, too, is generally acknowledged: and, in the eſtimation of life by Aſſurance Societies, ſuch circumſtances are always, prudentially, enquired into, and, duly weighed in the ſcales of *probability*. I may add, moreover, that amongſt the queſtions required to be anſwered by the medical adviſer to the Company, there is, now, introduced, ſometimes:—"If an *arcus*

[1] "In the courſe of my enquiries I met with only one perſon beyond eighty years of age who had never been married. I met with ſeveral women who had borne 10 to 20 children, and, ſuckled them all. I met with one woman, a native of Herefordſhire, in England, who is, now, in the 100th year of her age; who bore a child at 60; menſtruated till 80, and, frequently ſuckled two of her children (though born in ſucceſſion to each other,) at the ſame time. *She had paſſed the greateſt part of her life over a waſhing-tub.*"—Ruſh, B., M.D. Med. Enquiries, and, Obſ. Vol. ii, p. 299. Philadel. 1793.

[2] Saliſbury, 1799. *Vide*, alſo, Lejoncourt. Galerie des Centenaires. Paris, 1842; and, Bailey, Records of Longevity. Lond. 1857.

round the cornea? If ſlight, or, well-marked?" and, I ſhall, hereafter, offer the details of caſes which preſent us with inſtances of thoſe who have lived for more than a hundred years without the eſtabliſhment of this ſign; and, adduce examples, on the other hand, where it has ſhown itſelf as a complete circle in the eyes of thoſe who have not attained to the moiety of that age. In the latter caſes, likewiſe, I have proved, by diſſection, that the ſame form of change,—when it has invaded the eye to the extent I have now mentioned,—has, alſo, involved important internal organs. Beyond this, it will be ſhown, in one example of a centenarian, that, with the abſence of this ſign *without*, the changes *within* were wanting: whereas, we well know that, under the ordinary circumſtances of age, a definite ſet of ſenile metamorphoſes may be, almoſt confidently, looked for, on *poſt-mortem* examination. So curious, and, ſtrong a contraſt preſents a wide, and, intereſting field for ſpeculation, but, I muſt defer the remarks I ſhall have to offer on this important ſubject for future pages, adducing, for the preſent, the following caſes:—

In the year 1851, I had frequent opportunity of ſeeing, and, converſing with an intereſting old man,—James Coleman, then, *a hundred and one years of age*,—who lived in the pariſh of St. Martin's-in-the-Fields, where he was born on St. Valentine's Day, 1750. He died at the age of 103. Publiſhing, at this time, ſome obſervations on the Arcus Senilis, I referred to him as one "poſſeſſing all his faculties,

and, enjoying a *green old age*, in quietude, and, comfort; he may, ſtill, be ſeen, taking his daily ſtroll,—a happy, healthful centenarian,—fairly gainſaying the poet's dogma that 'life protracted is protracted woe.' Simple food has been his conſtant diet, water his invariable beverage, and, ſickneſs has, ever, been to him an utter ſtranger. Though the lack-luſtre, and, ſunken eye tells, unerringly, the tale of declining life,—though the dilated pupil, tinged lens, and, waning ſight, truthfully, beſpeak accumulated years,—the ſenile zone, withal, has added but the ſlighteſt teſtimony, in corroboration of ſuch unimpeachable evidence of the ravages committed by the hand of Time."

A year after theſe remarks were printed, a ſhort account of this old man's life was, privately, publiſhed and, circulated, with a view to procure him ſome additional, pecuniary aid from the ſale of copies of it. Believing that a few particulars will not be unacceptable to the reader, I make the following extracts from the hiſtory:—Coleman received his education at Archbiſhop Teniſon's School, and, was apprenticed, when very young, to a Mr. Sherborn, a writing engraver.

He has been married twice, and, been the father of twenty-one children,—ſix by his firſt wife, and, fifteen by his preſent partner, who is ſtill living, at the advanced age of eighty-ſix. The venerable pair have been married for ſixty-three years, and, they have ſurvived all their children, with the exception of four, whoſe ages are ſeventy-five, ſixty-nine, ſixty,

and, thirty-ſix. They cannot tell the number of their grandchildren, but, they know of nine great-grandchildren.

Coleman has lived all his life in the pariſh of his birth, and, knows but little of the external world: his moſt diſtant wanderings not having extended beyond *one* voyage to Graveſend, and, journey back to the great metropolis by ſtage-waggon, ere ſteam-packets had been thought of, or, locomotives had diſturbed the dreams of the boldeſt ſpeculator.

It, almoſt, ſavours of the marvellous to be in the preſence of one who can converſe with you on events which paſſed in the times of George II, and, III; one who has lived, therefore, through the entire reign of the latter monarch, the longeſt recorded in modern hiſtory, *viz.*, ſixty years.

How changed muſt all appear to him! In the days of Coleman's youth, the neighbourhood where he, now, reſides (5, White Hart Court, Caſtle Street, Leiceſter Square) was the moſt faſhionable in London; for, the manſions of Leiceſter Square were the dwellings of royalty, and, nobles. Sedan-chairs crowded the open ſquares, and, joſtled the humble, and, wondering crowd: greaſe-pots, and, ſmoking flambeaux ſupplied the place of modern gas. Men ſpent the beſt part of their morning in powdering their heads, and, arranging their tails; whilſt the fair ſex threw the latter appendages of their lords into the ſhade by the length, and, beauty of their brocaded trains, or, the extent of their gay, and, ſpreading hoops, in addition to their own powdered heads,

from which the barbarous compound fell like ſleet before a winter's cloud.

Coleman, when a boy, ran away from ſchool to witneſs the funeral proceſſion of George II, in November, 1760. In all probability, the mournful ceremony failed in moving one ſo very young, and, light-hearted to tears, ſo, his preceptor inſured his paying this tribute to the memory of the departed King, by means of a ſound flogging, adminiſtered for his unauthoriſed, and, uninvited attendance at the obſequies.

Let us, however, conſider poor Coleman as he is, at the preſent time; remarkable by his great age, and, his fine, and, venerable appearance. He is ſtill hale, and, hearty; in the full poſſeſſion of all his faculties, and, enabled to go out, and, employ his time in uſeful, and, remunerative occupation, ſo as, mainly, to ſupport himſelf, his wife, and, an afflicted ſon.

The old man is employed by ſome of the houſes at the Weſt End of London, in lettering their caſes, canvas-coverings, &c., which he executes with great ſkill, and, boldneſs, making only partial uſe of the old-faſhioned glaſſes which he generally wears, and, which are in good keeping with his fine, and, venerable countenance.

Coleman, as I have already ſtated, died at the age of 103 years,—"gather'd, not harſhly pluck'd, for death mature,"—retaining, to the laſt, the *youth of old age*, as the French, happily, expreſs it. No particular form of ailment marked his decline, and,

demiſe, and, he appears to have realized, in his end, the deſcription which Dr. Carpenter[1] has, ſo ably, ſketched of death from natural decay —"When neither diſeaſe, nor, accident, ſhortens what may be conſidered the normal term of life, there is a gradual diminution in every kind of vital activity, until it, entirely, ceaſes: the formative power ſeems, progreſſively, to exhauſt itſelf, until, no aſſiſtance from artificial heat, no ſupport of the moſt nutritious food can, any longer, avail for the generation of new tiſſue: and, the nervo-muſcular energy, gradually, declines, until, at laſt, even thoſe actions on which the circulation, and, reſpiration entirely depend, can, no longer, be performed, and, with the ceſſation of theſe functions, the life of the entire organiſm becomes extinct."[2]

In January, 1851, a large, well-built man, aged 103 years, died in Greenwich Hoſpital, and, who, a week previouſly, having ſtumbled in walking, fell down: though no local injury was ſuſtained, the general ſhock to the ſyſtem was ſo ſevere as to oblige him to take to his bed, from which he never again roſe, having gradually ſunk, without complaint, and, ſhowing no appreciable ſigns of diſeaſe. "He had enjoyed" (continues the Report of Dr. Beith, R.N., in the Tranſ. of the Pathol. Soc. of London, Feb.

[1] Principles of Human Phyſiology. 4th ed. p. 131. Lond. 1853.

[2] "If there was a country where men led natural, and, virtuous lives, neither pain, nor, diſtempers would be known; death would ſteal on men like a ſleep, in conſequence of no other cauſe than a gradual, and, unavoidable decay."—Dr. Price On Annuities. 5th ed. Vol. ii, p. 242.

4th, 1851,) "during his long life, an, almoſt, uninterrupted continuance of good health, and, his faculties were unimpaired to the laſt. His ſight was good, hearing acute, and, memory tenacious. He walked long diſtances, and, with comfort, until the time of his accident,—he might, indeed, be looked upon as a hale, hearty, old man. Dr. Beith ſtated that he thought it might be intereſting to the Society to learn, that, in connection with this lengthened term of life, and, continuous excellence of health, the body preſented, after death, an univerſally normal ſet of organs, with the ſingle exception[1] he had placed before the Fellows; and, that the indication we, ſo ordinarily, look upon as ſignificant of age,—*the arcus ſenilis—was wanting.*"

To the kindneſs of Dr. Beith I am much indebted for the opportunity of diſſecting the eyes, larynx, and, heart of this old man; and, not leſs

[1] "The bladder was ſeen to be much enlarged in capacity, with greatly thickened walls, which, in ſome parts, preſented a columnar arrangement. An opening, of ſmall ſize, at the inferior fundus, led from the cavity of the viſcus into a large pouch, which contained a thick, fœtid, greeniſh-yellow fluid, and, the parietes of the cyſt were in a ſloughy ſtate. A communication exiſted between this pouch, and, an abſceſs ſituated between the bladder, and, pubes. The proſtate gland was conſiderably enlarged, irregular in form, and, of a ſcirrhous hardneſs. On ſection of it, ſeveral, browniſh calculi, varying in ſize from a poppy to a millet-ſeed, were ſeen, occupying the ducts. On inſpection of the neck of the bladder from within, the gland is ſeen to project in a circular, and, lobulated form. The urethra preſented, cloſe to the bulb, the orifice of a falſe paſſage; and, a ſecond one exiſted nearer the proſtate: theſe led into ſinuſes which extended backwards, and, communicated beneath, and, at the ſides of the gland, with a large, open-worked, cellular cavity."

obliged am I to Dr. R. Quain, who, carefully, examined the latter organ, and, thus, reported upon it:—The *Heart*, cleanly waſhed, weighed fourteen ounces, avoirdupois; the colour, denſity, and, general appearance of its walls gave the character of a vigorous, well-developed organ. Except towards the apex of the left ventricle, and, which is rather pale, and, ſoft, the muſcular parietes have a good colour, a fibrous character, and, a firm conſiſtence. The walls of both ventricles are thick, but, they are not, diſproportionately, ſo. The endocardium is thick, but, uniformly, ſo, and, though ſomewhat opaque, is not ſo irregularly, nor, in patches. The pericardium is thick, opaque, and, there are ſome apparently old, but, flexible adheſions. The fat is in moderate quantity, and, in the uſual ſituations. All the valves, of both ſides, are free from diſeaſe, or, depoſit. There are a dozen, or more, ſmall ſpots of depoſit beneath the portion (two inches) of the arch of the aorta which remains attached. The coronary arteries are not obſtructed. At two inches from the origin of the left coronary branch, the veſſel is ſurrounded by a ring, two lines in breadth, of a firm, yellow, atheromatous matter; and, four inches, and, a half from the origin of the right coronary artery, a patch of the like depoſit occurs. The calibre of each veſſel is, ſlightly, diminiſhed at theſe points. The muſcular tiſſue from the baſe of each ventricle preſents the characters of well-developed fibre, in a remarkable degree,—the croſs-markings are, rarely, found to be ſo diſtinct in the fibre of the heart.

Amongſt thoſe of the left ſide, a few may be ſeen preſenting the characters of fatty degeneration, in a ſlight degree,—that is, the contained particles of fatty matter are few; but, what is very remarkable, they are, exceedingly, diſtinct, and, well-defined. Fibres taken from the apex of the left ventricle, preſent a greater number containing particles, and, theſe, themſelves, are increaſed in quantity, but, not, however, to any amount. The only part which preſents the change in any marked degree, is the right *columna carnea* of this ventricle; in it, alſo, ſome minute arteries can be ſeen quite blocked up. The fibres from the baſe of the right ventricle are quite free from degeneration; and, very little exiſts in a pale-looking *trabecula* towards the apex of the ventricle. *On the whole, I ſhould ſay, that the amount of change is not ſufficient to interfere with the function of the organ.*

I am, at preſent, well acquainted with a gentleman whoſe age is *ninety-three years*, and, who, for a long period, was phyſician to a London hoſpital. Though preſenting many of the external characteriſtics of ſenility, his intellectual faculties are perfect:[1] he, occaſionally, writes a long letter to a friend in

[1] This gentleman preſents a remarkable illuſtration of that curious appearance which may, occaſionally, be noticed at the upper part of the ſkull in aged perſons,—viz. depreſſions, more or leſs numerous, and, extended. In general, they are, ſymmetrically, diſpoſed, and, correſpond, only, to the parietal bones. It ſeems as though the external table of the ſkull had become, here and there, depreſſed, whilſt, the intervening parts of this table retained their natural level. Rokitanſky ſtates that the diploe ſhrinks to ſuch an extent that the two compact tables unite

claſſical Latin: his memory,—which, in elderly perſons, generally, is prone to become impaired,—is perfect, and, the only blunted ſenſe is that of hearing. *The arcus ſenilis is preſent, in each eye, as a mere trace in the upper, and, lower ſegments of the corneæ.*

I have lately ſeen, in the St. Martin's-in-the-Fields Workhouſe, a female whoſe age is *eighty-two years.* She has never been married, and, ſince her girlhood, has, always, been employed as a domeſtic ſervant. Her health has been ſo invariably good, that ſhe has never had occaſion to keep her bed. She is tall, ſpare, and, perfectly erect in her carriage: hair grey, and, all the teeth have been loſt. Her voice is clear, and, the ſpeech, unheſitating: memory excellent: hearing, ſmell, and, taſte, unimpaired; can read without ſpectacles, and, *there is not, even, a veſtige of the arcus ſenilis.*[1]

with one another, and, conſtitute a tranſlucid layer, not thicker than a ſheet of paper.

In the preſent inſtance, this change commenced about ten, or, twelve years ago, beginning at the vertex, and, ſhowing, firſt, a ſubſidence which included a portion of each parietal bone: from that time other depreſſions, cloſe by, and, around the original one have occurred, and, which, joining by degrees, more or leſs, with one another, and, that firſt formed, give, now, a generally depreſſed ſurface, in which are ſmaller pits, and, broad impreſſions, with, more or leſs, elevated, and, ſmooth parts intervening,—ſo that, over a ſpace compriſed between the coronal, and, lambdoidal ſutures, and, extending laterally to the diſtance of two inches, on each ſide, from the median line, the whole ſurface exhibits an undulating condition.

Rokitanſky remarks:—"It appears to me not improbable that this ſtate has ſome connection with inveterate ſyphilis." The above illuſtration is a notable example to the contrary.

[1] In this workhouſe, I find that of 367 inmates, 236 have attained the age of 60:—of these 157 are females, and, 79 males. The greateſt

Dr. B. Lee[1] has placed on record the following caſes :—A female, æt. 77 years, exhibits comparative vigour,—no dyſpnœa, nor palpitation,—heart-ſounds, perfectly, normal, and, this with the entire abſence of any properly-marked ſenile arcs. A certain old Peggy Munſon, too, has fallen under my notice, whoſe head the ſnows of ſeventy winters have not ſucceeded in whitening; and, who, although ſomewhat crippled by inflammatory rheumatiſm, exhibits not the leaſt ſign of cardiac difficulty, and, enjoys a more than ordinary degree of health, whilſt, her corneæ are almoſt free from the ſtamp of age.

Dr. Lionel Beale[2] is acquainted with a lady, upwards of ninety-eight years of age, in whoſe corneæ the arcus ſenilis appears to have, only juſt, commenced.

About five years ago, I had the opportunity of examining the eyes of the oldeſt inmates of the Chelſea Hoſpital, and, found the arcus to be entirely

age attained by a male is 88; whereas, two females have paſſed that age, one being 89, and, the other 91.

The average age of the males is $69\frac{47}{75}$, and, of the females $69\frac{126}{182}$, or, very nearly the ſame.

With regard to the relative longevity of men, and, women, it has been very truly remarked by Hufeland (l. c. p. 84)—"More women than men become old; but men, only, attain to the utmoſt extent of longevity. The equilibrium, and, pliability of the female body, ſeem, for a certain time, to give it more durability, and, to render it leſs ſuſceptible to injury from deſtructive influences. But, male ſtrength is, without doubt, neceſſary to arrive at very great age. *More women, therefore, become old; but, fewer, very old.*"

[1] Loc. cit. p. 176.

[2] Dublin Med. Preſs.

wanting in fifteen inſtances, where the ages varied from 68 to 96, incluſive. One man had arrived at the age of *one hundred, and, five years*, and, he preſented a very faint circle, only, of fatty degeneration in each cornea.

CHAPTER V.

"*La vieilleſſe ne part pas d'une organe. Ce n'eſt point un phénomène locale, c'eſt un phénomène général. Tous nos organes vieilleſſent. Il y a plus; ce n'eſt pas, toujours, ſur le même organe que ſe font ſentir les premiers effets de la vieilleſſe; c'eſt tantôt ſur l'un, tantôt ſur l'autre, ſelon la conſtitution individuelle.*"—FLOURENS.

IN deſcribing the changes that take place in the eyes of elderly people where the arcus ſenilis is completely formed, I referred to ſimilar alterations which may be found aſſociated with this appearance, viz.—fatty degeneration of the muſcles of the eye-ball: atheroma of the ophthalmic arteries, &c., and, I propoſe, now, to conſider, further, certain other ſtructural leſions, at the ſame time, preſent, in the bodies of the aged, illuſtrative, likewiſe, of that form of degeneracy which has implicated the cornea;—a degeneracy, indeed, which has, not uncommonly, ſo involved, at this period of life, the tiſſues, more or leſs, generally, as to be conſidered as characteriſtic of age in an anatomical, as the conſequent enfeeblement of function of theſe parts is ſo regarded, in a phyſiological ſenſe.[1] It is not, of courſe, here implied that

[1] "§ 887. In corpore ſenili ſolida ſicceſcunt, tubuli concallent

that to age, alone, ſuch changes attach ; for, diſeaſe may, equally, induce them long ere the body has become old (according to years), and, theſe peculiarities may be diſplayed in a part ſingly, or, where with that undermined condition of the health which abiding diſeaſe, ſo often, engenders, the nutrition of the body fails, an all-pervading implication of texture enſues,—it may be, many years, even, before the meridian of life has been attained : Mr. Barlow[2] has well obſerved :—" Diſeaſe anticipates the ravages of time; the young, as to years, became old as to ſtructure."

Not only, however, are theſe changes to be, frequently, traced to the preſence of ſome intractable affection which has attacked, eſpecially, an important viſcus, and, entailed, in its continuance, a degenerate ſtate of other parts of the body : for, in comparatively early life, the ſyſtem may ſuffer, ſeverely, from the inroads of fatty degeneration, gradually, ſucceeding to the impairment of the *vis vitæ*, dependent on prolonged mental anxiety, and, diſtreſs, induced through the cares, and, viciſſitudes to which ſo many are expoſed : or, that continued taxation of the phyſical energies which is the, not infrequent, lot of ſome whoſe bodily ſtamina is unequal to the protracted exertion,—*degeneracy*, *and*, *death* too often

nervi marcent, vis vitæ ac movendi ſentiendique facultas elangueſcit, circulatio torpet, calor nativus defervet, excretiones tardeſcunt, humores mucoſa, ſalina, terrea fece impuri, ſubtilioris materiæ defectu vappidi, vitiantur."—Gaubius. Inſtitut. Patholog. p. 475. Venet. 1766.

[2] Loc. cit. p. 6.

follow, ſlowly, but, ſurely, in the track of *wear, and, tear* of mind, and, body.

Inſtances of premature agedneſs, originating in the above cauſes, will be adduced, hereafter: but, I propoſe, now, to confine my attention, more eſpecially, to a conſideration of the altered condition of ſome of the tiſſues of the body, in old ſubjects, co-exiſting with a well-marked annulus ſenilis.

So juſt is the above-quoted obſervation of Flourens, that I ſhould experience ſome difficulty in the adoption of any order whereby to arrange the following account, but that, analogy ſuggeſts a reference, in the firſt place, to the cartilaginous tiſſue,—an analogy, which, in reſpect of theſe textures, cornea, and, cartilage, may be, thus, ſtated:—they enter into the compoſition of, ſo-called, *cavities*, and, are firm, and, reſiſtent: but, withal, flexible, and, elaſtic: a large number of nucleated cells exiſt in both:[1] each, in its earlier, or, formative ſtages, is vaſcular, but, becomes wanting in blood-veſſels, ſubſequently, and, is now, dependent for completion of growth, and, the maintenance of nutrition, on the copious arterial ſupplies, immediately, adjacent: no lymphatics are diſcernible in either ſtructure though Phyſiology, and, Pathology lead us to infer their exiſtence in both: cornea, and, cartilage are in cloſe contiguity with a fluid, and, fibrous tiſſue; and, the cornea, like cartilage, yields chondrin on boiling.[2]

[1] Virchow. Verhandlungen de Phyſik-med. Geſell. in Würzburg, b. ii, p. 150. Erlang. 1851, *and*, Die Cellularpathologie, p. 271. Berlin, 1858. Strube, loc. cit. His, loc. cit.

[2] *Vide* Müller in Poggendorff. Annalen. Vol. xxxviii, p. 513.

Whilſt drawing the above parallel, I am not unmindful of certain points wherein cornea, and, cartilage differ,—a diſſimilarity, however, which does not affect the main queſtion, inaſmuch as, modification of function, often, neceſſitates a modification of ſtructure in tiſſues which are, otherwiſe, cloſely allied. The cornea has an intra-nervous ſupply, whilſt, no nerves are traceable within cartilage: the intercellular ſubſtance of the former is tranſlucent, and, fibrous, but, that of the latter is opaque, and, homogeneous. Cartilage is ſupported by bone: not ſo, however, the cornea,—at leaſt, in man,—though in many fiſhes, birds, and, reptiles, oſſeous plates exiſt in the anterior part of the ſclerotica, and, which, in extending themſelves forwards, conſtitute a ring that ceaſes on junction with the circumference of the cornea.[1]

It is to the changes taking place in the cartilages of the ribs, and, larynx, that I have, more particularly, directed my attention. Theſe parts are well known to become oſſified, to a greater, or, leſs extent, as age encroaches, whilſt, the period at which the alteration commences, and, the rapidity of its progreſs, will, in a great meaſure, depend on thoſe *general* circumſtances which are acknowledged to influence the acceſſion, and, regulate the courſe of ſenile metamorphoſes in other organs of the body. Certain cauſes, however, of a *local* character, in many inſtances, induce a premature oſſification of theſe ſtructures, as when *phthiſis laryngea* brings in its

[1] Some extinct creatures, too, *e. g.*—the Ichthyoſaurus, poſſeſſed theſe ſclerotic oſſicles.

train this condition of the thyroid, and, cricoid cartilages; or, the perichondrium is irritated, from without, by the continued preſſure of a bronchocele. "The cricoid, and, thyroid cartilages," obſerves Dr. Williams,[1] "naturally, become oſſified in advanced life; but, chronic laryngitis, of two years' duration, produces the ſame change in young perſons. This is in conformity with a law, well developed by Andral, that a certain degree of irritation accelerates in tiſſues thoſe changes to which time would, naturally, bring them."

Particular cartilages of the ribs may undergo this bony converſion before age has arrived to harden them, where they lie in the vicinity of diſeaſed portions of lung, or, pleura; and, it is a matter of almoſt familiar obſervation, that, in caſes of phthiſis, the coſtal cartilages are prone to become, thus, altered. Otto[2] remarks:—"Extenſive oſſification of the cartilages of the ribs, eſpecially in the form of little bony plates, and, ſcales, in the membrane of the cartilages, I found common, particularly, in *conſumption*, and, alſo, in tubercular diſeaſe." Andral[3] ſays:—"It has been obſerved, that, in phthiſical patients,

[1] Library of Medicine. *art.* Laryngitis. Vol. iii, p. 48.

"It is an old, and, intereſting obſervation, that oſſification is apt to be induced in cartilages by the occurrence of inflammation in their vicinity; but, it takes place, only, in thoſe cartilages which, by their phyſiological conſtitution, are wont to oſſify, ſuch as the cartilages of the ribs, and, larynx. Rokitanſky. Vol. iii, p. 279.

[2] Compendium of Human and Compar. Pathol. *tranſl.* by South, *note* 25, p. 308. Lond. 1831.

[3] A Treatiſe on Pathol. Anatom, *tranſl.* by Townſend, and, Weſt. Vol. i, p. 369. Lond. 1829.

the cartilages of the ribs, and, larynx are, prematurely, oſſified, and, I have, myſelf, remarked the oſſification of the naſal foſſæ, and, the ſurrounding perioſteum in glandered horſes." Laſtly, I ſhall take occaſion to point out, that, in many inſtances, where fatty degeneration affects, prematurely, various other organs of the body, as the eye, the heart, the arteries, &c., it is, not unfrequently, to be found that the cartilages I ſpeak of have ſhared in the ſame change, and, in many parts, have become *oſſified*, or, in other words, have ſuffered the *calcareous degeneration.*

Oſſification of the coſtal cartilages is, very generally, regarded as one of the attributes of age, and, we are accuſtomed to conſider the extent to which this change has proceeded, as a meaſure, in ſome degree, of the years a perſon ſhall have attained to. The ſame obſervation applies, equally, to this condition of the laryngeal cartilages. It muſt be borne in mind, however, that ſuch alterations of texture have, not uncommonly, been found to be very tardy in their progreſs, and, calcareous degeneration of theſe parts is diſcovered after death, in ſome remarkable inſtances of longevity, to have affected the true cartilages to a comparatively ſmall extent, only ;

The ſame ſtatement is made by Béclard :—Elements of General Anatomy, *tranſl.* by Knox. p. 248. Eding. 1830.

" Coſtarum quatuor ſpuriarum lateris dextri partes anteriores cum portione earundem cartilaginum, et ab interiore appoſita lamina oſſea, ex cadavere militis, phthiſi pulmonali atque aſthmate mortui."—Sandifort, G. Mus. Anatom. Vol. iii, p. 228. No. CMLXXX. Lugd. Bat. 1827.

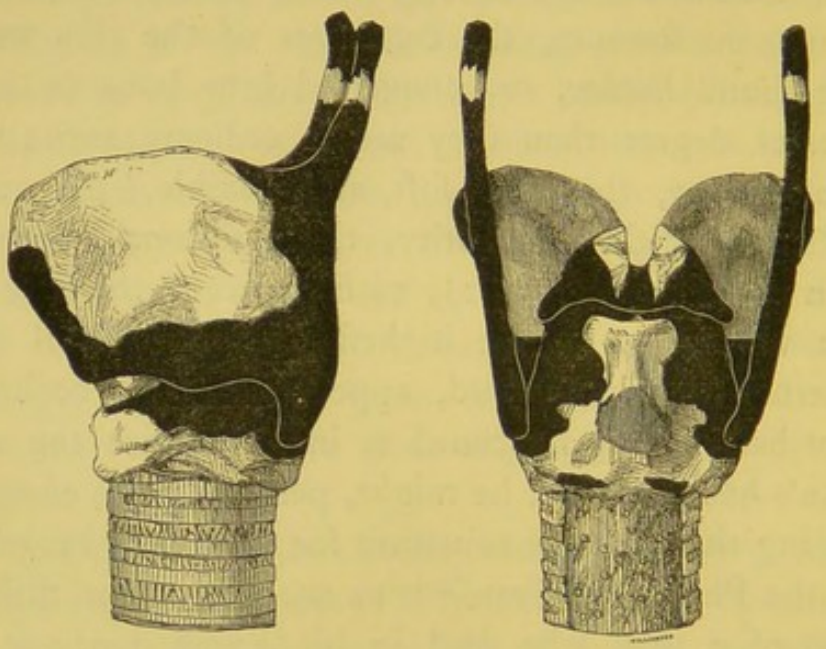
thus, Harvey,[1] in his account of the autopſy of Parr, who died at the age of 153 years, ſtates, that, "in raiſing the ſternum, the cartilages of the ribs were not found harder, or, converted into bone in any greater degree than they are in ordinary men; on the contrary, they were ſoft, and, flexible." In connection with this peculiarity, the additional obſervation of Harvey (p. 591), with reſpect to the ſtate of the viſcera, is of the higheſt intereſt:—"All the internal parts, in a word, appeared to be ſo healthy, that had nothing happened to interfere with the old man's habits of life, he might, perhaps, have eſcaped paying the debt due to nature for ſome time longer." In the Philoſoph. Tranſ.[2] is an account of the diſſection of a man who died in his 130th year: it is remarked that:—"The cartilages of his ſternum were not harder than they uſually are."

With regard to the ſtate of the ſkeleton of the larynx in the aged, I may, here, mention that I found all the cartilages compoſing it,—with the exception of the epiglottis,—affected by calcareous degeneration to no greater degree than I have, frequently, ſeen them to be at the age of fifty, in the inſtance of a man who died in his hundredth, and, third year, and, who, until the period of his death, (which was due to an accident,) had enjoyed an almoſt uninterrupted immunity from diſeaſe. The viſcera in this man were, alſo, healthy (p. 92):—

[1] Work. Syd. Soc. tranſl. p. 200.

[2] No. 306, p. 2247. The diſſection was made, and, an account of it drawn up by Dr. J. Keil.

Fig. 17.[1]



Before indulging in ſuch reflections as the above, and, other ſimilar caſes ſuggeſt, I ſhall endeavour to deſcribe the general, and, hiſtological characters preſented by oſſification of the parts, now, eſpecially referred to: and, firſt of the *Coſtal cartilages.* They become ſooner bony in the male than in the female, and, that which attaches the firſt rib is, thus, changed earlier than the others. Thoſe of the falſe ribs are the laſt in the ſeries to oſſify. The oſſification takes place both within the cartilages, and, at their ſurface; though, the rate of progreſs of the change is quicker in the latter than in the former ſituation, where the calcareous material is, at firſt, laid down in

[1] The black parts indicate thoſe which are oſſified.

larger, and, ſmaller pieces: whereas, beneath the perichondrium it is, moſt frequently, lamelliform.

I have been, frequently, ſtruck with the ſymmetry of this converſion, as regards the two ſides of the thorax, and, it recalls to mind a parallel obſervation made by Bizot[1] in reſpect of the arterial ſyſtem when affected by fatty, and, calcareous degeneration. The analogy is rendered ſtill cloſer on my finding that thoſe portions of the cartilage which have not, as yet, ſuffered, but, are in cloſeſt proximity to the bony transformation, have, alſo, become, to a great extent, affected by fatty degeneration.

When oſſification of the coſtal cartilages is complete, the bony matter becomes identified with that of the correſponding rib; but, there is, commonly, a ſurface-line, or, groove, to mark the place of junction with the ſternum. The firſt rib, however, frequently, preſents an exception to the latter part of this obſervation. It is remarked by Kölliker:[2]— "The oſſification is, ſometimes, more limited, ſometimes, more extenſive. In the former caſe, it does not proceed further than to the incruſtation of the cartilage-cells, and, of the matrix in which they are lodged, which has become fibrous: in the latter, and, frequently, alſo, in the former, the oſſification is preceded by the formation of hollow ſpaces in the cartilage, in which is depoſited a cartilage-marrow containing veſſels which are connected, in part, with

[1] Loc. cit.

[2] Manual of Human Hiſtology. Syd. Soc. tranſl. Vol. i, p. 379.

thoſe of the perichondrium, in part, with thoſe of the ribs: and, the oſſeous ſubſtance is more that of normal bone, though, almoſt always, more opaque, leſs homogeneous, with imperfectly formed lacunæ, which, frequently, contain a calcareous depoſit. Under the name *cartilage-marrow* are underſtood the medulla-cells, fat-cells, bundles of connective tiſſue, and, veſſels, which are preſented, inſtead of the detritus afforded by the diſintegration of cartilage, and, which may be ſaid to correſpond, in all reſpects, with thoſe of fœtal bone, and, may be, readily, ſeen in oſſifying cartilages." With reſpect to the lacunæ, I may ſtate, that, when the oſſification is complete, I find, that, not only are they, with their canaliculi, often, well-formed, but, we may, not uncommonly, ſee them arranged with that regular, concentric diſpoſition which characteriſes healthy, adult bone, and, with the innermoſt circle encloſing an Haverſian canal. Many lacunæ, however, are, ſcattered about in an irregular way, and, preſent, very variable forms; whilſt, not a few are to be found retaining, yet, an embryonic condition.

In regard to the fibrillation of the matrix: this is, by no means, of unuſual occurrence in other hyaline cartilages where morbid proceſſes occur in them: and, in the caſe of the ribs,—whether oſſifying prematurely, or, with the progreſs of age,—it will be obſerved, that, though they, now, nearly approach in texture, and, chemical compoſition to the fibro-cartilages, there is a want, nevertheleſs, of that peculiar reticulation of ſtructure which characteriſes

the latter, and, in place of it, the fibres,—which are exceedingly fine, and, numerous,—are arranged very closely together, except where their course is interrupted by the presence of the cells, and, their direction is, often, straight, or, slightly, undulatory. "The distinction," observes Dr. Hassall,[1] "of cartilages into true, and, fibro-cartilages, although useful for the purpose of classification, is, to some extent, artificial, since, on the one hand, some of the true cartilages, as old age approaches, become converted into fibro-cartilages, and, on the other, the fibro-cartilages themselves, in the early period of their development, do not contain fibres,—the cellular tissue being hyaline, and, identical with that of true cartilage."

There is, also, another change in the condition of the matrix which may, not unfrequently, be observed where the costal cartilages are undergoing ossification, viz., a finely-granular state. The hyaline substance is, here, seen to be, minutely, mottled: of a darker hue than natural, and, the tint, when a somewhat thick section is examined under the microscope, will be seen of a light, brownish-yellow. This must not be confounded with the molecular, calcareous particles, closely crowded together, and, laid down within the cells themfelves, as one of the more immediate stages of the ossifying process; for, frequently, these cells are completely charged with their contents, and, in their, now, close aggregation, in-

[1] Micros. Anatom. of the Human Body, p. 283. Lond. 1849.

dividuality becomes loſt, and, a deep brown hue, and, coarſely-granular character are conferred upon the confuſed collection of them.

I ſhall, now, deſcribe, more particularly, the condition of thoſe cartilage-cells which have been, already, referred to as preſenting a ſtate of fatty degeneration: but, may pauſe to remark, that, in the oſſifying coſtal cartilages, and, alſo, in thoſe of the larynx, we have an excellent opportunity afforded us of ſtudying, *in a ſingle ſpecimen, and, at the ſame time, the four forms of degeneration,—viz.—the fibrous: the granular: the fatty, and, the calcareous.* Theſe four kinds have diſtinctive phyſical, and, chemical characters,—the degeneration taking place in the order in which the ſeveral forms are ſtated above. "In chemical compoſition, and, in a fainter degree, in phyſical condition," remarks Dr. C. J. B. Williams,[1] "the ſeries, analogically, preſents a ſucceſſive deſcent from animal, through vegetable, to mineral compoſition."

In obſerving that the cells are to be ſeen in a ſtate of fatty degeneration in aſſociation with the calcareous changes which the cartilages are, at the ſame time, undergoing, it muſt be borne in mind that, normally, theſe cells contain a large quantity of fat, and, Kölliker[2] remarks:—"In the adult, every cell, except the moſt ſuperficial, contains larger, or, ſmaller (from 0·016—0·008) ſometimes, ſpherical, ſometimes more irregular fat-drops, which, fre-

[1] Principles of Medicine. 3rd ed. p. 445. Lond. 1856.

[2] Loc. cit. Vol. i, p. 118.

quently, ſo ſurround the nucleus as, entirely, to conceal it from view, whence, it has been aſſumed,—though, not quite correctly,—that the fat is ſeated in the latter." In a ſtate of fatty degeneration, the oil-drops are to be found more numerous, or, ſingle, and, of larger ſize than natural; and, very often, included in a congeries of pigment-granules which occupy with the former, to a great extent, the cavity of the cell. At the ſame time, the cell-wall becomes, more or leſs, thickened, or often, diſappears, entirely. "The nucleus," obſerves Wedl,[1] "undergoes no determinate pathological change: it, ſimply, diſappears."

Cartilage, in the above ſtate, is of a dirty-brown colour, with its uſual amount of elaſticity, greatly, impaired. In the examination of thin ſections it may, frequently, be noticed that, in many places, the coheſion between the cell-wall, and, the containing matrix, is ſo looſened, that, from the margin of the ſpecimen the cells, here and there, project freely, and, are almoſt detached: while, in the body of the preparation, empty ſpaces will be found, which have become ſuch by the falling out of the cells that had, formerly, filled them. Theſe points may be obſerved in matrix which is, yet, hyaline.

Another peculiarity is, that, in the immediate vicinity of cells which are preſenting different phaſes of degenerative change, there may be, often, ſeen numerous, much larger, and, more cloſely crowded

[1] Rudiments of Pathol. Hiſtology. Syd. Soc. Trans. p. 135.

cells than are to be found in normal cartilage. Each of the progeny occupying ſuch cells will, commonly, be found to preſent a large oil-globule in its interior.[1] Laſtly, it will be noticed that an early ſtep in the actually oſſific transformation is the depoſition of innumerable, calcareous granules in the interior of the individual cells,—firſt, towards their circumference,—and, as by degrees, this depoſit increaſes in amount, the cell-wall diſappears from around it, and, with the complete filling up of the cavity, the previouſly, contained oil, likewiſe, becomes wanting. We are, thus, enabled to verify the obſervation of Meyer,[2] who, in ſpeaking of the two ways of oſſification of cartilage, ſays:—"In all thoſe cartilages which are bones in the adult, the intercellular ſubſtance becomes earthy before the corpuſcles: but, where centres of oſſification are depoſited in the naſal, thyroid, and, coſtal cartilages, or, the fibro-cartilages, the reverſe of this proceſs is the caſe."

Before leaving, for the preſent, the ſubject of theſe changes in the coſtal cartilages, I may, inci-

1 "In fatty degeneration of *articular cartilage*," Mr. Bryant obſerves, "the microſcopic appearances are moſt characteriſtic. The change, evidently, commences in the cells themſelves. In its earlieſt ſtage one or two fat-globules will, firſt, be detected in the cartilage-corpuſcles; theſe gradually increaſe in number, till the corpuſcles diſappear,—larger cavities in the hyaline matrix being formed. Theſe cavities unite, and, form larger ones, till the ſtructure itſelf becomes pulpy, breaking down upon the ſlighteſt provocation. The hyaline-matrix takes on the ſame change, becoming, apparently at firſt, granular, and, then fatty in its degeneration." On the Diſeaſes, and, Injuries of the Joints, p. 53. Lond. 1859.

2 In Müller's Archiv. 1849. S. 292-357.

dentally, remark, that, ſimilar alterations occur in theſe ſtructures in ſome of the lower animals,—alterations which have been recogniſed, and, commented on, both by ancient, and, modern authors;—thus, Verſalius[1] obſerves:—"Superiorum verò coſtarum cartilago durior eſt, ſolidiorque, ac en valdè ſenibus intus oſſea efficitur; quemadmodum in ovibus et bobus aliiſque ferè omnibus ejus generis animantibus mediocris ætatis fieri cernimus, quorum cartilago intus friabili conſtat eſſe, exterius tantum cartilagine veluti membrana quapiam obvoluto. Atque id etiam in ſimiis et canibus utpote ſicciori temperie quàm homines conſtantibus adeò eſt manifeſtum, ut haud mirum eſt. Galenum illorum præcipère animalium fabricam docentum, verarum coſtarum, cartilagines oſſeas; ſpuriarum autem cartilagines, exquiſitas eſſe cartilagines ſcripſiſſe." Havers[2] remarks: "The preternatural mutation of the cartilages of the arteria aſpera, of the cartilago enſiformis, and, ſome others into bones, is not more than has been obſerved. So in the horſe, oxen, and, ſome other beaſts, this change is not very rare in the cartilages of the thorax." Amongſt modern writers, it is ſtated by Geber:[3]—"The oſſification of the coſtal cartilages which occurs in domeſtic mammalia, eſpecially the horſe, although incomplete, may ſtill be reckoned as normal: for, it takes place invariably.

[1] Anatomia, p. 66. Venet. 1604.

[2] Oſteologia Nova, p. 270. Lond. 1729.

[3] Elements of General, and, Minute Anatomy, tranſ. by Gulliver, p. 177. Lond. 1842.

In the full-grown horſe the coſtal cartilages are always found, more or leſs, bony. The ſame thing is obſervable in the middle-aged dog, and, probably, it occurs, conſtantly, amongſt carnivora."

I paſs, now, to a conſideration of the condition of the *Cartilages of the larynx* in the old man, and, in thoſe who have become, prematurely, aged. Theſe parts are well known to become, gradually, oſſified, and, the converſion continues, as a common rule, to increaſe, ſteadily, in extent,—progreſſing, *pari paſſu*, with the advance of years, until it is, eventually, found that that which was a cartilaginous, has, now, become changed into a bony, framework. Morgagni,[1] in giving the reſult of his large experience, obſerves:—"Sed mihi certe nihil frequentior in larygnis diſſectionibus oblatum eſt, quam ſenum, aut etiam ſenectutem inclinantium hominum thyroidem et cricoidem, aut oſſeas, aut oſſeientes, videre." As with the coſtal cartilages, the time at which this alteration commences, is uncertain, and, variouſly, ſtated by different authors. The calcification occurs later in life in the female than the male, and, the uſual order purſued is,—firſt, in the thyroid: ſecondly, in the cricoid, and, laſtly, in the arytenoid cartilages. The epiglottis remains unaffected: but, in regard to this point, obſervers differ, and, I ſhall have to revert, hereafter, to this ſubject. Van Heckeren,[2] remarks:—"In viris, tamen, hæc *degeneratio* frequentior quam in fœminis ob laxiorem,

[1] Adverſar. Anatom. i, p. 29. Lug. Bat. 1723.
[2] De Oſteogeneſi Præternaturali, p. 76. Lug. Bat. 1797.

quæ ipſis propria eſt, totius corporis laryngis habitum."

In the thyroid cartilage, calcareous degeneration commences, generally, in the cornua, and, poſterior margins, and, by degrees, invades the lower border, extending upwards, and, forwards, through the alæ, and, the laſt portions to become altered are thoſe lying external to the median notch. The cricoid cartilage is ſtated by Sharpey, and, Ellis,[1] with their accuſtomed accuracy, to become firſt oſſified at its upper border, upon each ſide, near the two poſterior articular eminences, and, the oſſification invades the lateral parts of the cartilage before encroaching on it, either in front, or, behind. Oſſification of the arytenoid cartilages begins at their baſes, and, thence, extends towards their apices. Though calcification of theſe latter parts is of more infrequent occurrence than the ſame change in the thyroid, and, cricoid, the obſervations of ſome authors in regard to them is ſcarcely correct, thus :—Cloquet[2] ſtates that they are, only, to be ſeen in that condition in very advanced age: Groſs[3] ſpeaks of their oſſification as extremely rare: whilſt, Andral[4] ſays :—"I am not aware that the arytenoid cartilages have ever been oſſified." Such, alſo, is the reſult of the experience of Morgagni,[5] who ſays :—"Multòque etiam ſœpius totam

[1] Elements of Anatomy. 6th ed. vol iii, p. 307. Lond. 1856.

[2] A Syſtem of Human Anatomy, tranſl. by Knox, p. 380. Eding. 1831.

[3] Elements of Pathol. Anatomy. 3rd ed. p. 401. Philadel. 1857.

[4] Loc. cit. Vol. ii, p. 493.

[5] Loc cit. p. 29

arytenoidum baſim celluloſam vidi, et, medullari liquore turgentem quamvis iſtas cartilagines videre oſſeas potuerim nunquam." The *fact* is, that, it is, by no means, uncommon for oſſification of the arytenoid cartilages to occur, and, I have now before me ſeveral ſpecimens wherein this change has taken place, to a greater, or, leſs extent, in perſons who have either not reached, have arrived at, or, only juſt paſſed, the middle period of life,—ſuch changes not being due to irritation propagated from the neighbouring ſtructures, which I had found, on diſſection, to be perfectly healthy. Moreover, the *cornicula laryngis* are ſuſceptible of calcification,—a circumſtance which I do not find alluded to by any author. A ſhort time ſince, in preparing the larynx of a man, aged 42 years, who had died of phthiſis, I found that, in addition to a very advanced degree of bony change in the thyroid, cricoid, and, arytenoid cartilages, the appendices of Santorini preſented, each, in its interior, and, at about the centre, a well-formed, oſſific nucleus.

However complete this oſſification of the laryngeal cartilages may become, thoſe portions which enter, more immediately, into the compoſition of the crico-thyroid, and, crico-arytenoid articulations, always, remain unaffected, and, anchyloſis at theſe joints has never been ſeen. An obſervation by Sandifort[1] may here find place:—"In viri robuſtiſſimi cadavere

[1] Obſ. Anatom. Patholog. lib. 3, cap. ii, p. 43. Lud. Bat. 1777. The following miſ-ſtatement is in the article "Age" in the Dict. de Médicine (Vol. i, p. 614, Paris, 1832,) "Dans la vieilleſſe, la larynx,

totum aſperæ arteriæ caput penitus oſſeum fuit, una cum appoſita epiglottide, ſic ut vel acutiſſimo cultro ne minima pars tolli potuerit: baſis tamen epiglottidis, articuli cricoideæ, et, arytenoidearum cartilaginum, perſiſterant mobiles."

With regard to the *Epiglottis*,—a fibro-cartilaginous ſtructure,—I may ſtate that, even, in the moſt perfect ſpecimen of calcification of the laryngeal cartilages that I have examined, I have never ſeen this one to be otherwiſe than in an unaltered condition. This is in accordance with the experience of Cruveilhier,[1] and, the majority of anatomiſts, and, pathologiſts. Three hundred years ago, Columbus[2] wrote:—"Vero ſi humanum inſpexeris, præſertim in conſiſtente ætate, procul dubio oſſicula omnia, ex quibus conficitur, agnoſces, *epiglottide excepta* quæ fiſtulam tegit." Spigelius,[3] likewiſe, obſerves that the epiglottis never becomes bony. There are ſome writers, however, who have made contrary ſtatements,[4] and, Cloquet,[5] whilſt allowing its rarity, ſays:—"When it does happen, it preſents a number of ſmall, bony nuclei, irregularly diſſeminated, and, ſeparated by very viſible areolæ." Van Heckeren[6]

très vaſte, et, preſque toute oſſeux, préſente une cavité dont les divers pièces ſoudées, ſont, entièrement, immobiles."

[1] Deſcrip. Anatom. tranſl. in Tweedie's Lib. of Med. Vol. ii, p. 575. Lond. 1841.

[2] De re Anatomica. Cap. v, p. 100. Venet. 1557.

[3] De Human. Corp. Fabric. Lib. iii, p. 90. Francof. 1632.

[4] Four caſes are related by Albers in Gräfe, and, Walther's Journal. Vol. xxix, p. 20.

[5] Loc. cit. p. 399.

[6] Loc. cit. p. 76.

remarks :—"Si quid mea valeat obſervatio, in epiglottide diſtincte obſervavi nucleum oſſeum in meditullio formatum, ita ut ab omni parte cartilagine incluſus." Groſs[1] believes that of oſſification of the epiglottis there is hardly a well-marked caſe on record. Andral,[2] in acknowledging its rarity, ſtates that a minor degree of induration is, by no means, uncommon, the effect of which is to render it leſs moveable, ſo that it is, with difficulty, bent down to protect the aperture of the larynx. A ſimilar obſervation is made by Pauw,[3] who is thus referred to by Sandifort :[4]—"Conſpexit tres, quibus mortis fuit cauſa, quod adeo induruiſſet epiglottis, ut flexi non valuerit, et deglutitionem penitus impediverit." Morgagni,[5] although he has never met with oſſification of the epiglottis, entertains no doubt that it may, ſometimes, become less flexible, and, yielding.

Before deſcribing the hiſtological condition of the calcified parts of the larynx, together with the ſtate of the adjoining cartilage which has not, as yet, undergone, but, is inclining to ſuch converſion, I may, with a view of rendering the ſubject more complete, devote a ſhort ſpace to the conſideration of analogous changes occurring in the tracheal, and, bronchial rings, in the progreſs of age: and, I ſhould be tempted to apologiſe for the extent to which I

[1] Loc. cit. p. 40.
[2] Loc. cit. Vol. ii, p. 492.
[3] Primitiv. Anatom. p. 10, 24.
[4] Loc. cit. lib. iii, cap. ii, p. 43.
[5] De Cauſis Sedibuſque. Morb. tranſl. by Cooke. Vol. ii, p. 3. Lond. 1822.

have charged my account with quotations from the works of ancient, and, modern authorities, but, that I find in the former much which pertains to, and, is correct on the preſent points: whilſt, in the latter there is, ſometimes, to be detected a laxity, or, even incorrectneſs of ſtatement, but little in accordance with the improved pathology of more recent date: indeed, it may, not unfrequently, be found, that, *what is true is not new, and, what is new is not true.* Were I endeavouring to frame an account of the calcified, and, fattily degenerate condition of the coſtal, and, laryngeal cartilages in age, only, I might content myſelf with a bare deſcription, and, unincumbered text; but, I truſt to be enabled to develop, in the courſe of the preſent enquiry, ſome curious, and, intereſting facts reſpecting the exiſtence of ſimilar changes in perſons who have, prematurely, ſuffered under impairment of nutrition,—in whom, too, fatty degeneration, as in ordinary age, has ſet its arciform, or, circular ſtamp on the cornea, and, in whom the alteration will be found to have, correſpondingly, affected, beſides thoſe ſections of the cartilaginous ſyſtem to which I more particularly refer, the arterial trunks, and, branches, in the coats of which it is well known, that fatty, and, calcareous degeneration are, often, to be detected in aſſociation with one another. It is, then, by a collation of ſcattered facts; by eſtabliſhing a relationſhip amongſt, previouſly, isolated parts, and, on articulation of theſe *disjuncta membra*, by adding increaſed ſtrength to the whole, through amplified enquiry, that we may hope

to ſucceed in gaining the right path towards *generaliſation*, which ſo often brings us, yet nearer, to the deſirable goal of *ſimplicity*.

The following diſcrepancy of opinion is rather remarkable:—Seiler[1] obſerves:—"Arteriæ aſperæ, et, bronchiorum cartilagines haud raro, in oſſeas mutantur," whereas, Cloquet[2] ſays:—"The tracheal, and, bronchial rings ſeldom oſſify,—even in the moſt advanced age." Morgagni[3] remarks:—"Theſe cartilages become bony, ſometimes, even, before the perſon is far advanced in years." Groſs,[4] on the contrary, ſtates that "the rings of the trachea, being of a fibro-cartilaginous texture, ſeldom oſſify." The older are, here, the more reliable authorities: and, it is, by no means, uncommon to find that theſe rings are, even in, comparatively, young ſubjects, more or leſs, oſſified; whilſt, in old men, whoſe laryngeal cartilages have, to a great extent, become bony, the oſſification of the tracheal rings may be complete.[5] Of this fact, Groſs gives an illuſtration in ſtating that

[1] Anatom. Corpor. Human. Senilis. p. 77. Erlang.

[2] Loc cit. p. 623.

[3] Loc. cit. Vol. i, p. 324.

[4] Loc. cit. p. 37.

[5] This ſtatement, made by me in the "Lancet," a few years ſince, has been corroborated by the moſt recent writer on the ſubject, who obſerves:—"It has been ſtated by Williams and others that the tracheal cartilages manifeſt no diſpoſition to oſſify. In this opinion I cannot concur; I have rarely examined the trachea of an elderly man without finding the cartilages conſiderably oſſified, and, I have even found ſpecks of oſſification at a ſomewhat early period of life!"—Waters, A. T. H. The Anatomy of the Human Lung. *Note*, p. 73. Lond. 1860.

"when this transformation takes place it, uſually, occurs in ſmall points which, coaleſcing, may embrace, at length, the entire rings, as I have witneſſed in a man ſeventy-five years of age. The different tiſſues of the tube were remarkably denſe, inelaſtic, and, brittle, requiring only ſlight traction to tear them. All the rings were completely oſſified." Littre[1] found, in addition to oſſification of ſome of the abdominal blood-veſſels, that "les cartilages du larynx, et, les anneaux cartilagineux de la trachée, et d'une partie de ſes bronches l'étoient, tout à fait, oſſifiées." Vieuſſens[2] relates, that in a female who died at the age of eighty-four, and, in whom there was found extenſive oſſification of the aorta, in its whole length, M. Deidier "obſerva, encore, que tous les anneaux des bronches du pûmon étoient devenus oſſeux; auſſi ne pouvoit elle jamais ſe coucher la tête baſſe ſans avoir quelque peine à reſpirer." The following obſervation is made by Gernet[3]:—"Incruſtationem vero ſimilem ei, quam in cartilaginibus, ſterni deprehendimus, in alio la-

[1] Hiſtor. de l'Academ. Roy. des Scien. p. 26. Paris, 1706.

[2] Traité nouveau de la Structure et des Cauſes des mouvement Naturel du Cœur. Chap. xvi, p. 109. Toulouſe, 1715.

[3] De Siccitatus Senilis Affectibus. *Diſſ. Inaug.* p. 4. Lipſ. 1753.

"Phthiſico in corpore vi Maii 1675, invenimus Tracheæ per pulmonum ſubſtantiam diſtributæ particulam aliquam digiti longitudinem habentem, quæ oſſeam non ſolum duritiem adepta, ſed, et coloris ejus cujus oſſa ſolent eſſe hoc eſt candicantis, erat, deliniationem habes."—Blaſſius. Obſerv. Med. rarior. pars. vi, p. 77. Amſt. 1677.

Morgagni (25) quotes the following caſe from Valſalva (xxii, 24): A phyſician of middle age, whoſe countenance had long betrayed a cachectic diſpoſition, and who, afterwards experienced difficulty of

rynge perſpeximus, in quo præter cricoidem, et, arytenoidas cartilagines etiam aſperæ arteriæ, annuli ſimili cruſta inveſtiti deprehendebantur, ita tamen, ut cartilagines ipſas, ſub cruſta diliteſcentes, accurate perſpicere potuerimus."

An opinion has prevailed, that, in certain inſtances, an oſſified ſtate of the tracheal rings, or, of the laryngeal cartilages, has proved to be a preventive to ready death by hanging, and, has, even, been the cauſe of the preſervation of life. Statements to this effect have been made, both by ancient, and, modern writers, *e. g.*, Placentinus[1] quotes two caſes, upon the authority of Cardanus :— . . . de eo Bononiæ ſuſpenſus, et, tanquàm mortuus à patibulo ſolutus, vivus inventus eſt, quod aſperam arteriam, oſſeam non cartilaginem haberet: altera, *lib.* 14, *de re rer variet. cap.* 76, de quodam ſuſpenſo, qui

breathing, and, hoarſeneſs, began, at length, to expectorate a variouſly-coloured ſputum, with which he coughed up, alſo, a ſmall, curved bone. He ſhowed it to me, and I found it not very ſmall in ſize : it was ſmooth on its concave ſurface, and rough on its convexity. He was often afflicted with a ſenſe of ſuffocation, and ultimately, was found dead in his bed, a few hours after he had repreſented himſelf better. His deceaſe had been ſo quiet that another perſon ſleeping in the ſame bed was unconſcious of what had happened. *Diſſection.*—The lungs, both internally and externally, were pervaded by veſicles full of pus. They were of various ſizes, but, the largeſt did not exceed the magnitude of a grape.

Morgagni remarks on this caſe, that it ſeems probable that the bone was a portion of one of the rings of the trachea which had become oſſified ; for, we know that the air-tubes have undergone this change in phthiſical patients. Valſalva, indeed, conjectured that it had been detached from the larynx, the larger cartilages of which, unqueſtionably, often become bony.

1 De Vocis Audituſque Organis. Cap. ix, p. 78. Ferrar. 1600.

miraculi ſpecie bis ſeruatus, tertio Judicis ſolertia perijt: cujus cauſſam, oſſeam tracheam fuiſſe, poſtea compertum eſt." Bartholinus[1] obſerves:—"Cartilagines larygnis quinque ſunt, quæ in ſeneſcentibus aliquando inſtar oſſium indurantur unde aliqui ſuffocationis periculum in patibulis declinaverunt." Dr. Beck, in his Medical Juriſprudence,[2] extracts from Profeſſional Anecdotes[3] the following:—"Dr. Plott, in his Hiſtory of Staffordſhire, quotes a patent roll of the 48th year of Henry the Third, in which it is ſtated that Inetta Balſham, having been convicted of harbouring thieves, was ſentenced to be hung, and, accordingly, was hung, but remained alive from nine until the next morning. A free pardon was, therefore, granted her. Dr. Plott ſuggeſts that her life was, probably, preſerved on account of the larynx being turned to bone, as it happened in the caſe of a Swiſs, as I was told by the Rev. Obadiah Walker, Maſter of Univerſity College, who was attempted to be hanged no leſs than thirteen times, yet lived, notwithſtanding, by the benefit of his windpipe, that, after his death, was found to have turned a bone." Dr. A. F. Thomſon[4] ſtates in his Lectures that

[1] Anatom. lib. ii, p. 442. Lugd. Bat. 1674.

[2] 7th ed. p. 617. Lond. 1842.

[3] Vol. iii, p. 180. Lond. 1825.

Some intereſting obſervations, and, caſes reſpecting the injuries done to the various parts of the larynx, and, the os hyoides by hanging, will be found in Dr. Gibb's monograph on "The Diſeaſes, and, Injuries of the Hyoid, or, Tongue-bone," p. 44. Lond. 1862.

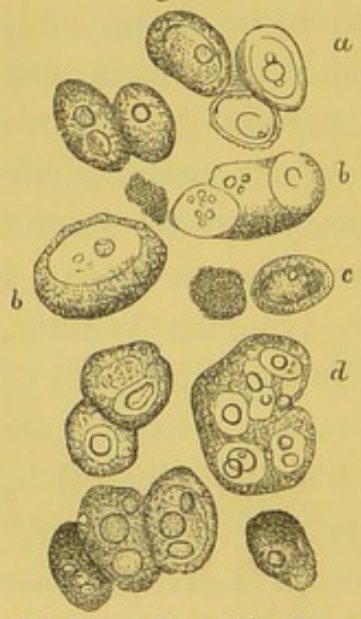
[4] Lond. Med. and Surg. Journal. Vol. vii, p. 418.

Morgagni (loc. cit. vol. ii, p. 637) ſtates that from hanging the parts ſituated in the neck ſuſtain a diverſity of leſion. In ſome perſons

Governor Wall was long in dying, in conſequence of which a particular examination of his throat took place, and, it was found to have been owing to an oſſified portion of the trachea reſiſting a part of the rope.

As the degenerative changes advance in the laryngeal cartilages, the ſame peculiarities will be found to characteriſe them as have been already deſcribed when ſpeaking of the cartilages of the ribs. "If the drier, browniſh-yellow portions of the laryngeal cartilages, in a ſtate of atrophy, be ſelected for examination," obſerves Wedl,[1] "we ſhall ſee the appearances repreſented in the annexed figure, exhibiting a group of the various kinds of pathological, morphological metamorphoſes of the cells. They cannot all, however, be deſcribed under the term atrophy. It has, already, been ſtated that cartilage-cells with apparently thickened walls (*a*, *c*) may, alſo, be noticed at the commencement of the proceſs of oſſification. Thus,

Fig. 18.



one or other of the muſcles are ruptured, in ſome the cartilages are broken. A caſe is quoted from Valſalva (xix. 13) of a man who had been hanged, in whom the ſterno-thyroidei and hyo-thyroidei muſcles were ſo lacerated that, about the annular cartilage, nothing except membranous ſubſtance remained in their place, and the cartilage itſelf was fractured.

[1] Loc. cit. p. 139.

the cells *b*, *b*, repreſent imperfect forms of development into ſecondary cells: and, in the ſame way, between *b*, *b*, and near *c*, may be obſerved a granular maſs, which muſt, perhaps, be explained as of new formation, and not as reſulting from the retrograde metamorphoſis of a cartilage-cell. In the parent-cell *d*, will be noticed an accumulation of a coloured granular material, particularly toward one ſide, the ſecondary cells containing fat-globules of conſiderable ſize. The other cells are in a ſtate of fatty, and, pigmental degeneration."

As with the coſtal cartilages, fibrillation of the hyaline matrix, alſo, takes place at various parts; and, in ſome ſituations we may, at the ſame time, obſerve portions of the matrix in a ſtate of granular change.

With the depoſition of minute calcareous granules in the intercellular ſubſtance, and, in the walls of the cells themſelves, during the proceſs of oſſification, the cartilage becomes vaſculariſed; large ſpaces are formed, and, filled by oil, and, at the ſame time that theſe intervals become increaſed in ſize, they preſent a reticular ſtructure, and, coaleſce with one another to conſtitute a cancellous texture, like that found in ordinary bone, filled with fluid, reddiſh medulla. The greateſt amount of this texture is, generally, to be found in the cricoid, and, arytenoid cartilages, which do not preſent that degree of thickneſs of external, compact bone which the thyroid cartilage poſſeſſes when oſſified.

"In the cartilages of the larynx in advanced

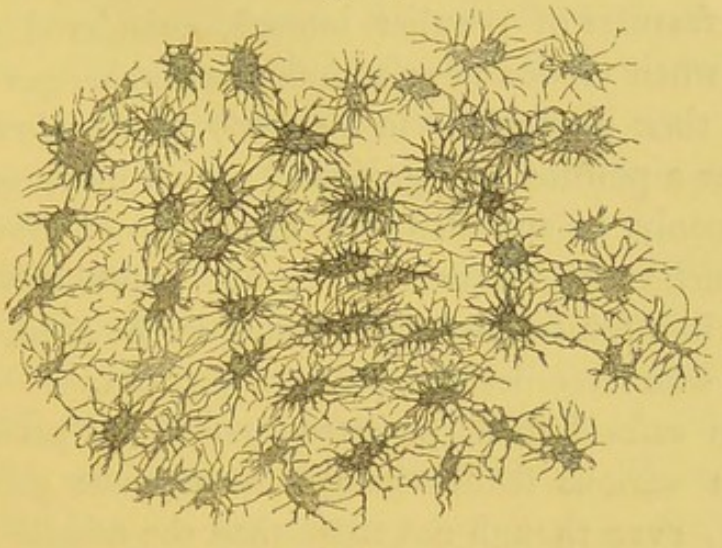
age," obſerves Tomes,[1] "as the formation of oſſeous tiſſue goes on, but ſlowly, the proceſs may be obſerved with eaſe. In this caſe, the corpuſcles do not develop others, as in the temporary cartilage where increaſe of ſize is required, but, retain their uſual appearance. With the oſſeous granules in the intercorpuſcular tiſſue, at firſt, but few of them are ſeen, and, theſe ſpherical, and, iſolated; they ſoon, however, become numerous, and, unite; thereby, forming an oſſeous maſs. The intercellular ſubſtance being advanced in oſſification, the corpuſcles, or, rather, their parietes, paſs through the ſame proceſs, and, by degrees, the whole cartilage becomes converted into bone.

The formation of the individual granules is more readily obſerved in theſe cartilages than in any other ſituation. This form of oſſification eſtabliſhes an intereſting, and, explanatory link of connection between bone, and, the various oſſeous plates we find in abnormal ſituations. For, in the latter, the ſpherical granules appear, and, are at firſt few, and, iſolated, and, lying amongſt the fibres of the tiſſue, rapidly increaſe, and, form an oſſeous maſs."

In many parts of the oſſified cartilages, the lacunæ may be ſeen, more or leſs, cloſely aggregated, of large ſize, and, often, aſſuming ſomewhat of an oval form; their canaliculi unite with thoſe adjoining, as in ordinary bone :—

[1] Cyclop. Anat. and Phyſiol. *art.* "Oſſeous Tiſſue."

Fig. 19.



The Haverſian canals are, commonly, of large ſize; comparatively, few in number, and, intercommunicate by means of wide branches :—

Fig. 20.

Not only does the hiſtological ſtudy of degeneration of the coſtal, and, laryngeal cartilages preſent us with features of peculiar intereſt, conſidered *per ſe*, but, when viewed in relationſhip with changes at the ſame time progreſſing in the body, theſe alterations aſſume a poſition of ſignificancy which may, not uncommonly, be appealed to in expoſition of the degree to which other textures have, not improbably, ſuffered in a ſimilar manner, whether in the aged, or, in thoſe who have become, prematurely, old.

In caſes I ſhall, hereafter, relate, of perſons in whom various ſenile changes have made great advance, even though not more than the middle period of life has been attained, the cartilages of the ribs, and, larynx have, likewiſe, ſuffered the ſame "degradation" of ſtructure; and, though theſe conditions are, occaſionally, referred to in the detailed account of autopſies, their affinity to the ſame morbid ſtate preſent in other organs, has not received that conſideration which the ſubject, I believe, merits:—and, ſhould fatty degeneration have proceeded in the cornea to the extent of encircling its margin with a well-defined ring, let us, while ſeeking out fatty, and, calcareous degeneration in internal parts, not forget to take notice of the condition of thoſe, like the cornea, nearer the ſurface, and, examine with care the changes undergone by the coſtal, and, laryngeal cartilages.

Speaking of oſſification of the cartilages of the ribs, Rokitanſky[1] remarks, "it is, ſo frequently, ob-

[1] Loc. cit. Vol. iii, p. 281.

ſerved in old people that it can, only, be looked upon as a pathological appearance when it is found at an early period of life; and, Andral[1] obſerves, in reference to oſſification of the thyroid, and, cricoid cartilages, it is a natural phenomenon of old age, "but, at an earlier period of life, it conſtitutes a true morbid ſtate."

Morgagni[2] examined the body of an Æthiopian, æt. 30, and, remarked,—"as we were about to open the thorax, we much wondered at the unuſual hardneſs of the cartilages that joined the ſternum to the ribs, and, eſpecially at that age." What was, here, the ſtate of the cornea, the larynx, the heart, the arteries, &c.? Hufeland,[3] in deſcribing premature old age, ſays:—"I once diſſected the body of an *artificial old man*, who had ſcarcely attained the *age of forty*; and, found, not only his hair grey,[4] but, the cartilages of the ribs, which do not become bones until the greateſt age, totally oſſified."

Let us conſider, now, the converſe of the above propoſition, and, enquire whether,—when a man has arrived to a "great age," and, the various organs of the body are diſcovered, after death, to be in a comparatively healthy ſtate,—we are to expect the cartilages of his ribs, and, larynx to have undergone oſſification? I would reply that the abſence of ſenile

[1] Loc. cit. Vol. iii, p. 493.
[2] Loc. cit. Lib. i, epiſt. v, art. 17.
[3] Loc. cit. p. 176.
[4] Thus, they who reach
Grey hairs, die piecemeal.—*Southey*.

changes in ſeveral organs, or, at all events, their preſence, to a, comparatively, ſmall degree, ſhown in different tiſſues,—as the cornea, the blood-veſſels, &c., which are ſo prone to diſplay, at a late period of life, the well-known forms of degeneracy,—would lead me to anticipate only a relative degree of converſion, and, depoſit in the coſtal, and, laryngeal cartilages.

Whenever opportunity has ſerved, within the laſt ten years, of making poſt-mortem examinations, under the above circumſtances, I have, commonly, found evidence in ſupport of the validity of the ſtatements here advanced; and, I am pleaſed to be enabled to add the teſtimony of an accompliſhed anatomiſt,[1] who, a ſhort time ſince, remarked:—"The oſſification of the cartilages of the ribs is, commonly, regarded as being ſimply a ſenile change, and, the inſtance of old Parr, noted by Harvey, in whom they remained ſoft, and, eaſily cut, is quoted as a marvellous exception to the general rule. My own obſervations have furniſhed many exceptions,—not ſo ſtriking, of courſe,—but, ſufficiently marked, and, ſufficiently numerous to make me queſtion the rule. In almoſt all the old perſons in whom I have had the opportunity of making a poſt-mortem examination, I have obſerved the cartilages of the ribs

[1] Humphrey, G. M. A Treatiſe on the Human Skeleton, p. 58. Cambridge, 1858.

This condition of the coſtal cartilages in very old people had not eſcaped the obſervation of Lobſtein, who remarks:—"On a trouvé les cartilages des côtes exempts d'oſſification chez les perſonnes d'un âge extrêmement avancé."—Loc. cit. tom. i, art. 7, p. 339.

to be diſcoloured, and, yellowiſh, but ſoft, ſo as to yield, eaſily, to the knife, and, render the ſaw unneceſſary; and, in the ſkeleton of a perſon, æt. 100, in the Berlin Muſeum, the coſtal cartilages are, ſtill, unoſſified; *whereas, they are commonly oſſified, and, require to be ſawn through in adults who have been addicted to drinking, and, have become unhealthy.* I am, on the whole, therefore, diſpoſed to regard the oſſification of the coſtal cartilages as a ſign of diſeaſe, rather, than age. The morbid condition which induces it in the adult, may induce it, alſo, in the aged, though I have not remarked that it does ſo, and, I ſuſpect that thoſe in whom it occurs do not attain to a great age."

Fatty degeneration of the heart, exiſting in aſſociation with a correſpondent change in other organs of the body is, by no means, unuſual; and, in ſuch caſes I have, moſt frequently, found the coſtal cartilages oſſified to a greater extent than might have been anticipated from the years the patient had numbered. The degeneration of theſe latter ſtructures has not been previouſly taken notice of as bearing any particular alliance to the internal converſion, though I believe it merits ſuch a conſideration. Dr. Ormerod[1] mentions an inſtance of ſudden death occurring to a medical man, æt. 56, from fatty degeneration of the heart. At the autopſy, it was obſerved, that "the coſtal cartilages were firmly oſſified."

As far as I am aware, Dr. H. Kennedy[2] is the

[1] Lond. Med. Gazette. 1849.

[2] Eding. Med. Journal, p. 20, No. xlix, July, 1859.

only author who has directed attention to this converſion of the cartilages of the ribs in caſes of fatty degeneration of the heart, and, he adduces the circumſtance as explanatory, in part, of the peculiar form of dyſpnœa[1] which accompanies the cardiac affection. The preſence, however, of the fatty, and, other changes, I have deſcribed above, in the coſtal cartilages, is not referred to. Did we more frequently regard certain forms of diſeaſe which we are in the frequent habit of ſeeing as having their origin in a *conſtitutional* ſtate, and, not look upon them with reſpect to their *local* preſentations, only, we ſhould advance an important ſtep beyond what the pathology of the preſent day has taught us in regard to theſe maladies. I am happy, however, to be enabled to conclude this chapter with a valuable obſervation from the pen of Dr. O'Bryen Bellingham,[2] who, in deſcribing the atheroma of arteries, remarks :—"It conſtitutes, in fact, a form of fatty degeneration, and, as ſuch, is not to be regarded as a local diſeaſe, but, as part of a conſtitutional diatheſis; we often, conſequently, find it aſſociated with fatty degeneration, or, fatty depoſit on the heart, or, in other ſituations."

[1] *Vide*, The Diſeaſes of the Heart, and, Aorta. W. Stokes, M D. p. 324. Dublin, 1854.

[2] A Treatiſe on Diſeaſes of the Heart. Vol. ii, p. 556. Dublin, 1857.

CHAPTER VI.

"Human life is rarely abbreviated by the mere, unaſſiſted diſorders of nature. Ignorance of our bodily conſtitution, and, thoughtleſſneſs of the means of preſerving it, are the main cauſes of ſhortening our exiſtence. And, if either from ignorance, or, careleſſneſs, or, from the deſire of preſent gratifications, we will not take the little trouble that the preſervation of health, and, the prolongation of life require, we are, ourſelves, the authors of thoſe abbreviations of exiſtence under which we ſuffer; and, a Coroner's jury might bring in a verdict againſt us of ſlow ſuicide, committed under the influence of habitual inſanity."—PINNEY.

AMONGST the various cauſes which lead to impairment of nutrition, none, perhaps, is more rife in producing this ſtate than *Intemperance*, and, however vigorous the conſtitution may have been, originally, perſiſtence in this pernicious habit, ſooner or later, undermines its ſtrength, and, is, too often, the inſidious, but, unerring guide to a premature grave. Neiſon[1] found that at the term of life from 21 to 30,

[1] Journal of the Statiſtical Society. Vol. xiv, p. 200.

"It cannot be too widely known through the length, and, breadth of the land, that, though, during the laſt few years, the moſt ſevere competition has taken place between different life aſſurance companies for buſineſs, not one has dared to inſure intemperate lives, or, lives which have been intemperate, at any increaſed rate. No reaſonable rate meets the caſe. It is in vain that the drunkard returns to propriety; he can never, altogether, eraſe the miſchief; and, alſthough, much may

or, in the firſt vigour of manhood, the mortality of drunkards was upwards of five times, and, from 31 to 50, upwards of four times, that of the general community at like ages; and, he remarks, that "if there be anything in the uſages of ſociety calculated to deſtroy life, the moſt powerful is, certainly, the inordinate uſe of ſtrong drink." Nevertheleſs, we may, occaſionally, meet with thoſe the chief part of whoſe lives has been paſſed in unſwerving adherence to the habit of drinking, and, who, notwithſtanding, have attained to great length of years. Such caſes, however, muſt be regarded as quite of an exceptional character, and, I doubt not that, in moſt of them, were due enquiry made, ſome aſſociated circumſtances would be found, which tended, materially, to modify, or, to a great extent, counteract the noxious effects of theſe deadly potations. In ſome inſtances which have fallen under my own notice, I aſcertained this to be the caſe. One ſtout, elderly gentleman whom I was called on to attend, and, who, for many years, had been accuſtomed to drink ſeveral glaſſes of ſpirit, and, water daily,—not unfrequently increaſing the

be done by great perſeverance, and, ſkill, he never can, altogether, bring himſelf into a healthy ſtate, or, be regarded as a thoroughly healthy life. The frame of the drunkard is debilitated throughout, and, he ſinks by pneumonia, diſeaſe of the liver, or, other malady depending on debility, which cuts off his career, prematurely. Inſurance companies abhor the drunkard, as a riſk far too great, and, uncertain to be eſtimated, and, ſafely conſidered. If the career of a drunkard be watched, it is aſtoniſhing how ſoon he paſſes away, as if the voice of nature exclaimed, 'Cut it down! why cumbers it the ground?'"—A Smee, F.R.S. General Debility, and, Defective Nutrition, p. 25. Lond. 1849.

amount at night in the company of friends, without ever having been known to become inebriated,—uſed, invariably, to ſuffer from looſeneſs of bowels as a ſequel to theſe orgies, and, voided, always, copious bilious motions, occaſionally admixed with blood. To this circumſtance he attributed the preſervation of, what he was pleaſed to term his *health*, and, was wont, with a melancholy attempt at humour, to ſtyle his inteſtinal canal his *ſafety-valve*. Another example fell under my notice, where the draughts of whiſky, and, water indulged in were large, frequent, and, had been perſevered with for many years; yet, this *habitué* was old, and, apparently, healthy: I found, moreover, that he never laboured under headache, thirſt, dry ſkin, nauſea, loſs of appetite, impaired digeſtion, &c.; but, in experiencing always great freedom of perſpiration, the balance of the circulation, through this eliminative effort, became reſtored, and, the other functions of the body were, proportionately, maintained in due order, and, activity. A gentleman who arrived at a large age, and, who was as well known for his regular attention to buſineſs, as his deep devotion to the bottle, might be ſeen, at an early hour, every morning, in the Park, taking, as he termed it, his *conſtitutional walk*, and, diſtilling off, as it were, by the ſkin, the ſuperabundance by which his ſyſtem would, otherwiſe, have been oppreſſed. I have known, alſo, of an inſtance where a perſon, for a long ſucceſſion of years, ſteadily purſued a courſe of daily, and, nightly drinking, and, who, nevertheleſs, died aged. I un-

derſtood that he had been, originally, a ſpare man; but, towards the latter part of his life, became corpulent, and, ſuffered from occaſional attacks of gout: his eſpecial beverage was Iriſh whiſky, to which, he uſed to ſay, his conſtitution had become quite *acclimatiſed*. He was never known to be intoxicated; but, in my attendance on him, I learnt, that, whenever he had conſumed a certain amount of his favourite *punch*, he always experienced uneaſineſs of ſtomach, and, retired from company to find relief in freeing this organ from its contents,—only to return, however, and, renew his debauchery, to a ſimilar diſguſting termination of it.[1]

Happily, for the credit of human nature, the above preſent us with illuſtrations, only, of certain rare peculiarities of conſtitution in which exceſſes are tolerated, and, in the midſt of ſuch debaſing indulgence, the attainment of length of life is allowed. But, moſt frequently, "ſuch men," ſays Seneca, "pay their liberty for their delights, and, ſell themſelves for what they buy;" and, it muſt be borne in mind that the attainment of longevity in the few who have lived thus irregularly, is no argument in favour of man's conſtitution being ſo framed as to

[1] Thoſe who frequently fly to the bottle for relief, ſhould weigh well their raſhneſs. Wine, and, ſpirits to theſe perſons "ſhould not be meaſured out by cups, but, by conſequences."

Byron made the following characteriſtic note of a party at which Sheridan was preſent, and, where the wine, as uſual, was freely circulated:—"Firſt, ſilent; then, talky; then, argumentative; then, diſputatious; then, unintelligible; then, altogethery; then, inarticulate; then,—drunk."

be capable of ſubmitting, with impunity, to habits of inebriety ;—rather ſhould we regard them as inſtances of original organiſation of ſuch ſtrength, that, had proper prudence been exerciſed, life might, not improbably, have been prolonged far beyond the average period of exiſtence.[1] Moreover, it will be obſerved, on looking to the records of longevity, how exceptional are the caſes I refer to, and, how numerous, on the other hand, are thoſe "prizes in the lottery of life," as Buffon has termed them, in whom frugality, and, ſobriety have been prominent characteriſtics. Brande has moſt truly ſaid :—"*Every healthy toper is a decoy-duck, and, no more proves that health is ſafe in intemperance, than does an unwounded ſoldier that life is ſecure in battle.*"

When we reflect on the groſs, and, artificial life led by the, habitually, intemperate man : the wear, and, tear to which his conſtitution is ſubject through the continued antagoniſm between lethargy, and, ſtimulation, induced by the introduction of narcotic, and, irritant fluids : the conſtant excitation of thirſt, and, ſure ſubdual of hunger : the waſte of nervous energy, and, loſs of muſcular power, &c., can we

[1] "The firſt phyſicians by debauch were made ;
Exceſs began, and, ſloth ſuſtains the trade.
By chaſe our long-lived fathers earn'd their food ;
Toil ſtrung their nerves, and, purify'd their blood ;
But we, their ſons, a pamper'd race of men,
Are dwindled down to threeſcore years and ten.
Better to hunt in fields for health unbought
Than fee the doctor for a nauſeous draught,—
The wiſe for cure on exerciſe depend ;
God never made his work for man to mend."—*Dryden.*

wonder that he ſhould, as a common rule, fall an early, and, eaſy prey to this ſelf-inflicted, ſlow-poiſoning; and, might we not, fairly expect, that, after death, the circulating fluid, with the various tiſſues of the body, would afford abundant evidence of chemical, and, phyſical changes, ſtealthily, but, ſurely wrought by this toxœmic power? "If," ſays Dr. R. G. Dods,[1] "the thoughtleſs conſumers, or, zealous advocates of ſtimulating beverages would accompany us to a few *poſt-mortem* examinations of individuals who had perſevered in ſuch habits, or, were called to witneſs, like us, the ſufferings they, previouſly, endured, they would feel horrified at their own folly, and, ignorance, and, if they were wiſe, would never touch the bowl again."

Without entering, particularly, into a conſideration of all the ſtructural changes which occur in the various tiſſues of thoſe who have been, habitually, intemperate, I may, nevertheleſs, refer to the ſtate in which ſome of the chief organs are found, after death, in ſuch perſons, and, I believe, it is very generally admitted that *fatty degeneration* conſtitutes, in them,

[1] Report from the Select Committee on Inquiry into Drunkenneſs, p. 225. Printed by order, May 5, 1834.

"People who have any regard for their health, and, lives, ought to tremble at the firſt cravings for theſe poiſonous liquors. Strong waters ſhould never be taken but by the direction of a phyſician, or, in the agonies of death. For, when perſons arrive at that ſtate, that they become neceſſary to their eaſe, and, freedom of ſpirits, they may juſtly be reckoned among the dead, both as to the ſhort time they have to live, and, the little uſe they can be of to themſelves, or, mankind." —G. Cheyne, M.D. An Eſſay on Health, and, Long Life, 8th ed, p. 50. Lond. 1734.

a prominent pathological condition. Even the blood itſelf, in drunkards, preſents, very commonly, characteriſtics which have been recogniſed, and, commented on by many obſervers,—its fatty condition being allowed by all :—Lecanu found, in ſome caſes, as much as 117 parts in 1000,—the higheſt eſtimate of the quantity in health, being 8·64 parts. "In general, I have noticed," ſays Huſs,[1] "that oily particles abound in the blood remaining in the heart, and, larger arteries in the bodies of drunkards, and, the blood, when rubbed between the fingers, gives the ſame feeling as though it were fat." This increaſed amount of fat in the blood (*piomænia*) confers on the ſerum a whitiſh, milky diſcoloration, and, the floating fat-globules may be, eaſily, recogniſed under the microſcope.

The blood, in addition to preſenting theſe peculiarities in drunkards, is found to be defective in its uſual amount of fibrine, and, a lower than the normal grade of plaſticity prevails: the corpuſcles appear to be diminiſhed in number, and, the aqueous parts are increaſed in quantity: there is leſs than the ordinary eſtimate of hœmatine preſent, and, the carbon is ſuperabundant :—Scharlau has found as much as 30 per cent. more carbon in the blood of a drunkard than in that of a healthy man.

Beyond the fact of the direct paſſage into the blood of the alcoholic fluid received by the ſtomach, the accumulation of hydro-carbonaceous matter in it

[1] Alcoholiſmus Chronicus. Part i, p. 19. Stockholm, 1849. *Vide*, alſo, an Eſſay by Frank in the Hannov. Annalen for 1847.

may be accounted for by the diminution of the amount of carbonic acid, and, water expelled from the lungs of thoſe under the influence of this ſtimulus. "But," obſerves Dr. C. Wilſon,[1] "phyſical, and, even mental exertion increaſes the degree of exhalation of carbonic acid by the lungs, and, therefore, alſo, operates by increaſing the power of reſiſting the effects. Hence, the drunkard, reduced to inaction, loſes yet another of his grounds of vantage. Faſting, on the other hand, cauſes leſs carbonic acid to be exhaled: and, faſting increaſes the proneneſs to intoxication, and, the miſchief of its reſults."

I paſs over the morbid ſtate induced in the ſtomach by the introduction of the alcoholic ſtimulus, to conſider the effects reſulting from the circulation of blood in the condition above deſcribed, throughout the ſyſtem. Operating as an irritant, it is propelled by the heart with increaſed force, and, frequency through the arterial channels,—firſt, however, in its depraved form, perverting the nutrition of this organ, and, giving riſe, there, both to fatty *depoſition*, and, fatty *converſion*; at the ſame time that the occurrence of this latter ſtate is favoured by the re-action enſuing from reiterated over-ſtimulation of the heart-fibre—a re-action reſulting in atrophy, and, degeneration. This is, equally, the caſe in reſpect of the coats of the arteries, and, their atheromatous condition in drunkards is well known: or, as we now ſpeak of the change,—fatty, and, calcareous degene-

[1] The Pathology of Drunkenneſs, p. 164. Eding. 1855.

ration have involved them, and, for the normal tiſſue we find ſubſtituted, albumen, choleſterine, fat, bone-ſalts, and, ſometimes, pigmental matter. It is remarked by Huſs,[1] that, "In the arteries of the brain another important change is, frequently, obſerved; uſually, but not always, in company with atheroma of the larger blood-veſſels of other parts. This is a dilatation of the arteries, both large, and, ſmall, which ramify in the cerebral ſubſtance; ſo that, on ſlicing the brain, they appear of larger ſize than natural: while, the coats of the larger blood-veſſels, likewiſe, become brittle."

Under this abnormal ſtate of the circulating apparatus, and, its contents, can we be ſurpriſed at the occurrence of hœmorrhages, arteritis, apoplexy, or, aneuriſm? Can any condition be more ſubverſive of all thoſe proceſſes by which the aſſimilative force is, duly, exerciſed?—the life of the drunkard hangs, indeed, on a thread, and, his frail exiſtence may become, ſuddenly, cut ſhort by failure of the heart's action,[2] or, where the nutritive, and, reparative

[1] Loc. cit. p. 11.

[2] "Such an individual, in the prime of life, who had been engaged in his uſual avocations till a few days previouſly, when he became indiſpoſed, was found lying extended on the floor of his apartment, cold, and, rigid, having, evidently, been dead for ſeveral hours. On aſſiſting his medical attendant at the poſt-mortem examination, we found the liver ſo much enlarged, eſpecially on its upper convexity, that it extended as high as the fourth rib: its whole ſubſtance being of a yellow-ochery colour, and, friable conſiſtence, or, in other words, preſenting the characteriſtics of what has been termed the fatty liver. The more immediate cauſe of death was attributable to the ſtate of the heart, which was *ſoftened, eaſily lacerable*, and, contained fibrinous concretions."—Dr. C. Wilſon, loc. cit. p. 75.

powers are ſo greatly in abeyance, the ſlighteſt injury may be, rapidly, followed by an, equally, fatal reſult.

With reſpect to the more frequent occurrence of aneuriſm in the intemperate, I may quote the valuable teſtimony of Dr. Criſp,[1] who remarks :—" This diſeaſe is, I believe, more frequent in England than in any other country. Temperature has but little influence in the production of the diſeaſe ; but, when the habits of the people are conſidered, their great induſtry, the violent, and, continued exertion they are accuſtomed to uſe, as well as their greater addiction to the uſe of ardent ſpirits,—the cauſe admits of a ready explanation. Soldiers, and, ſailors,[2] eſpecially, the former, are more liable to aneuriſm than any other claſs : and, they are called upon, often, when the heart's action is increaſed by the uſe of alcohol, to make ſudden, and, violent efforts. Amongſt agricultural labourers, on the other hand, who (though ſubject to great bodily fatigue) generally, lead a life of temperance, and, have their minds free from anxiety, the diſeaſe is, comparatively, rare."

Beſides the ſtate of the heart, in drunkards, already indicated, the great depurating organs of the blood,—the lungs, the liver, and, the kidneys,—ſuf-

[1] A Treatiſe on the Structure, Diſeaſes, and, Injuries of the Blood-veſſels, p. 118. Lond. 1847.

[2] Fiſcher (De ſenio ejuſque gradibus et morbis. Cap. I, § xxxviii, p. 76. 2nd ed. Erford, 1760) quotes a caſe from the Comment. Academ. Sc. Paris, where a man, æt. 56, having had his leg amputated, all the arteries of the limb were found, on diſſection, to be oſſified—even to the extremities of the toes. It is added :—" Anglus fuit natione, nauta. Hinc relator putat oſſificatione illam arteriarum *ex potu Anglicis Pontſch.* cibiſque nauticis, nec non a morbis prægreſſus viro eueniſſe."

fer, materially, from organic changes. In eight caſes, Huſs found the lungs healthy, only, in three. Dr. Ogſton[1] ſtates them to have been affected in 75 per cent. of the whole of his inſtances. Fatty degeneration is the prominent characteriſtic of, and, is well known as, the "drunkard's liver." Its great enlargement, at firſt, and, contracted ſize, at laſt, with many other peculiarities, are ſo familiar to all as to require no more than this paſſing alluſion to them. Laſtly, the kidneys are, commonly, to be ſeen diſeaſed in drunkards, and, their great tendency to paſs into the ſtate of granular degeneration has been, fully, acknowledged by all writers on affections of this organ. With regard to the frequency of this diſeaſe Dr. Chriſtiſon[2] obſerves:—"A large proportion of caſes have occurred in the perſons of habitual drunkards. It is not neceſſary, however, that the vice of intemperance be carried to ſo great an exceſs: for, a ſtill larger proportion, perhaps, is compoſed of thoſe who, without deſerving the deſignation of habitual drunkards, are in the conſtant practice of uſing ardent ſpirits ſeveral times in the courſe of the day, and, of occaſionally indulging, to intoxication. I am not prepared to ſtate the exact proportion of caſes thus referable to one variety, or, another, of intemperance, but, I am certainly within the mark in ſtating it at three-fourths, or even, four-fifths of the whole."

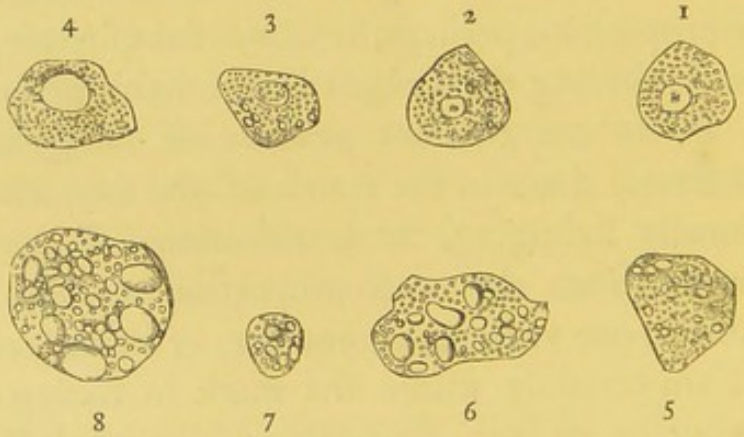
That the kidneys ſhould ſuffer from the long-continued, and, habitual excitement to which they

[1] Brit. and For. Med. Chir. Review. Vols. 13 and 14. 1854.

[2] On Granular Degeneration of the Kidnies, p. 110. Eding. 1839.

are ſubject,—the great eliminative efforts they are called upon to make, and, from the direct irritation of the alcoholic fluid itſelf which reaches them, is not to be wondered at; and, we, hence, find that they, at firſt, become deeply congeſted, are ſoon affected with a low, chronic form of inflammation, and, a correſponding impairment of functional power enſues: they paſs, inſenſibly, into a ſtate of fatty degeneration, which has been ſhown by Dr. G. Johnſon[1] to conſtitute the true pathology of the granular diſeaſe of theſe organs. This accurate obſerver remarks:—"Bright's diſeaſe may be deſcribed as *primarily, and, eſſentially, an exaggeration of the fatty matter which exiſts, naturally, in ſmall quantities in the epithelium cells of the healthy organ.* A ſpecimen of the diſeaſe in an advanced ſtage, examined with

Fig. 21.



[1] Med. Chir. Trans. Vol. xxix, p. 1. Lond. 1846.

"In every healthy kidney there are many cells, entirely free from oil (fig. 1) while, others contain only one, or, two minute particles (figs. 2 & 3); others, again, contain ſeveral ſcattered over the interior of the cell (fig. 4.)"—Loc. cit. p. 2.

the microſcope, preſents epithelium cells in every degree of engorgement, from the incipient enlargement of the particles in fig. 5, in which the cell-nucleus is ſtill viſible, to the complete engorgement of the cells in figs. 6, 7, and, 8, in which the nucleus is concealed by the fatty globules.

The diſeaſe, then, appears to be a fatty degeneration of the kidney; preciſely, analogous to the fatty degeneration of the liver.[1]

I ſhall take occaſion to point out, hereafter, that, in addition to this peculiar form of change occurring in various organs, and, tiſſues of the intemperate, there may, commonly, be found eſtabliſhed, by degrees, an arcus ſenilis; and, the cartilages of the ribs, and, of the larynx, ſimultaneouſly, become affected with fatty, and, calcareous degeneration.

Before concluding, however, the ſubject of the above condition of the kidneys, I may refer to an obſervation I communicated to "The Lancet," in January, 1851:—"*Aſſociated with this change (fatty degeneration) in the cornea, and, the heart, I, not unfrequently, find fatty degeneration of the liver, kidneys,*

[1] "It is an intereſting fact, in illuſtration of the frequent connection of liver diſorder with renal diſeaſe, that, when the urine is laden with albumen, oil globules, and, fatty matter, may often be detected by the microſcope, adhering to the ſhed epithelium ſcales. If, under ſuch circumſtances, blood be taken from the arm, the ſerum, after ſeparation from the clot, is found to be quite milky from the preſence of oil globules, which may be diſſolved out by digeſtion in ether. (See Dr. J. F. Duncan, in the Dublin Medical Preſs, June 28, 1848). All this points to the probable cloſe relation between albuminuria, and, fatty degeneration."—Dr. C. J. B. Williams. Loc. cit. p. 307.

various muſcles, bones, arteries, cartilages of the larynx, and, ribs, and, ſeveral other parts." At this time, my examinations were confined, chiefly, to the aged ſubject; but, extended experience ſoon, and, abundantly, proved to me that, even, in comparatively early life, a corneal arcus, when ſymmetrically, and, largely-developed, might, in many caſes, be looked upon as affording an additional ſymptom wherefrom to ſuſpect a ſimilar form of morbid change being, not improbably, in progreſs, within the body. Many authors have, ſince, adduced evidence in ſupport of my belief. From amongſt them I may quote a caſe by Dr. Todd, and, obſervations by Dr. C. J. B. Williams :—

" A copper-plate printer, and, by nature of his vocation, ſubject to great viciſſitudes of temperature. His age is 55 years. He denies being an intemperate man, but, admits that his habit has been to drink about two quarts of porter, and, a quartern of gin, daily. He never had rheumatiſm, or, gout, nor have any of his family ſuffered from either of theſe complaints.

" On examining the eyes, each cornea exhibits a large, and, well-marked arcus ſenilis.

" This patient was under treatment, for many months, ſuffering from renal dropſy, of which he, eventually, died.

" A *poſt-mortem* examination was made of the abdomen, only; when, the kidneys were found to be large, and, preſented, exceedingly, good ſpecimens of fatty degeneration of theſe organs, exhibiting under

the microſcope, the uſual characters of this form of renal diſeaſe."[1]

Dr. C. J. B. Williams[2] obſerves:—"In a large proportion of the caſes of degenerative diſeaſe of the kidneys, and, heart, that have fallen under my notice, the moſt obvious exciting cauſe of the miſchief has been extreme anxiety, or, long-continued mental exertion.

There is, generally, an outward ſign manifeſted in the *arcus, or, circulus ſenilis* of the eye,—this, almoſt always, indicates premature age brought on by the wear, and, tear, of exceſſive mental anxiety, or, by "faſt living."

The ſtructural changes which we have ſeen habitual intemperance to entail, have, ſo completely, perverted the phyſiological powers of the various organs; diſarranged the mutual conſent of action which ſhould, harmoniouſly, prevail among them, and, overthrown the fine balance of normal relation between the fluids, and, ſolids of the body, that, we cannot wonder at the drunkard, eventually, exhibiting thoſe many indications, ſo ſurely betokening the, deeply, deteriorated condition of his *vis vitæ*. We muſt, however, on the other hand, obſerve caution, and, not be miſled by the ſpecious ſemblance of health, which, under the guiſe of rounded form, vigorous frame, and, energetic mind, often—for a while—tends to the belief, that, ſoundneſs of conſti-

[1] Clinical Lectures on Certain Diſeaſes of the Urinary Organs, and, Dropſies. R. B. Todd, M.D., p. 83. Lond. 1857.

[2] Loc cit. 3rd edition, p. 47. Lond. 1856.

tution obtains in all the plenitude of textural integrity, and, functional power. Such, be it remembered, are falſe, and, fleeting characters, only; unwonted ſtimulation of brain has but evoked, for a time, a brighter diſplay of its intricate workings: conſtitutional vigour is maintained, merely, under the reiterated excitement of poiſonous potations; and, fulneſs of figure,—in implying *fat*,—affords direct evidence of the low vital ſtandard to which the health of the drunkard is reduced; and, preſents a ſignificant ſurface-ſymptom of the ſure ſpoil, in progreſs, of important organs beneath.[1]

I have ſtated that, in theſe caſes, there may, not uncommonly, be obſerved a fatty degeneration of the cornea; and, when we conſider the great involvement of the other tiſſues of the body in this change, and, the degraded nutrition of all,[2] it might, not unreaſonably, be anticipated that the eye would afford corroborative teſtimony to the general evidence of ravages ſo wide in extent, and, deadly in form,—ravages which have, rapidly, reduced youth to age, and, are, hurriedly, leading the *artificial old man* to premature decrepitude, and, the tomb.[3]

It does not appear to have been remarked by

1 "Corpulence is, often, ſuch an exceſs of health that it is, really, the beginning of diſeaſe.—Sir C. Scudamore.

2 "Even in the bones the fat-formation has gained ground at the expenſe of the bony texture."—Rokitanſky. Vol. i, p. 397. Lond. 1854.

3 "And that incurable diſeaſe, *old age*,
In youthful bodies more ſeverely felt,
More ſternly active ſhakes their blaſted prime."
Dr. Armſtrong. The Art of Preſerving Health.

thoſe who have inveſtigated the morbid appearances preſent in the bodies of habitual drunkards, that, the cartilages of the ribs, and, of the larynx have undergone any particular alteration,—ſuch, however, will be found to be the caſe.

At *poſt-mortem* enquiry, with, perhaps, a paſſing expreſſion of ſurpriſe that the coſtal cartilages ſhould be, to ſuch a great degree, oſſified at ſo early an age, they, with the ſternum, are placed aſide, for an inſpection of the condition of the heart, and, lungs; and, no further thought is, ordinarily, beſtowed upon them: and, we are unaccuſtomed to make an examination of the laryngeal cartilages unleſs the peculiar circumſtances of the caſe point to them as the ſeat of diſeaſe. It has occurred to me to pay ſome attention to the ſtate of both of theſe parts, in inſtances where premature agedneſs,—from whatever cauſe ariſing,—obtains, and, is, ſtructurally, indicated by fatty degeneration of ſo many, and, diverſe tiſſues; when, I find theſe cartilages have alſo become, materially, involved in a ſimilar alteration, and, they may, frequently, be ſeen to be, in a great meaſure, oſſified, *i. e.*, converted into true lacunal bone.

Such changes aſſume a poſition of great pathological intereſt, when, in place of being, ſtill, conſidered as phenomena, *per ſe*, they are regarded, on the other hand, in aſſociation with the preſence, alſo, of atheromatous, and, calcified arteries, fatty degeneration of the heart, the liver, the kidneys, the cornea, &c.[1]

[1] "The diſcovery of a general law, or, the incluſion of what is already known in generaliſations of a ſtill higher order, is a new ac-

"The changes of natural degeneration in advanced life," obſerves Mr. Paget,[1] "have a direct importance in all pathology; becauſe, they may guide us to the interpretation of many ſimilar anomalies, which, while they occur in earlier life, we are apt to call diſeaſes, but, which are only premature degenerations, and, are to be conſidered, therefore, as methods of atrophy; as defects rather than as perverſions of the nutritive proceſs; or, as diſeaſes, only, in conſideration of their time of occurrence."

Andral,[2] in ſpeaking of oſſification of the thyroid, and, cricoid cartilages as a natural phenomenon of old age, remarks,—"but, at an earlier period of life, it conſtitutes a true morbid ſtate." This obſervation will apply, equally, to the coſtal cartilages.

From the ſketch I have drawn of the ſtate to which the conſtitution of the drunkard is reduced by habitual intemperance, we learn, that, he has already, and, deeply ſown thoſe elements of diſeaſe, which, with rankneſs of growth, often, ſpring up, rapidly, to encumber, and, deſtroy; and, ſhould injury accrue, from without, in what a deplorable condition do we find the ſufferer who has, now, to call upon the ſelf-enfeebled reſources of failing ſtrength, for healthy ſupply, and, vigorous repair! How impoveriſhed has become that fluid from which the reparative

quiſition, and, ſo far as our experience has, hitherto, gone, every advance towards generality has, at the ſame time, been a ſtep towards ſimplification."—W. Addiſon, M.D., On Healthy, and, Diſeaſed Structure, p. 183. Lond. 1849.

[1] Loc. cit. Vol. i, p. 97.

[2] Loc. cit. Vol. ii, p. 493.

materials are to be derived:—to what an abnormal ſtate are the channels reduced through which the tainted current has to find its way:—how ſignal muſt be the failure of ſuch veſſels to propel with force, and, diſtribute with freedom,—and, what muſt be the reſult of the loſs of healthy balance between the ſolids, and, fluids, when, at the ſeat of miſchief, as throughout the body, their niceſt adjuſtment is neceſſitated? The frequent iſſue of ſuch caſes affords a ready, but, a melancholy reply. Death has long been buſy, though life ſtill perſiſts:—the blow falls heavieſt on the already ſtricken man. Decay has, by degrees, engroſſed much, and, a ſpeedy diſſolution, ſoon, claims the whole.[1]

The further conſideration of this ſubject cannot be better purſued than in the words of Dr. Carpenter,[2] who remarks:—"The claſſes of men among whom there is an appearance of remarkable bodily vigour, notwithſtanding habitual exceſs in the uſe of alcoholic liquors, are thoſe who are, continually, undergoing great muſcular exertion, and, who, not only, drink largely, but, eat heartily. Of this claſs, the London

[1] "It would, frequently, be a ſource of ſerious error in medicine if we did not admit, in at leaſt a wide circle of caſes, the poſſibility of a parity of effect from a diverſity of cauſe, in form, if not in eſſence. Whatever lowers, or, vitiates the action of the vital forces muſt tend to the promotion of a diſeaſed nutrition; and, thus *intemperance* may provoke, on the one hand, what hereditary diſpoſition, or, peculiar tendencies of conſtitution, or, ſome other chain of cauſation, may excite on the other."—Dr. C. Wilſon, l. c. p. 81.

[2] On the Uſe and Abuſe of Alcoholic Liquors, 2nd ed. p. 72. Lond. 1851.

coal-heavers, ballaſters, and, brewers' draymen, are remarkable examples; many of them drink from two to three gallons of porter daily, and, even, ſpirits beſides; they are, for the moſt part, large, groſs, unwieldy men, and, are capable of great bodily exertion,—ſo long, at leaſt, as their labour is carried on in the open air. But, it does not, hence, follow that they are in a condition of real vigour; for, the conſtitutions of ſuch men break down before they are far advanced in years, even, if they do not earlier fall victims (as a large proportion of them do) to the reſults of diſeaſe, or, injury, which were apparently, at firſt, of the moſt trifling character. It is well known to thoſe who have obſerved the practice of the London hoſpitals, that when ſuch men ſuffer from inflammatory attacks, or, from local injuries, theſe are, peculiarly, diſpoſed to run to a fatal termination: in conſequence of the low aſſimilative power of the ſolids, and, the general depreſſion of the whole vital energy, reſulting from habitual over-excitement. The want of plaſticity of the blood gives to the inflammatory proceſſes an *aſthenic* inſtead of *ſthenic* character: there is no limitation to plaſtic effuſion, but, they ſpread far, and, wide through the tiſſues: depletion cannot be borne: and, the only hope of ſucceſs lies in the uſe of opium, and, ſtimulants, with nutritious diet, to ſuſtain (as far as poſſible) the proſtrate energy. Thus, we ſee in ſuch men the ſlighteſt ſcratch, or, bruiſe will, not unfrequently, give riſe to a fatal attack of eryſipelas, and, that, internal organs, affected with inflammation, rapidly, become

infiltrated with pus, or, paſs into a gangrenous ſtate. Hence, the ſurgeon is very unwilling to perform operations upon them, knowing that their chance of recovery is but ſmall. The condition of theſe men, in regard to recovery from injury, is in remarkable contraſt to that of men who have been 'trained' to pugiliſtic encounters; the latter, having been brought to a condition of the higheſt poſſible health by active exerciſe, abundance of nutritious food, occaſional mild purgation, and, either entire abſtinence from fermented liquors, or, by the very ſparing uſe of them. Men, thus trained, recover with remarkable rapidity from the ſevere bruiſes which they are liable to receive."

By no means an unfrequent mode whereby the life of the drunkard is, more immediately, terminated after an accident in which a wound is involved; or, in inſtances where, for the relief of the miſchief, a wound has to be inflicted,—*e. g.*, in amputation,—is, by *pyæmia*,—a form of diſeaſe, particularly, prone to occur in conſtitutions where the vital powers are already depreſſed, and, the nutritive operations deranged, and, depraved.

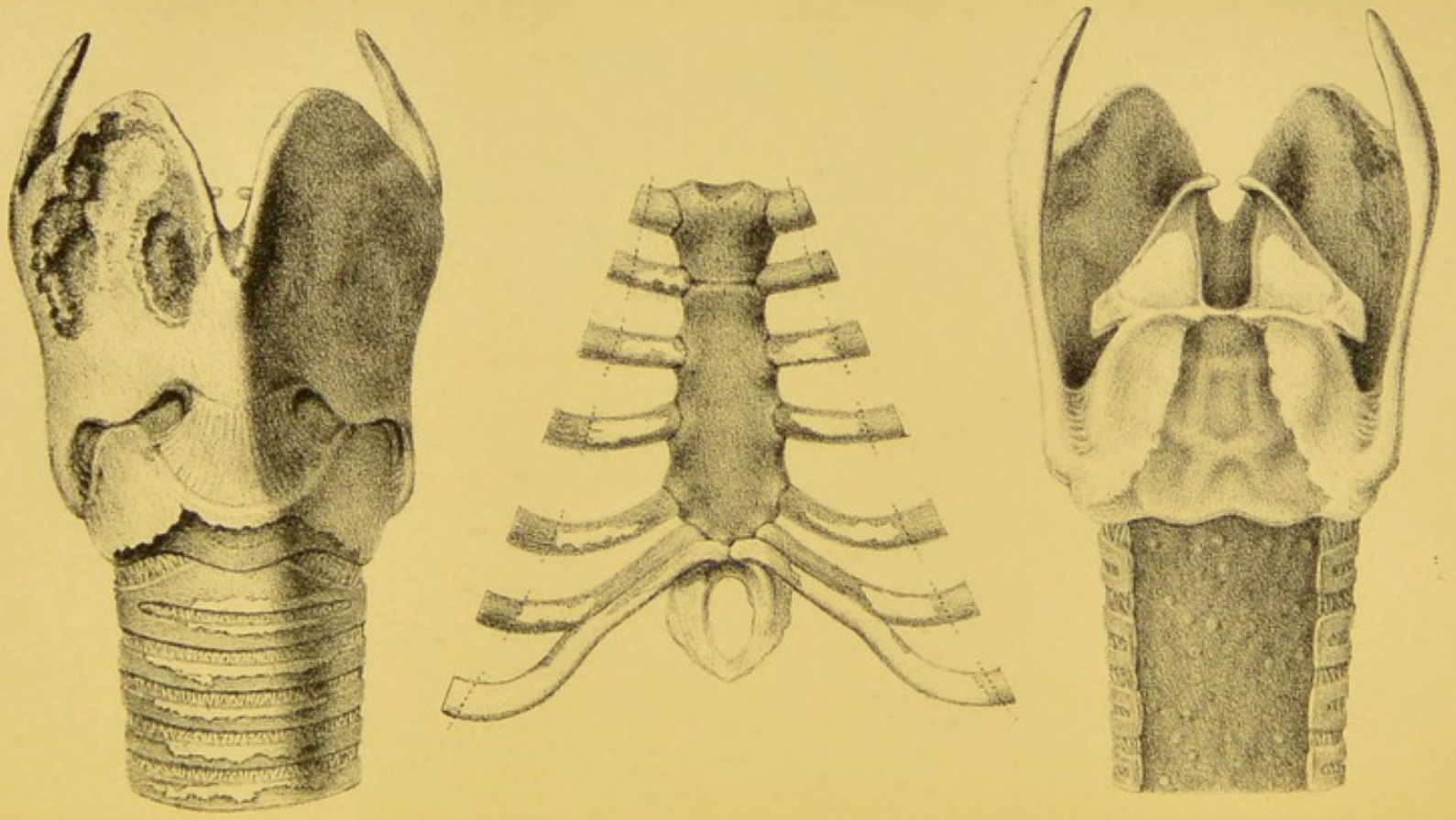
It would be foreign to my purpoſe to enter into a lengthened conſideration of this ſubject, but, the following opinion is ſo much in accordance with my own views, and, bears, ſo cloſely, on the account, above given, of the condition of the blood, and, ſolids in the bodies of drunkards, that I am induced to extract it:—"The reſearches of Mr. Addiſon have rendered it probable, that the *liquor puris* is

a degraded, or, degenerated form of the liquor ſanguinis; and, though, we cannot agree with him in conſidering the pus corpuſcles as metamorphoſed white corpuſcles (becauſe we cannot think it probable that bodies ſo large as theſe can paſs out of the capillaries, without an abſolute rupture of their walls,) we are inclined to think that the two are developed from the ſame germs,—the minute molecules floating in the blood, and, continually regenerated, (like the germs of the ſimple, cellular plants,) by burſting of the parent corpuſcles. Theſe germs, developed in the midſt of a degraded fluid, will have a degraded form; and, thus, from healthy liquor ſanguinis, and, from cell-germs, which would, otherwiſe, have produced exudation-corpuſcles, will be produced, under the deteriorating influence of the contact of a dying, and, diſintegrating tiſſue, liquor puris, and, pus-corpuſcles." [1]

The annexed inſtances, from among many of a ſimilar deſcription, with which practice has furniſhed my caſe-book, may be adduced, in illuſtration of the foregone obſervations.

J. C——, *æt. an.* 56. A bit-maker, was admitted into the Charing Croſs Hoſpital, having ſuſtained a compound fracture of the left tibia, extending into the ancle-joint. He was intoxicated at the time of the accident, and, an inquiry into his habits of life proved him to have been an habitual drunkard.

[1] *Review* in the Brit. and, For. Review (July, 1844, p. 3). "The Actual Proceſs of Nutrition in the Living Structures, demonſtrated by the Microſcope." Wm. Addiſon, F.L.S. Lond. 1844.



Profuſe ſuppuration of the wound ſoon occured, and, the reparative efforts were moſt feeble. Amputation was obliged to be had recourſe to; but, the ſtump, ſpeedily, aſſumed an unhealthy character, accompanied by a copious, dark, ſanious diſcharge, and, the patient, eventually, died with the ſymptoms of pyœmia.

Autopſy.—The body was ſpare: the hair grey, and, ſcanty. He appeared to be a man much older than fifty-ſix years of age.

Upper, and, lower arches of fatty degeneration, broadly, developed in each cornea.

A large quantity of pus exiſted in, and, around the right ſterno-clavicular joint: alſo, in the right knee-joint.

The larynx was, to a great extent, oſſified (*Pl.* III), and, the, yet, cartilaginous parts were affected with fatty degeneration.

Thorax.—The cartilages of the ribs were under the ſame conditions. Lungs healthy.

The heart was, abnormally, encumbered with fat —eſpecially the right ventricle—and, was ſomewhat larger than natural. It was pale; here, and, there, mottled, flabby, and, friable. The left valves were ſtudded with ſpecks of atheroma, and, the muſcular ſubſtance, on this ſide, ſhowed, under the microſcope, in many places, an advanced ſtage of fatty degeneration.

The aorta was charged with larger, and, ſmaller patches of atheroma, throughout its whole courſe.

Abdomen.—Liver very large, and, pale. Every

part examined ſhowed the hepatic cells charged with oil-globules. Spleen of normal ſize, and, colour; but, ſofter in conſiſtence than natural. The kidneys preſented, each, a few ſmall, watery cyſts; they were of a pale hue, but, the diſtinction between the cortical, and, medullary portions was tolerably well marked.

J. S——, æt. an. 53, a cabman, was admitted into hoſpital under my care, having met with a compound fracture of the tibia, and, fibula. The external wound was not an inch in length. Only a very ſmall quantity of blood had been loſt. The fracture was readily adjuſted, and, the edges of the wound, eaſily, brought together.

This was the only injury received; and, the recovery from its ſhock was, apparently, ſpeedy. The patient, however, had been a very intemperate man, for many years, and, it was, ſoon, to be perceived that the reparative powers were, conſiderably, in abeyance; his ſpirits were always depreſſed, and, the countenance, though, at firſt, plump, ſpeedily became jaded; and, the habitual liſtleſſneſs of the eyes ſpoke of gloomy forebodings:—there was no rallying *ſmile* betokening *force*.

At the end of three weeks, the patient died from pyœmia,—not having ſhown a ſingle, hopeful ſymptom from the day of his admiſſion.

Autopſy.—The body was moderately well ſtored with fat. In each cornea was a complete *circulus ſenilis*.

The cartilages of the larynx, and, ribs preſented the ſame conditions as in the firſt-mentioned caſe.

Thorax.—Lungs healthy. The trunk of the left coronary artery of the heart ſhowed, here and there, calcified patches, whilſt, its branches were encumbered with atheromatous depoſits. The organ, itſelf, was of moderate firmneſs; but, the fibres of the left ventricular wall, and, eſpecially, thoſe of one of the large *columnæ carneæ* were affected with fatty degeneration in varying degrees. All the valves healthy.

Abdomen.—Liver large, pale, and, contained abſceſſes of different ſizes. Spleen quite pulpy, and, in ſome parts, diffluent. Kidneys pale; and, the middle portion of each ſhowed the early ſtage of granular degeneration.

Aorta not examined, but, the femoral arteries preſented bony patches, and, the condition, hence, of the former veſſel might be fairly judged of.[1]

Theſe caſes offer a practical commentary on the obſervations preceding them, and, ſhow, among other peculiarities, the great extent to which fatty degeneration of the heart had advanced, without, however, the exiſtence during life of ſuch ſymptoms as beſpeak, in particular caſes, the preſence of this affection. Theſe men were in the daily habit of following their reſpective vocations without a ſuſpicion, even, that each was the ſubject of ſuch organic changes as might, in a moment, terminate exiſtence. Continual ſtimu-

[1] A caſe is related by Morgagni (loc. cit. vol. i, p. 442, caſe 3) of a Venetian tailor, devoted to hard drinking, in whom it was found, after death, that, the aorta, "opened from the curvature to the loins, exhibited numerous ſcales, which were alſo obſerved, to ſome height, in both the carotid arteries."

lation, whilſt ſupporting, was deſtroying them: but, at the ſame time, the deſtruction was all-pervading, and, every part, in its deterioration, was acting in uniſon with fellow-organs, in like manner being ſpoiled: and thus, the equilibrium of fictitious health was ſuſtained: but, when the ſhock of injury fell on theſe ſhattered frames, the vital forces became diſarranged, and, were no longer able to maintain that concert of action which had, previouſly, the effect of continuing life, even though, under an enfeebled form.

"*In ſhort,*" obſerves Mr. Paget, "*the arcus ſenilis ſeems to be, on the whole, the beſt indication that has, yet, been found of proneneſs to an extenſive, or, general fatty degeneration of the tiſſues.*"

A ſhort time ſince, I attended to a caſe, in the Charing Croſs Hoſpital, in many reſpects comparable with thoſe already related; but, in which fatty degeneration of the heart had made greater progreſs than in either of them. The patient, too, was ten years younger,—his age being only *forty-three*. His habits had been, for many years, moſt intemperate.

Shortly after his admiſſion, with a compound fracture of the tibia, and, which ſubſequently, required amputation of the leg, he had an attack of *delirium tremens*, brought on, more immediately, by taking ſpirits, which his friends had, ſurreptitiouſly, brought him, thinking,—as is found, ſo often to be the caſe under theſe circumſtances,—that the ſurgeon would not keep his patient ſufficiently ſupported by *drink*, from his being unaware of what the conſtitu-

tion, through habitual intemperance, required,—and death, in the abſence of ſtimulation might, moſt probably, be the iſſue of ſuch preſumed neglect.

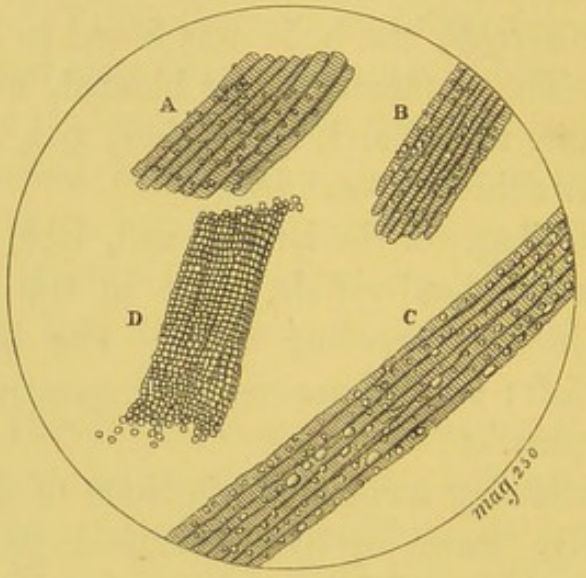
At the *autopſy*, the body was found to be ſtored with fat. The countenance was bloated, and, paſty, the hair quite white, and, a complete, and, *broad circulus ſenilis* exiſted in each eye.

The cartilages of the larynx, and, ribs, the liver, kidneys, and, blood-veſſels, were in the condition deſcribed in the preceding caſes. The brain was, unuſually ſoft; and, its arteries were, greatly, affected with atheroma.

The following account of the ſtate of the *Heart* was, kindly, drawn up by my houſe-ſurgeon,—Mr. Colton Arnold:—"This organ was of flabby conſiſtence, and, the colour of its muſcular ſubſtance lighter than normal. The walls,—particularly of the left ventricle,—were unnaturally thin, and, loaded with fat. On placing a ſpecimen of the muſcle under the microſcope, the fibres were ſeen to be impregnated with fat, to a conſiderable extent, although this depoſit varied in quantity in different parts of the heart; thus, in a portion from the right auricle, the fibres retained their tranſverſe markings, but, a large amount of veſicular fat could be noticed, mixed up with the fibrillæ.

Specimens from various parts of the heart were examined, but, fat was obſervable in each, varying in amount from that ſhown in A to D:—

Fig. 22.



In this laſt portion, (D) (taken from one of the large *muſculi papillares* of the left ventricle) the character of muſcular fibre appeared to be, entirely, deſtroyed,—the ſarcous elements being, wholly replaced by fat-globules, arranged in linear ſeries, and, retaining the parallel relation of the fibrillæ. A piece of muſcle from this part, when placed between the glaſs-ſlide, and, mica-cover, yielded to the ſlighteſt preſſure, like ſoft wax, and, appeared to have loſt the tenacity, and, indeed, almoſt every characteriſtic of muſcular ſubſtance.

The coronary arteries were examined, but, no atheromatous depoſit was detected in their walls.

In the Brit. and For. Med. Chir. Review,[1]

[1] July, 1857, p. 226.

Mr. Henry Lee has recorded the following inſtructive caſe:—Philip Shaw, æt. 56, a porter, was admitted into Fiſk Ward, with gangrene of the left foot. On the 31ſt of January, after having been expoſed to cold during the day, he felt, in the evening, ſome numbneſs, and, ſtiffneſs in the left foot. He, ſubſequently, experienced conſiderable pain, and, the ſkin of the toes became of a dark-bluiſh colour. When admitted into the hoſpital, his countenance was pinched as if from habitual intemperance. His pulſe intermitted at every ſeven, or, eight beats; and, there was a diſtinct bellows ſound at the apex of the heart. In the beginning of March the whole of the metatarſal bones had become expoſed by the ſeparation of ſloughs; and, on the 23rd of the ſame month he died. His body was examined 34 hours after death.

Autopſy.—A diſtinct arcus ſenilis preſented itſelf in each eye.

On opening the *thorax*, the lungs were found healthy, and, everywhere crepitant. The cavities of the heart were empty: there was ſome thickening of the mitral valve: the arch of the aorta preſented numerous atheromatous patches.

In the *Abdomen*, the liver, ſpleen, kidneys, and, inteſtines were found, perfectly, healthy. The aorta, here, preſented ſimilar depoſits to thoſe already noticed. Near the origin of the inferior meſenteric were ſome fibrinous flakes adhering to the poſterior part of the veſſel, and, connected with a coagulum which extended ſome three, or, four inches down the

veſſel. The common, and, external iliacs, on both ſides, were much more diſeaſed, the atheromatous depoſit having undergone various degrees, both of hardening, and, ſoftening. The femoral artery of the left ſide was, almoſt, obſtructed in its lower part by white, fibrinous coagula. Between this depoſit, and, the wall of the artery, a channel appeared to have been formed, through which the blood found way. In the popliteal ſpace, the vein, and, artery had become firmly adherent, and, were both obſtructed. The left poſterior tibial artery was almoſt cloſed by fibrinous coagula. In the anterior tibial no diſeaſe was diſcovered. The axillary, brachial, radial, and, ulnar arteries, on both ſides, were, apparently, healthy. The arteries at the baſe of the brain ſhowed ſome diſtinct patches of atheromatous depoſit.

CHAPTER VII.

"Let no practitioner neglect the ſlighteſt warnings of the aberrations of gout. He who does ſo, however often he may eſcape without blame, will ſurely be, at laſt, caught in diſgrace, and, calamity. His patient, lulled into a falſe, and, fatal ſecurity, will undertake duties which he ought, ſtudiouſly, to avoid,—for which he is wholly unfit, and, will break down at the moment when all his ſtrength is moſt needed."—GAIDNER.

IN aſſociation with the ſubject treated of in the laſt chapter,[1] I propoſe, now, to devote a ſhort ſpace to a conſideration of the co-exiſtence of an arcus ſenilis with the gouty cachexia, the external characteriſtics of which have been, thus, ably, ſet forth by Dr. Laycock :[2]—"Blood-veſſels largely developed over the malar bones, and, varicoſed: blood darkly tinted, or, icteric: ſkin oily, yellow, from ſubcu-

[1] "During a long, and, extenſive profeſſional connection with a large, rural diſtrict, we never knew an inſtance of gout among agricultural labourers, who, of courſe, form a great maſs of the population; gout was not uncommon amongſt tradeſmen; but, ſtill more frequent in the claſs of gentlemen, and, opulent farmers (p. 218).

"All the tradeſmen we have met with afflicted with gout have been known to us for their intemperate habits; and, eſpecially, their abuſe of malt liquors: a very large proportion were innkeepers" (p. 219). Budd, W., M.D. Lib. of Med. Vol. v. Lond. 1840.

[2] Lectures on the Principles, and, Methods of Medical Obſervation, and, Reſearch, p. 98. Eding. 1856.

taneous depoſit of fat, or, fatty degeneration of the derma: hair thick, and, white: teeth numerous, diſcoloured, cruſted with tartar: lips bluiſh: noſe reddiſh, hypertrophied; margin of lucid cornea opaque at junction with ſclerotic (*the arcus ſenilis*): abdomen pendulous: limbs thick: joints nodoſe: nodoſities on the ends of the fingers, lobes of ears, faſciæ of muſcles, and, tendons: reſpiration hurried, wheezing: pulſe intermittent, irregular: ſtomach flatulent: digeſtion acid: urine loaded with lithates: temper irritable: mind, ſometimes, enfeebled."

Although fully concurring with Dr. Laycock in an acknowledgment of the not infrequent preſence of the arcus in confirmed inſtances of the gouty diatheſis, I cannot adopt his opinion that "when it happens early in life it is, uſually, indicative of a feeble type of the arthritic conſtitution."[1] This ſtatement finds place in the relation of a caſe where a man, *aged* 28 *years, having this ſymptom, and, being tainted with ſyphilis*, laboured under articular rheumatiſm, and, rheumatic perioſtitis, ſucceeded by diathetic pneumonia, and, hœmoptyſis.[2] Inſtances of the premature occurrence of the arcus in thoſe who diſplay no diathetic indications of gout, or, rheumatiſm, are found to be too numerous to allow of a ready acquieſcence in this latter view of Dr. Laycock; but,

[1] Clinical Obſerv. on a Characteriſtic of the Urine in Rheumatiſm, and, Gout, with eſpecial reference to Diathetic Diagnoſis. Eding. Med. Journal, Aug. 1857, p. 116.

[2] Mitral inſufficiency was detected. Dr. Laycock obſerves that "the arcus ſenilis is, not unfrequently, coincident with fatty degeneration of the heart."

that fatty degeneration of the cornea may co-exiſt with the gouty cachexia, even to the extent of marking the eye with a complete, and, broad zone, and, at an age when the fainteſt trace, only, of this change may, ſometimes, be perceived, no doubt can be entertained, and, is well illuſtrated by the following caſe :—

A few years ago, I was ſummoned, ſuddenly, to attend a gentleman, *æt.* 45, who having riſen, at an early hour, from his bed, fell, heavily, on the floor, in a ſtate of inſenſibility. By the time that I arrived, I found his conſcioufneſs, to a great extent, regained ; but, there was complete hemiphlegia of the right ſide. My patient was a large, bulky man ; accuſtomed to take but little exerciſe, and, to live freely. He had, generally, enjoyed very good health ; but, laboured under varicoſe ulceration of the legs. His hair had been, for a long period, perfectly grey ; and, the *corneæ* muſt have been, for many years, affected with *fatty degeneration* for them to preſent the broad, and, complete circles which, now, characteriſed them :—

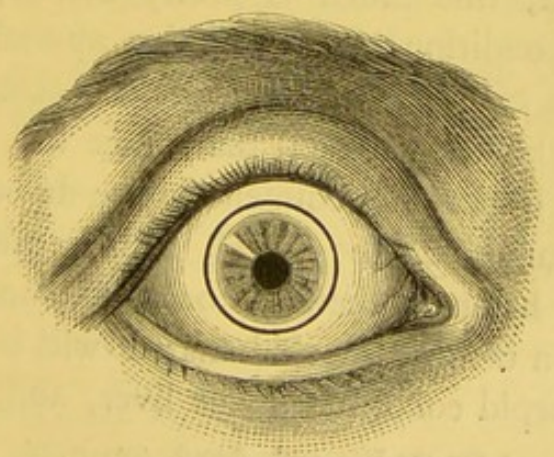


Fig. 23.

Although the father, and, brothers of this gentleman had ſuffered, ſeverely, from gout, he had, himſelf, never been afflicted by it. During the progreſs of treatment, however, and, when recovery was, ſteadily, advancing, a ſudden, and, ſharp attack of gout ſeized the great toe. From this time, the amendment was more rapid; and, eventually, he became quite reſtored to health.

"Among the general diſorders of nutrition," obſerves Dr. Carpenter,[1] "to which the uſe of alcoholic liquors, certainly, prediſpoſes, although it may not, of itſelf, cauſe them, are gout, and, rheumatiſm. The former is moſt common among thoſe who have been accuſtomed to eat, and, to drink freely; and, it is favoured by ſuch a uſe of alcoholic liquors as ſtimulates the ſtomach to digeſt more azotiſed aliment than the ſyſtem can appropriate. This may be regarded as the fundamental cauſe of the diſeaſe when it occurs in the ſthenic form. Of the ulterior ſtages of it we, yet, know too little to enable us to trace, with certainty, the effect of alcohol upon each of them; but, this much is pretty certain,—that, an impaired condition of the nutritive operations will be favourable to the production of the *materies morbi*, whatever be its nature: that, this will be further promoted by any impediment to the due oxidation of the conſtituents of the blood, ſuch as the admixture of alcohol has been ſhewn to occaſion; and, that, the elimination of this morbid matter will be obſtructed by that torpid condition of the liver, and, kidneys to

[1] On the Uſe, and, Abuſe, &c., p. 76.

which theſe organs are, eſpecially, liable in thoſe who have, habitually, over-ſtimulated them in earlier life."[1]

Furthermore, it is found that there are, by degrees, ſuperinduced, ſome of the ſtructural leſions to which reference has been, particularly, made in the laſt chapter; and, among the cauſes leading to an atheromatous, and, calcareous condition of the arteries, we, commonly, find that gout is referred to by ſyſtematic writers, as a diſeaſe in which this change is, eſpecially, prone to occur.[2] The peculiar, morbid ſtate of the blood, originating in error of the

[1] "Strength of nature in youth paſſes over many exceſſes which are owing a man till his age."—Bacon.

[2] "In perſons who have been the ſubjects of ſyphilis, and, are filled with mercury; in gouty perſons; in thoſe ſubject to piles; in wine, and, brandy drinkers; in gourmands, &c., I find oſſification of the arteries moſt common. Otto. Compend. of Pathol. Anatomy, *tranſl.* by South, *note* 7, p. 332. Lond. 1831.

"Quant aux oſſifications des artères qui ſurviennent dans l'age mur, et, même dans la jeuneſſe, des cauſes d'une autre nature lui donnent probablement naiſſance. Si nous en jugeons par ce qui ſ'obſerve ſur le cœur, la plus fréquente de ces cauſes ſerait l'arthritis. En effet, cette maladie ſemble en quelque ſort diſpoſer à ſon gré du phoſphate calcaire, tantôt pour le ſouſtraire, tantôt pour l'accumuler ſur un organe. Qu'on ſe rappele l'appauvriſſement des os dans la goutte, leur deformation par des végétations oſſeuſes, les incruſtations de certaines parties du cœur, les oſſifications de ſes valvules, ainſi que de celles des groſſes artères par des cauſes arthritiques, peut-être trouvera-t-on cette même cauſe en jeu dans l'oſſification des artères chez le ſujets de trente ans,—c'eſt-à-dire à une époque de la vie qui favoriſe le developpement de l'arthritis. Serait-ce auſſi la raiſon pour laquelle les artères des extrémités inferieures ſont bien plus ſouvent oſſifiées que celles des extrémités ſupérieures, la goutte occupant, en général, plus fréquemment les mêmes extrémités."—Lobſtein. Traité d'Anatom. Pathol., Vol. ii, p. 565. Paris, 1833. Alſo, *vide*, Copland's Dictionary, *art.* Arteries, § 66, p. 120.

aſſimilative operations, together with the impairment of the functions of the ſecreting organs, eventuate in ſo perverted an action of the nutritive proceſs, that, the coats of the blood-veſſels ſuffer atrophy,[1] and, become affected, to a great extent, in the manner deſcribed.

The cerebral arteries are, materially, implicated in this degenerative proceſs: and, their weakened walls, yielding before the impetus of the currents they ſhould ſupport, and, aſſiſt to regulate, often give way, ſuddenly, and, death by apoplexy is not an infrequent mode by which the life of the gouty ſubject is terminated.

Irreſpective, too, of the preſence of any definitely-marked ſymptoms to beſpeak the arthritic cachexia, ſanguineous apoplexy is, generally, allowed to be in frequent aſſociation with this altered ſtate of the cerebral veſſels. Hodgſon[2] obſerves:—"I have rarely examined a caſe of apoplexy, not ariſing from accidental violence, which did not exhibit a morbid condition of the arteries of the brain;" and, Dr. Copland,[3] remarks:—"Oſſific, or, cretateous depoſits in the coats of theſe veſſels, or, atheromatous, or, fatty changes in them, diſpoſing them to rupture upon increaſed action of the heart, or, in-

1 "C'eſt une grande loi de l'économie en vertu de laquelle tous les fois qu'un organ tend à ſ'atrophier, une matière graiſſe vient à ſe ſécréter autour de cet organe, ou, à la place de ces molecules."—Andral, loc. cit. Vol. ii, p. 547.

2 A Treatiſe on the Diſeaſes of the Arteries and Veins, p. 25. Lond. 1815.

3 On Palſy, and, Apoplexy, p. 281. Lond. 1850.

ordinate excitement of the cerebral functions, are, doubtleſs, very common, immediate cauſes of apoplexy, eſpecially, in aged perſons, and, thoſe who have been addicted to the exceſſive uſe of animal food. Not only, in theſe caſes, are the larger arteries found to be, thus, diſeaſed, but, Mr. Paget[1] has determined the preſence, likewiſe, of fatty degeneration of the cerebral capillaries. We muſt, I believe, nevertheleſs, agree with Mr. Barlow,[2] that, "degeneration, although it be very common, cannot, certainly, be detected in all caſes of apoplexy. I ſhould moſt calculate on finding it in thoſe perſons deſtroyed by cerebral hœmorrhage, who have lived beyond the maturity of life, *who preſent the arcus fully marked*, or, have a fatty heart, or, fatty degeneration more or leſs general,—the large veſſels of the brain being found atheromatous, and, a marked degree of ſoftening ſurrounding the clot."

In a paper read before the Medical Society of London (May 17th, 1851) on a caſe of *ramolliſement*

[1] On Fatty Degeneration of the ſmall Blood-Veſſels of the Brain, and, its Relation to Apoplexy. Med. Gaz. 1850.

It is remarked by Mr. Gulliver (Eding. Med. and, Surg. Jour. Vol. ix, p. 163) that "in a man who died of apoplexy, the coats of the arteries of the brain, even of the ſmalleſt branches, were ſtudded with, and, made fragile by fatty patches;" and, Rokitanſky (loc. cit. vol. iii, p. 399) in alluding, eſpecially, to fatty degeneration of the middle coat of arteries in caſes of this affection, ſays of the well-known changes of thoſe veſſels:—"Hence, it may be inferred that the more minute arteries, and, even the capillaries within the brain, are in a ſimilar condition; eſpecially as the former are, ſometimes, found oſſified, and, the brain filled, as if with ſtiff wires."

[2] Loc. cit. p. 50.

of the brain,[1] Mr. Barlow ſtates :—" In ſeveral caſes of apoplectic effuſion which I have, lately, met with, the arcus ſenilis has been very palpable ; and, ſo far as my obſervation, at preſent, leads me, I ſhould, in certain caſes, wherein it ſeems doubtful whether apoplexy be foreſhadowed, or not, lay conſiderable ſtreſs on the preſence, or, abſence of this arc ; and, the rather if a fatty heart were ſuſpected with reaſon, or, ſigns of degeneration of the kidneys were evident." The following caſe is, then, related, and, which is ſo fraught with intereſt that I need offer no apology for tranſcribing it *in extenſo* :—Thomas Winfield, *æt.* 41, *having a well-marked arcus ſenilis*, was admitted into the Weſtminſter Hoſpital, under the care of Dr. Kingſton, with an attack of apoplexy of two days' duration, and, died in about ſeven hours afterwards. There was an immenſe effuſion of blood,

1 " Among the morbid appearances deſcribed by authors on *cerebral ſoftening*, it is often mentioned, incidentally, that the texture of the heart was ſoft, and, pale, or, readily, lacerable : but, without inferring that there was any alliance of the brain-diſeaſe with this condition. Theſe facts, however, have become important by the diſcovery of cerebral ſoftening in connection with fatty degeneration of the heart. Several caſes, in which the ſymptoms of both theſe affections exiſted, have come under my notice, in all of which the *arcus ſenilis*, which Mr. Canton has found to conſiſt of fatty matter, was diſtinctly marked. There is reaſon to conclude that in ſome of theſe patients the brain had undergone a ſimilar transformation, and, it is intereſting to obſerve the alteration of ſtructure thus viſibly diſplayed in the eye, manifeſting itſelf, ſcarcely leſs perceptibly, in internal ſtructures."—R. Rowland, M.D., On the Nature, and, Treatment of Softening of the Brain, p. 62. Lond. 1851.

" The occurrence of white ſoftening of the brain, as deſcribed by Roſtan, was connected by him with diſeaſe of the cerebral arteries, and, doubtleſs, ſuch a condition would have great influence in producing the

which ſeemed to have commenced externally to the left lateral ventricle, to have ruptured its wall, filled it, torn its ſeptum, and, then, made way into the correſponding cavity, which it nearly occupied. The fourth ventricle was diſtended with blood. The convolutions of the brain were flattened, and, its ſubſtance preſented numerous red points on being cut, and, here and there, a pinkiſh tint. The brain about the clot was greatly ſoftened; and, the ſoftening extended ſome diſtance into its ſubſtance; innumerable little ſpecks of blood were ſeen on the ragged ſurface whereon the clot reſted. It ſeems to me very probable that the ramolliſement had, in part, preceded the effuſion. Thinking this would be a ſavourable opportunity for repeating Mr. Paget's obſervations on fatty degeneration of the ſmaller blood-veſſels of

leſion; but, as Dr. Law (On Diſeaſes of the Brain dependent on Diſeaſes of the Heart, Dub. Jour. of Med. Science, Firſt Series, Vol. xvii, 1840) has ſhown that a ſimilar affection may ariſe from diſeaſe of the heart itſelf, a probability is created, that, in ſome caſes, ſuch as thoſe deſcribed by Roſtan, a weakened ſtate of the heart was, really, at the bottom of the malady.

The caſes in which Dr. Law has obſerved this condition of the brain are as follows:—

1. Permanent patency of the aortic orifice, with regurgitation.
2. Contraction of the mitral oriſice.
3. Permanent patency of the mitral orifice, allowing free regurgitation into the auricle.

It is plain that in all theſe examples the brain may ſuffer from deficient arterial ſupply, and, although no caſe is given of ſoftening of the brain, as a reſult of fatty heart merely, we cannot doubt, from the context, that Dr. Law would admit this condition alſo, reſulting from œnemia of the brain, although there was no diſeaſe of the valves.—W. Stokes, M.D., The Diſeaſes of the Heart, and, Aorta, p. 361. Dublin, 1854.

the brain, I aſked Dr. Charles J. Shearman to examine them with the microſcope. He, kindly, obliged me, and, the reſult was a moſt obvious demonſtration of degeneration. When examining the appearances, and, comparing them with thoſe delineated by Mr. Paget, it was eaſy to perceive their eſſential reſemblance. Dr. Shearman has given me a drawing, and, deſcription of the appearances he found :—

Fig. 24.

Fig. 24. A veſſel $\frac{1}{1600}$th of an inch in diameter, with branches up to $\frac{1}{2800}$th of an inch : only a ſingle apparent coat ; exhibiting perſiſtent nuclei, and, fatty granules, of a dark, yellow colour, cloſely aggregated together in the coat. Granules from $\frac{1}{20000}$th of an inch to ſmalleſt appreciable ſize.

Fig. 25.

Fig. 25. A ſmall veſſel, with branches of diameter $\frac{1}{3600}$th of an inch with extremely thin coat, in which are nuclei, and, fatty granules, ſparingly diſtributed. A dilatation of the veſſel at *a*, where ſome fat-globules are ſeen.

Fig. 26.

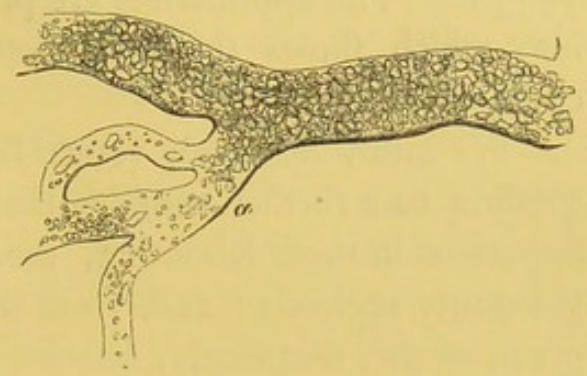


Fig. 26. A veſſel $\frac{1}{176}$th of an inch in diameter, the coats thicker, but no veſtige of a muſcular coat; the fatty granules larger than in figs. 24 and 25, and, more cloſely aggregated. At *a* branches of ſmaller ſize, with conſiderable fatty degeneration,—nuclei viſible. This veſſel contained ſome matter which gave the granules a darker aſpect.

In this caſe, the arteries at the baſe of the brain ſeemed, all but, healthy, and they, by no means, indicated the condition of the ſmaller channels,—an obſervation of importance, ſince it ſerves to ſhow, that, though the great veſſels may, frequently, be a guide to the ſtate of the ſmaller ones, yet, they are *not ſo invariably*. But the arterial ſyſtem, taken altogether, would, I believe, had it been, thoroughly, examined, have diſplayed a pretty general, and, grave degeneration; for, the aorta, and, abundantly about its arch, manifeſted fatty depoſits which, on being magnified, preſented the appearances that Mr. Gulliver has figured. The ſmall veſſels of the brain, as microſcopically viewed, preſented fat granules, far and wide, diffuſed, and, of moſt varying abundance: here, they were cluſtered very thickly: there, they were, thinly, ſcattered, and, in ſome ſpots, ſhowed clear interſpaces: but, the moſt conſiderable veſſels had ſuffered moſt, as was well ſeen by one, of the

diameter of $\frac{1}{375}$th of an inch with another of that of $\frac{1}{1500}$th. The appearances are preſerved in the drawing, which ſhows them far better than deſcription could."[1]

We muſt, however, return from this lengthy digreſſion to a further conſideration of the circulating apparatus in thoſe labouring, more eſpecially, under the gouty cachexia; and, from the account, already, given of the, frequently, diſeaſed condition pervading the arteries in aſſociation with, and, dependent on, the general perverſion of nutrition which prevails in the ſyſtem, we might be prepared to expect that the heart, itſelf, would ſuffer in its vaſcular ſupply, valvular apparatus, and, muſcular ſubſtance. Such, indeed, is found, not unfrequently, to be the caſe; and, in this affection it is, by no means, uncommon to ſee the left valves rigid from a greater, or, leſs degree of impregnation of them with bony ſalts; or, they may, even, become, perfectly, inflexible from their complete calcification, giving riſe to dilatation of the left cavities,—as was well illuſtrated in the inſtance of King George the Fourth. Lobſtein[2] obſerves:—"C'eſt le propre du principle goutteux, qui

[1] London Medical Gazette, 1851.

[2] Loc. cit. Vol. ii, p. 516.

In the caſe of a perſon who died at the age of 48 years, and, who, during the greater part of his life, ſuffered moſt ſeverely from gout, Lobſtein found the mitral, and, aortic ſigmoid valves, extenſively, affected by "plagues oſſeuſes, et, incruſtations oſſéo-pieireuſes." A portion of them was analyſed by M. Maſuyer, and, the reſult of the examination publiſhed in the Journal de Département du Bas-Rhin (t. i, p. 351). It was found to conſiſt of a mixture of phoſphate, and, urate of lime, and, ſoda. "Elle avait, par conſequent," remarks Lobſtein,

y amène le phoſphate calcaire dont le ſang des arthritiques eſt ſurchargé, de là ces végétations oſſeuſes, et, oſſéo-pétreuſes des parties fibreuſes du cœur, qui ne ſont nullement l'effet d'une cardite cronique (Brouſſais. Examen. des Doctrine Medic. t. i, prop. 173) mais uniquement celui d'un acte nutritif anormal. Cette altération détermine enſuite le rétréciſſement des orifices du cœur, et celui-ci les dilitations de ſes cavités."

During the later periods of the life of the gouty ſubject, the heart may offer evidence of the organic miſchief with which it is attacked,—miſchief which has been, for a long time, in progreſs, even, though no direct ſymptoms had exiſted to point to this viſcus as being, materially, if at all, implicated. The earlieſt indications, even, of gout, in ſome inſtances, greatly, affect the function of this organ, and, at a time when, from that circumſtance, alone conſidered, —we ſhould be too haſty in concluding that any ſerious alteration of texture had taken place. Palpitation, and, intermittent action of the heart may exiſt for a very long period, and, continue to be of a very diſtreſſing character, but, on the ſupervention of a regular gouty paroxyſm, theſe ſymptoms ſhall

"la plus grande analogie avec le tuf arthritique des articulations." (p. 527.)

"To conſider," obſerves Dr. Garrod (The Nature, and, Treatment of Gout, p. 150, Lond. 1859), "calcareous depoſitions as a proof of gouty inflammation is altogether an error, for, I have ſhown that even in gouty ſubjects with concretions of urate of ſoda in all the joints, the depoſits upon the aorta are of a different character,—conſiſting either of phoſphate, and, carbonate of lime, or, of choleſterine, and, fatty matter."

diſappear, entirely, and, remain, for years, in abeyance.[1] Nevertheleſs, they ſhould, always, be regarded with ſuſpicion, and, their recurrence, jealouſly, watched by the medical attendant,—more eſpecially, when it is remembered, that, with the diſeaſed condition of the blood-veſſels I have deſcribed, as being, by degrees, eſtabliſhed, it is found that fatty degeneration of the heart is, often, intimately allied. This diſeaſe complicates, to an alarming degree, the original diſorder; and, is, not uncommonly, found, after death, to have been, as it were, lurking within; whilſt, the ſymptoms to beſpeak its preſence, from without, have been trivial, or, of ſuch an order that no diagnoſtic ſtreſs could, fairly, have been laid on

[1] *e.g.*, Sir C. Scudamore relates the caſe of a gentleman, æt. 50, corpulent, and, plethoric, who laboured under irregular action of the heart from the year 1811 to 1814, when he, for the firſt time, ſuffered from an attack of gout, which laſted a week. The patient writes:—"I had tried various medicines for the relief of the heart without the leaſt ſucceſs. I took particular notice, that, on the very evening when the gout firſt came on, the feeling which I had in my left breaſt, (and, from which I could, plainly, tell the miſſings of my pulſe without examining it) entirely left me; and, my pulſe became regular, and, has continued ſo to the preſent hour." Sep. 1818. A Treatiſe on the Nature, and, Cure of Gout, p. 442. Lond. 1823.

"I am informed by Dr. Baillie of a gentleman who ſuffered palpitation at the heart for ſix months without relief from medicine; but, a fit of the gout coming on, it ſuddenly, and, entirely left him," *note*, p. 16.

Dr. Garrod (loc. cit. p. 510) ſtates that:—"In the majority of caſes, this condition (palpitation of the heart) is ſecondary to dyſpepſia, but, at times, it may be directly excited by the impure condition of the blood, and, I have notes of ſome caſes in which no organic miſchief could be diſcovered in the heart, nor, any ſigns of indigeſtion, and, the ſymptoms ceaſed on the occurrence of gout in the joints."

them. Dr. Stokes[1] has, very truly, obſerved :— "Although it is not to be denied, that, under the diſturbing influence of either rheumatiſm, or, gout, —palpitation, irregularity, or, pain may, only, indicate functional derangement,—yet, we muſt look with apprehenſion upon them, if not with reference to immediate conſequences, at leaſt with regard to the future condition of the heart."

With regard to death enſuing from the ſo-called metaſtaſis of gout, I fully concur with the above talented author, that :—"The patient does not die of gout in the heart, but, *he dies of the bad treatment of gout ;* and, his death is cauſed by failure of the heart, the weakened ſtate of which is, ſo often, overlooked." (p. 525.) "It does not much matter whether theſe patients have the ſimply weakened, or, the fatty, and, atrophied condition of the heart; for, the indications of treatment, and, *the danger of reducing the ſyſtem* are ſeen in either caſe." (p. 560.)

From the evidence, nevertheleſs, of various authors, given, chiefly, through the medium of their caſes, there is no doubt that the immediate cauſe of ſudden death, in ſome inſtances of gout, is, fatty degeneration of the heart ;[2] though I believe it would be often difficult to be enabled to ſay whether this organ had,

[1] The Diſeaſes the Heart, and, Aorta, p. 552. Dublin, 1854

[2] "In gout, where death is very ſudden, by ſyncope, the ſubſtance of the heart is, in general, atrophied."—D. Craigie, M.D., Elements of the Prac. of Phyſic. Vol. ii, p. 613. Eding. 1840.

"Some few, in ſpeaking of fatty degeneration, ſeem to think of the fat, and, forget the atrophy : it would be more proper to remember the atrophy, and, forget the fat."—F. W. Barlow.

inſtantaneouſly, ceaſed to act from an accelerated, and, unwonted momentum of the blood, by whatever cauſe produced, impreſſing it with an amount of labour which it is unable to accompliſh; or, whether, its own feeble efforts have ſo diſordered, and, diminiſhed the already irregular, and, weakened flows of blood through the brain, that, with the loſs of the proper amount of ſtimulation of this organ, the reſulting effect on the heart is to determine its laſt contraction. With a leſs diſeaſed condition of the heart, and, cerebral veſſels, it might be expected, under the latter circumſtance, that a ſyncopal attack would be the marked precurſor to the ceſſation of the heart's action; but, in the preſent inſtance, the ſudden withdrawal of nervous energy may prove, at once, fatal to continuance of power in that organ, which, in itſelf, is already tending, momentarily, to forego its function. Be this as it may, there is, ſometimes, "no act of dying,—the patient dies, at once."

Dr. Gaidner[1] relates the caſe of a gentleman, aged 63 years, afflicted with gout, and, who, for ſome years, had been ſubject to cardiac ſymptoms, though, frequent examination at the ſeat of the heart could detect no abnormal ſounds. His death happened in the moſt ſudden manner. He was in bed at the time, and, appeared to have died in a ſudden ſyncope.

Poſt-mortem.—Body conſiderably loaded with fat in the abdominal region, and, other uſual ſituations.

[1] On Gout, its Hiſtory, its Cauſes, and, its Cure, p. 40. Lond. 1854.

The morbid appearances were in the *heart*, *aorta*, *kidneys*, and, *liver*.

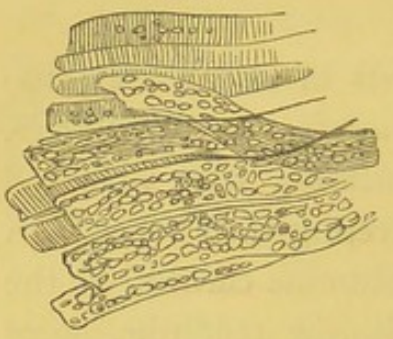
Heart.—Size, and, thickneſs of its parietes, natural. Aortic valves, *very nearly*, not *abſolutely*, healthy. Some points of oſſification were obſerved about their roots, but, not affecting their form. In the mitral valve, ſome of the columnæ carneæ, at the points of inſertion into the chordæ tendiniæ, were changed into a white, denſe texture. The aortal ſegment of the valve was thickened, in particular parts, which was of the denſity of cartilage. Dimenſions of all the cardiac orifices normal: valves of the right ſide of the heart, alſo, normal. The muſcular ſubſtance of the heart, and, more eſpecially, of the ventricular ſeptum, appeared, when cloſely examined, to have undergone a change, having become of a lighter colour, with a tinge of yellow, and, having loſt part of its natural, fibrous appearance. It could be torn, however, and, was, eaſily, lacerable. *Aorta*.—The arch was, very conſiderably, dilated, but, without any depoſit in its tiſſue.

Kidneys.—Secreting portions of a light, ochery colour, more eſpecially in the right kidney. Tubular part was of the proper proportion to the cortical.

Liver was paler than it ought to be, and, unequally pale, particular parts being quite anœmic. It was, alſo, ſofter, and, more ſoapy to the touch than natural. Its ſize was normal.

Microſcopic examination.—The ultimate texture of the heart had undergone the granular degeneration; the fibrillæ were eaſily broken up, the ſtriæ being

Fig. 27.



everywhere, in great part, ſupplanted by irregular granules.[1]

The epithelium of the liver, and, kidneys, and, the tubuli of the latter were, alſo, filled with fatty granules, and, globules.

Another caſe is related by Dr. Gaidner (p. 77) of a gentleman, æt. 58, who was afflicted with gout, and, who, whilſt, ſitting in his chair, which he had not quitted for ſome days, was found dead, ſupporting his head upon a pillow in front of him, having been left ſcarcely two minutes before.

There was found, at the *autopſy*, a rent near the apex of the right ventricle of the heart, the muſcular ſubſtance of which was very thin, not corrugated, ſo that, it appeared as if about to tear in another, or even, in many, places.

Every portion of the muſcular fibre of the heart examined preſented granular, or, fatty degeneration. The tranſverſe ſtriæ were, everywhere, but faintly viſible; while, within the ſarcolemma, minute oil-granules were obſerved, in great abundance. The examination was made with a power of 250 diameters.[2]

Dr. Cheyne's[3] caſe is remarkable for the extent

[1] The examination was made by Dr. Gaidner of Edinburgh, and, the drawing by the late Mr. Dalrymple.

[2] By Dr. Hiſlop of the Queen's Hoſpital, Birmingham.

[3] Dublin Hoſpital Reports. Vol. ii, p. 217. 1818.

to which fatty degeneration of the heart had proceeded in a gentleman, æt. 60, who was the ſubject of gout:—"The heart was about three times its natural ſize. The lower part of the right ventricle was converted into a ſoft, fatty ſubſtance: the upper part was, remarkably, thin, and, it gradually degenerated into this ſoft, fatty ſubſtance. The cavity of the left ventricle was greatly enlarged. The whole ſubſtance of the left ventricle, with the exception of the internal reticulated ſtructure, and, carneæ columnæ, was converted into fat. The valves were ſound. The aorta was ſtudded with ſteatomatous, and, earthy concretions." [1]

The next caſe I ſhall refer to is that of King George the Fourth, who died in his 68th year. His habits of life: frequent attacks of gout: great corpulence[2] in the latter portion of his reign, &c., are circumſtances too well known to require more than this alluſion to them.

[1] The *autopſy* was made by Sir Philip Crampton.

[2] "We may think with profit of Mr. Hunter's words:—'Fat is not part of an animal.' . . . . 'An animal is the ſame without it as with it;' and, couple with them Mr. Paget's commentary. In all caſes of converſion of ſtructures, it never appears but at a loſs, and is literally no part of an animal,—no *eſſential* part of it. So far from ſupporting life in any way, it is nothing but a mark of death. We meaſure by its quantity the dangers that once threatened, and refer to it when queſtioned as to ſudden diſſolution. And ſo, from a point of view which Mr. Hunter took not, and, with the information open to him, could not take, we may, adapting ourſelves to the advancement of knowledge, uſe language, even ſtronger than he employed, as truly deſcriptive of that inferior material which commonly encroaches juſt in proportion as life is weakened, and is one of the beſt poſſible evidences of decline and proofs of fatal atrophy."—Barlow, W. F. Loc. cit. p. 69.

Autopſy.[1]—The *liver* was pale, and, had an unhealthy, granulated appearance.

Upon the ſurface of the *heart*, and, *pericardium*, there was a large quantity of fat. The *muſcular ſubſtance of the heart was ſo tender as to be lacerated by the ſlighteſt force*. It was much larger than natural. The cavities of the right ſide natural: thoſe of the left ſide dilated,—eſpecially the auricle.

The *three ſemi-lunar valves* at the beginning of the aorta were oſſified throughout their ſubſtance, and, the inner coat of that blood-veſſel preſented an irregular ſurface, and, was, in many parts, oſſified.[2]

Dr. Saunders[3] has furniſhed a caſe which well exemplifies the condition in which parts of the arterial ſyſtem are, not unfrequently, to be found in the gouty ſubject:—"An honourable baronet died at about 65 years of age: his pulſe was unequal, and, intermitting: he had been ſubject to ſevere paroxyſms of gout, and, politics for many years; and, had had ſeventeen, or, eighteen months, previouſly, an apoplectic ſeizure. At the *autopſy*, the heart was found *hypertrophied*; the valves of the aorta partly, and, the orifices of the coronary arteries, completely, oſſified: the interior ſurface of the aorta, alſo, exhibited oſſific formations in different ſtages." Although it

[1] The Times, Friday, July 2nd, 1830.

[2] Signed, Henry Halford.
Matthew John Tierney.
Aſtley Paſton Cooper.
B. C. Brodie.

[3] Obſ. on Gout. Eding. Med. and Surg. Jour. Vol. xxx, p. 267. 1828.

is not mentioned that the muſcular fibre of the heart was in a ſtate of fatty degeneration, there is good reaſon to believe, from the diſeaſed ſtate of the arteries, &c., that, ſuch was its condition,—a condition which is, by no means, incompatible with the circumſtance of the heart being hypertrophied. Dr. R. Quain[1] has recorded this fatty change, with hypertrophy, as being preſent in twenty-three of thirty-three caſes in his firſt ſeries; and, in ſixteen of thirty-five in the ſecond ſeries: and, adds:—"It is, therefore, perfectly clear, that, fatty degeneration frequently, occurs in hypertrophied heart." In the following caſe this aſſociation was noticed by Dr. H. Kennedy:[2]—"A clergyman, æt. 59, died ſuddenly. He had ſuffered, twice, from well-marked attacks of gout in the foot. At the *autopſy*, the external parts of the body were ſeen to be thickly covered by a coating of fat, of an unhealthy character. The brain was very much congeſted; while, the heart preſented a good example of fatty heart, being, at the ſame time, larger than natural. The valves were healthy."

I ſhall conclude this chapter in the words of Sylveſter Graham,[3] who has, very juſtly, remarked:—"it muſt be remembered that not one human being

[1] On Fatty Diſeaſes of the Heart. Med. Chirurg. Tranſ. 1850.

"The circumſtance of hypertrophied hearts being likely to become converted into fat, reads, or, ſhould read, a leſſon. So long as they are, ſimply, enlarged, life, though embarraſſed, may be continued long; but, if degeneration be added, the danger of ſudden death may become extreme."—Barlow, W. F. Loc. cit. p. 13.

[2] Dub. Med. Preſs, Vol. xxii, p. 370. 1849.

[3] Lectures on the Science of Human Life. Boſton, 1839.

in a million dies a natural death. If a man is ſhot, or, ſtabbed, or, poiſoned, or, killed by a fall, or, ſome other means of this kind, we ſay that he dies a violent death; but, if he is taken ſick, and, is laid upon his bed, and, is attended by phyſician, and, friends, and, waxes worſe and worſe, and, finally, dies, perhaps with dreadful agonies, and, anguiſh, we ſay he dies a natural death. But, this is, wholly, an abuſe of language,—a miſ-ſtatement of fact,—the death, in this latter caſe, is as truly a violent death as if the individual had been ſhot, or, ſtabbed, or, poiſoned. Whether a man takes a doſe of arſenic, and, kills himſelf, at once, or, takes ſmall doſes which more gradually, and, by more imperceptible degrees, deſtroy life, he, equally, dies a violent death, though the convulſive agonies which attend his diſſolution may be leſs violent in the latter than in the former caſe. And, whether he, gradually, deſtroys his life with arſenic, or, any other means, however common, he, equally, dies a violent death. He only dies a natural death, who, during his exiſtence, ſo perfectly, obeys the laws of conſtitution, and, relation eſtabliſhed in his nature, as, neither by irritation, nor, intenſity, to waſte his vital energies, but, naturally, and, ſlowly, paſſes through the progreſſive changes of his ſyſtem, from childhood to old age, and, finally, in the exhauſtion of his vital powers lies down, and, falls aſleep in death, without a ſtruggle, or, a groan."

CHAPTER VII.

"HEALTH *is the ſoul that animates all enjoyments of life, which fade, and, are taſteleſs, if not dead, without it; a man ſtarves at the beſt, and, greateſt tables; makes faces at the nobleſt, and, moſt delicate wines; is old, and, impotent in ſeraglios of the moſt ſparkling beauties; poor, and, wretched in the midſt of the greateſt treaſures, and, fortune; with common diſeaſes, ſtrength grows decrepit, youth loſes all vigour, and, beauty all charms; muſic grows harſh, and, converſation diſagreeable, palaces are priſons, or, of equal confinement; riches are uſeleſs; honour, and, attendance cumberſome, and, crowns themſelves are a burden; but, if diſeaſes are painful, and, violent, they equal all conditions of life, make no difference betweem a prince, and, a beggar; and, a fit of the ſtone, or, the colic, puts a king on the rack, and, makes him as miſerable as he can do the meaneſt, the worſt, and, moſt criminal of his ſubjects.*"—SIR W. TEMPLE.

"DISEASE *anticipates the ravages of time; and, there is no more intereſting part of our ſubject than that which refers to its wide relation to thoſe various affections which impair nutrition. . . . . The young as to years become old as to ſtructure.*"—BARLOW.

"*The* ARCUS *is the only indiſputable external ſign of true fatty degeneration; and, carefully interpreted, will be found, in many difficult circumſtances, a clue to the deſtruction proceeding within. At the ſame time it may exiſt, occaſionally, as a local change, or, be aſſociated with but an inconſiderable degree of degeneration of vital organs, and, found, therefore, quite compatible with years of vigorous, and, active life.*"—IBID.

IN the ſcience of Medicine there is not a more curious, important, and, intereſting ſubject for ſtudy than that of conſtitutional peculiarities, whether congenital,

or, acquired ; and, an intimate acquaintance with their hiſtory will, always, be found of high practical value in the recognition, and, treatment of diſeaſe. Much, doubtleſs, may be gathered from our conſideration of *diatheſes*, *hereditary tendencies*, *pſychical ſtates*, &c., and, our knowledge become greatly enhanced by attention devoted to an inveſtigation of thoſe numerous, and, multiform agencies which, ſo greatly, tend to modify, or, play a yet more prominent part in the development of the human conſtitution. True it is "pour connaitre l'homme malade, il faut connaitre l'homme ſain," and, our acquaintance with medical ſcience ſhould,—in its application,—be ſo profound, as to make us, intimately, aware, at the ſame time, not only of the true nature of diſeaſe, but likewiſe, of the particular manner in which ſuch diſeaſe becomes modified by having incorporated within it—ſo to ſpeak—thoſe elements of original, or, acquired conditions with which mind, and, body are ſtamped when health, alone, is believed to impreſs them. How difficult, often, the taſk of ſeparating the real from the fictitious!—of judging to what extent a particular condition, or, even, a ſymptom, may, more or leſs, ſignify a nearer approach to, or, a further departure from health.

It is not aſſuming too much to ſtate, that, it is through the medium of ſuch nice diſcrimination the practitioner acquires the acumen, ſo requiſite in many caſes, for the adoption of an efficacious treatment. The required data being, ſecurely, obtained, and, our diagnoſis rendered faultleſs, the therapeutic part has,

yet, to be played; and, here, it often occurs that it is the mind alone of the phyſician which enacts the *rôle* in an appeal to, and, operation on that of the patient;—his mental *tactus eruditus*—ſo to expreſs myſelf, completely ſuperſeding the employment of the conventional materia medica.[1]

Of the higheſt intereſt, and, importance, alſo, is the ſtudy of the *incubation* of diſeaſe. The ſource, and, onward progreſs of circumſtances likely to deteriorate health ſhould be cloſely inveſtigated by the medical philoſopher. Not only muſt he, duly, recogniſe an *effect;* but, be eſpecially careful to determine a *cauſe;* and, more particularly, ſhould his preſcience guide him to *prevention*, thus, obviating the neceſſity for *cure*. Doubtleſs, the taſk is difficult, but, the exerciſe of penetration, and, energy, ſhould be in direct proportion to the difficulty. Languor, and, debility have, already, ſet their ſeal,—let us ſeek their ſource that we may not have to treat idiotcy, or, phthiſis, hereafter. Are the powers of life failing, and, is enervation leading, inſidiouſly, to an early grave, with no readily recogniſable malady to beſpeak a cauſe? Has light-heartedneſs become ex-

[1] "Is it required that a phyſician, or, a ſurgeon ſhould know anatomy, natural, and, morbid, phyſiology, pathology? To the ſcience of medicine, and, to its rational improvement, and, extenſion, it is neceſſary; but, by no means ſo, to the mere routine of practice, and, the very ſucceſsful proſecution of the trade. Perhaps, indeed, a firm faith in drugs, and, plaſters, and, a liberal adminiſtration of them, may be the ſurer road to popular ſucceſs, if the remark addreſſed by a veteran practitioner to a young enthuſiaſt in ſcience be well grounded:—'*Juvenis, tua doctrina non promittit opes: plebs amat remedia.*'"—Lawrence, W. Loc. cit. p. 55.

changed for deſpondency; and, is the openneſs of youth merged in the gloom of the miſanthrope, whilſt the cauſe is as obſcure as the effect, on the other hand, is obvious? Here is it that the phyſician will be required not only to diſplay his medical maſtery, but, to exerciſe all thoſe powers of thought, and, obſervation with which nature has endowed him, and, which his extended education, and, ſtatus in ſociety have tended to enlarge, and, refine. And, while his ſuperior intelligence—placing him on vantage ground—ſecures the reſpect of his patient, undeviating kindneſs will induce a confidence likely to reſult in diſcloſures of vital importance to the welfare of the ſufferer, to be made, involving, perhaps, the revelation of a cauſe which may prove to be of that ſecret, and, peculiar nature, an acquaintance with which no other plan of enquiry would have elicited.

The nicer ſhades of early diſeaſe are, often, ſo obſcure, that, long before any well-marked, or, recogniſable ailment has ſet in, the ſyſtem is found to be labouring under that want of healthy nutrition, with lack of vigour which beſpeak a failure of the aſſimilative force. Stealthily, but, ſurely, the work of deterioration proceeds, and, the *vis vitæ*, becoming more, and, more undermined, degenerative proceſſes, now, further deſtroy the atrophied tiſſues, and, by implicating, eſpecially, ſome vital organ, ſlow, lingering death may reſult, or, life become, without warning, ſuddenly extinct.

Fully ſubſcribing to the views, I would, here,

adopt the words of Dr. Handfield Jones :[1]—" We cannot forbear expreſſing the feeling which is ſtrongly faſtened on our mind, that a large portion, probably, the majority, of diſeaſes of the preſent day, are of the nature of *degenerations*, commencing unperceived, advancing gradually, and, often, ſcarcely attracting attention until irreparable miſchief is done. We do think it behoves medical men to ſtrongly impreſs on the minds of parents, and, friends, the deep need there is for watching, carefully, the firſt ſymptoms of failing health, and, of not deferring to ſeek aid until ſerious diſeaſe has ſounded its alarm, and, diſorganiſing proceſſes have commenced that can never be thoroughly repaired."

In the midſt of theſe changes, in which each part of the organiſm, more or leſs, participates,—although certain portions of it would ſeem to diſplay more readily, and, feel more eaſily the abnormal proceſſes than others[2]—how ſpeedily would the ſyſtem be

[1] Brit. and For. Med. Chir Review. Vol. xii, p. 44. 1853.

[2] " It is a fact, and, one very difficult to explain, that, in nearly every inſtance, one tiſſue, or, a portion of one tiſſue, undergoes changes of degeneration out of all proportion to thoſe taking place in the remainder of the organiſm. Thus, at one time, the nervous ſyſtem is the firſt to ſuccumb,—the brain becoming atrophied, or, ſoftened, and, the patient, fatuous; at another time, the oſſeous framework is that in which the inroads of decay become moſt evident. In ſome individuals, the vaſcular apparatus, chiefly, ſuffers; the conſequent phenomena, varying ſtrangely, according to the ſeat of change; thus, in one caſe, the valves of the heart become oſſified, producing death by cardiac incompetency; in another, the arteries, weakened by atheromatous depoſit, yield, and, rupture; while, in a third, the veſſels of the extremities become blocked up by a ſimilar product, and, ſenile gangrene enſues; and, finally (to paſs over innumerable examples of the ſame law) a certain part of the

likely to ſuccumb to the operation of thoſe ſupervening, morbific agencies, againſt which even ſtronger conſtitutions are not proof; and, how materially is the probability of relief leſſened when treatment has to combat diſeaſe in a conſtitution where the havoc of decay has, already, proceeded, for a long period, unchecked in its career. The phyſician may have to deal with the malady at a period of life when the patient, though he ſhould flatter himſelf that he has youth on his ſide, is made to feel that it is the *youth of years*, only, and, that premature agedneſs has, already, carried him beyond this epoch of life—his conſtitutional powers, in ſo far as regards their tolerance, being materially undermined, and, weakened. It is this ſtate which often complicates, too, the various maladies which the *ſcience* of the ſurgeon is called on to relieve, or, the *art* which he is required to exerciſe for their cure. Mr. Paget[1] obſerves, in writing of fatty degeneration of the heart:—"I have ſpoken of this affection at great length, both becauſe there is no better example for the illuſtration of ſuch affections, and, becauſe it is extremely important that this condition of the heart ſhould be recogniſed after death when no ſuſpicion could be entertained of it during life. For, it often introduces unexpected dangers into the ordinary practice of ſurgery; it is, I believe, not rarely, the cauſe of ſudden death after

muſcular tiſſue of the heart may become degenerated, either directly, or, ſecondarily, to degeneration of the veſſels leading to it." Dr. Briſtowe, Tranſ. of the Path. Soc. Lond. Vol. v, p. 91. 1854.

[1] Loc. cit. Vol. i, p. 129.

operations; it is one of the conditions in which chloroform ſhould be adminiſtered with more than ordinary caution. *They who labour under it may be fit for all the ordinary events of calm, and, quiet life; but, they are unable to reſiſt the ſtorm of ſickneſs, an accident, or, an operation.* And, let it not be ſaid that one learns little in learning too late the exiſtence of an incurable diſeaſe; for, very often, the death which has come from ſuch a diſeaſe has been aſcribed to a wrong cauſe, and, has ſpoiled confidence in good men, and, their meaſures. Nor, does this caution ſeem unneceſſary, that, ſerious as the effects of the diſeaſe are, the change of ſtructure may eſcape any but a very careful, and, practiſed examiner. For, often, the change is hardly manifeſt to the eye, though, while it affects the whole heart, it may have deſtroyed life."

Modern pathology has, in its progreſſive advancement, opened widely the way to a more ſcientific, and, hence, more ſyſtematic, and, perfect, and, it is to be expected, a more practically uſeful knowledge of many abnormal conditions, the recorded accounts of which, by previous obſervers, were—ſo to ſpeak—that of the exterior, only, of a ſealed volume, whoſe valuable contents, however, have now been laid bare by patient enquiry, which, bringing with it a more intimate knowledge of the proceſſes tending to deſtroy life, ſhould aſſiſt us, proportionately, to thoſe means whereby we may arreſt the evil, and, reſtore health.

To no department of pathology will theſe re-

marks, I believe, be more appropriately adapted than that of atrophy, and, degeneration; but, he who inveſtigates this ſubject by the light of its groſſer characteriſtics only, or, even, in the more minute detail of hiſtological change, though he may claim the credit of being a well-informed *morbid anatomiſt*, will, often, find his uſefulneſs reſtricted to the bare employment of the ſcalpel, needles, and, microſcope; whilſt, the *pathologiſt*, in diſtinguiſhing the ſymptoms which, during life, denote the preſence of theſe changes, and, in recogniſing the relations they bear to other organs which he finds to be, ſimilarly, affected, purſues a more, practically, uſeful courſe, in his endeavour to attain that enviable goal of medical diſtinction—*the diagnoſis of diſeaſe*—a reſult which is but the ſtarting-point, again, and, the only reliable one, for a, yet, more coveted end—the ſucceſsful treatment of the affection he inveſtigates.

"Who, a ſhort time ago," obſerves Mr. Barlow,[1] "would have dared to aſſert,—unleſs from ſome morbid deſire to be ridiculous—hœmorrhage of the brain, the heart, the lung, and, the placenta, was, often, the reſult of fatty degeneration, ſimilarly, affecting theſe parts; and, leading to their rupture? Who could have aſſerted that mollities oſſium, atheroma of arteries, and, the *arcus ſenilis*,—heretofore, grand, and, unmeaning appellations,—were, only, ſpecimens of the ſame devaſtation? Who have affirmed that ramoliſſement of the brain, and, ſoftening of the heart were (I ſay not, invariably) ex-

[1] Loc. cit. p. 89.

amples of it, too? Who could have ſpoken of degeneration of the liver, and, the kidney, as conditions aſſociated with, and, dependent on general atrophy? Who could have traced *gradual* to the ſame cauſe as ſudden death, as we can, now? Surely, there has been,—to ſpeak moſt modeſtly,—a great, and, evident advancement in pathology."

The anatomiſt, and, phyſiologiſt ſtand in the ſame relative poſition to one another, as do the morbid anatomiſt, and, pathologiſt, in regard to their reſpective ſtudies of *health*, and, *diſeaſe*. For example, the morbid anatomiſt becomes acquainted with a certain abnormal ſtate of the kidney; the pathologiſt, in aſcertaining it, too, aſſociates the ſymptoms by which, during life, we recogniſe its preſence, and, Bright's diſeaſe is made familiar to all. The morbid anatomiſt finds, in his reſearches, unhealthy ſupra-renal capſules; the pathologiſt extends his obſervations to the ſurface,—a bronzing of the ſkin is ſeen to accompany them,—and, the name of Addiſon becomes one of wide renown. The morbid anatomiſt is ſtruck by a particular form of diſeaſe of the ſpinal bones; but, the pathologiſt,—more inquiſitive ſtill,—connects with it the palſy of the limbs below, and, Perceval Pott confers a laſting boon on the profeſſion he adorned. How curious, often, are the relations of cauſe, and, effect; and, how frequently do we ſee the mere morbid anatomiſt ſatisfied with a ſcrutiny of the peculiarities of the former; whilſt, the able pathologiſt, in ſtudying, likewiſe, the phenomena of the latter, diſplays his acumen in allying

the two,—in combining with its anatomy, the phyſiology of diſeaſe.

Let us, then, in the ſtudy of the ſubject before us, endeavour to paſs beyond a ſimple recognition of thoſe changes which preſent us with fatty molecules in place of elementary particles; let us deſcend, yet, deeper into the *penetralia* of theſe deadly metamorphoſes, and, attempt to determine on what depends the replacement of the highly-nitrogeniſed heart-fibre by drops of hydro-carbonaceous fluid—in a word—in what *eſſentially* conſiſts this fatty degeneration? It is, only, when we have ſolved this difficulty that we can hope to paſs the narrow confines of the morbid anatomiſt, merely, and play a more uſeful part in the wider domain of the ſcientific pathologiſt.[1]

Theſe obſervations may incline the reader to believe that I am about to advance ſome new views in explanation of this abnormal proceſs; and, in endeavouring to ſolve the difficulty which environs it, pave the way to more ſucceſsful treatment. What peculiar form of blood-craſis exiſts, however, in this affection, I own myſelf unable, with accuracy, to define; for, to ſuch condition muſt we look, in a

1 "Of the nature of this fatty degeneration, under whatever circumſtances, there can be no doubt; it is, eſſentially, an atrophy, whereby the moſt highly organiſed elements of the body are replaced by one of the ſimpleſt. It is not that the ſubſtances are changed into fat,—that is, plainly, impoſſible,—but that the nutritive proceſſes of muſcle, or, gland, or, bone, no longer reſtore particle for particle, whatever is loſt by the daily uſe of the parts, but, replace it with oil. Nutrition goes on in ſome ſort; but, the additions are of matters, wholly, unſuited to the office of thoſe they have replaced; they can neither move, nor, ſecrete, nor, even mechanically, ſupport the weight of the body."—Dr. Ormerod, Med. Gazette, 1849.

great meaſure, for a ſolution of the problem; and, yet, more particularly, muſt we ſearch in order to determine on what peculiar condition of the ſyſtem is this ſtate of its vital fluid dependent. The *fons, et, origo mali* remains, ſtill, to be brought to light; and, I have only ventured on the above remarks with a view to point out, that, though our knowledge of the ſubject of fatty degeneration is greatly advanced, and, we are, now, enabled to ſpeak, with comparative confidence, of its anatomical peculiarities, we muſt not be unmindful how imperfect, withal, is our information; and, how large, yet, is the oblation required to be made at the ſhrine of pathology, before we can hope, ſucceſsfully, to attack that of which we, ſtill, *intrinſically*, know ſo little. True it is, we ſpeak of atrophy, and, degeneration as events of impaired nutrition;—but, on what numerous, and, varied cauſes may ſuch impairment depend!—and, deep, indeed, muſt be our inveſtigation into, and, intimate our comprehenſion of thoſe intricate agencies which, in combined operation, reſult in the myſterious phenomenon—Life—ere, we can hope, adequately, to explain the ſubtle proceſſes of decay which impair its integrity, and, foreſhadow its extinction.[1]

[1] "Il faut, néceſſairement, conclure que les dégénerations organiques ne ſont pas *cauſe*, mais, *effet*. Et, dès lors, nous ſommes fondés à vous dire, qu'au lieu d'uſer votre vie à chercher, toujours, quelles ſont les dégénerations organiques, et, les altérations de texture qui *produiſent* les ſymptômes des maladies; il ſerait bien temps de ſ'inquiéter, un peu, de ſavoir ce qui *produit* ces dégénerations elles mêmes, en étudiant ſérieuſement les caractères, la marche, et, la tendance des actes vitaux qui les préparent, et, qui les produiſent, réellement."—Cayol, Léçons Orales.

The preſence of *debility* is a ſubject which ſhould, in the ſtudy of diſeaſe, ever, be kept prominently before the mind of the medical practitioner. Not only has it to be, often, regarded as a malady, *per ſe*, but it is, frequently, a ſtate of the ſyſtem which uſhers in the moſt formidable ailments, or, ſeriouſly complicates thoſe, which, in its abſence, on the other hand, would become more readily amenable to treatment.

The cauſes of debility are many, and, diverſified; and, in numerous inſtances extremely difficult to trace. It behoves us, nevertheleſs, to aſcertain the exact ſource of this condition, or, our meaſures for relief may be wholly ineffectual. For example, advice is ſought by a female labouring under great, and, increaſing debility. She has been gradually, and, for a long period, waſting. Her countenance is pallid, ſunken, and, ſorrowful: the eyes liſtleſs, ſurrounded by duſky areolæ, and, the bluiſh tint of the ſcleroticæ is, unnaturally, evident. The lips are parted, and, pale; the tongue,—languidly protruded,—is tremulous, and, flaccid; the alæ naſi act inordinately, and, the oppreſſed reſpiration becomes hurried on the ſlighteſt exertion. Sighing is frequent; no pain is complained of. Palpitation of the heart is, often, troubleſome; but, the ſounds of the organ are normal; the pulſe is quick, weak, and, irritable; by the ſlighteſt effort, even, the circulation is, unnaturally, accelerated. Appetite is capricious, or, almoſt, wholly loſt; and, a ſenſe of oppreſſion is complained of at the ſcrobiculus cordis. There are preſent, oc-

caſionally, confuſion of thought: a feeling of lightneſs in the head, throbbing of the temples, and, ſinging in the ears. Syncope, ſometimes, occurs. Sleep is dreamy, and, unrefreſhing. The eyelids, feet, and, ancles may be œdematous. The ſymptom, however, moſt complained of is debility, which has become ſo extreme as to render life a burden. Under what ailment is this patient labouring of which ſuch great vital depreſſion forms ſo prominent a ſign? The innate, but, miſguided modeſty of her ſex, has led the ſufferer to conceal the circumſtance of the exiſtence, for a long period, of hœmorrhoids, the daily bleeding from which has, thus, gradually, reduced the powers of life to the loweſt ebb.

In ſuch a caſe as the above, much may be accompliſhed by treatment.[1] The ſtate to which the ſyſtem is reduced by reiterated loſſes of blood, lays it open to the inroads of degenerative changes which may, with readineſs, ſupervene in the anœmic condition to which the body is brought through defective performance of the nutritive operations; and, death, even, may take place from ſudden failure of the action of the heart, which has, at the ſame time,

[1] "Few of the effects of medicine are more immediate, or, more remarkable in their reſults in this diſeaſe (anœmia) than the exhibition of *iron*. We all know, chemically, how ſoon, under the influence of this remedy, our patients recover their natural complexion; and, a chemical analyſis of the blood explains this, ſufficiently. F. Simon gives a caſe, where, after a few weeks' treatment, the proportion of blood-corpuſcles roſe from 32 to 95 in a thouſand. Herberger, one where it roſe from 38 to 98; Andral, and, Gavarret one where it roſe (in ſpite of two bleedings) from 46 to 95."—Simon, J., F.R.S., Lectures on General Pathology, p. 42. Lond. 1850.

largely ſhared in the general ſpoil. Dr. Ormerod[1] has detailed the hiſtory of a pale, bloodleſs boy, *aged eight years*, who had ſuffered from profuſe epiſtaxis; he appeared to ſink from exhauſtion, and, died in convulſions: the heart was found mottled by buff-coloured ſpots, compoſed of diſorganiſed fibrils which, in place of their proper ſtriæ, preſented irregular rows of little granules of oily matter.

To Dr. Briſtowe[2] we are indebted for the relation of the following intereſting caſe, which came under the care of Dr. Riſdon Bennet:—B. R——, *æt.* 11, extremely pale, and, anœmic, preſented over the entire cutaneous ſurface, but eſpecially, on the cheſt, a copious eruption of ſmall purpura ſpots. The gums were rather ſwollen, ſoft, and, to a certain degree, ſpongy: and, bled readily, when touched. Once, or, twice, the noſe had bled while in hoſpital; hœmorrhage, occaſionally copious, took place from the noſe; and, ſometimes, blood was vomited, and, paſſed by the bowels. He became ſo anœmic that the lips were ſcarcely diſtinguiſhable from the ſurrounding ſkin. *Autopſy.*—The heart was of natural ſize, and, apparently, for the moſt part, healthy. The muſcular tiſſue was very pale without being flabby; and, the ſurface bounding the left ventricular cavity, including that of the columnæ carneæ, was finely mottled. On examining the muſcular tiſſue of the heart with the microſcope, it was found to be in an extreme ſtate of fatty degeneration."

[1] Loc cit. caſe viii.

[2] Tranſ. of Pathol. Soc. of Lond. Vol. v, p. 87, 1854.

Mr. Barlow[1] relates a caſe in which the arcus ſenilis was ſeen in a man, aged forty, who had ſuffered from frequent naſal hœmorrhage, and, had been bled, largely, likewiſe, at different times. "Without pretending to ſay, raſhly," adds the author, "that the arcus appeared as a direct conſequence of the loſs ſuſtained in this particular inſtance, we may ſuppoſe with reaſon, that the degeneration of the cornea may be much promoted by repeated hœmorrhage. The converſion of this part muſt be cauſed by atrophy before the latter can be indicated by it. The frequent, and, often, profuſe hœmoptyſis which occurs in phthiſis[2] muſt be conſidered in reſpect of the relations of this diſeaſe to fatty degeneration of the heart, and, other parts."

Among the cauſes leading to defective nutrition, all authors on the ſubject include an inadequate ſupply of blood, and, the above, with many other caſes on record, point out, in a ſtriking manner, the extent to which the ſubſtance of the heart may ſuffer from this ſource of atrophy, and, degeneration. We muſt not forget, however, to take into account the condition into which the blood itſelf, ſpeedily, paſſes; ſo that, in conſidering the ſubject, we can ſcarcely diſconnect its impoveriſhed ſtate from the defect in quantity which, now, characteriſes it. Simon[3] obſerves:—"Continu-

[1] Loc. cit. p. 12.

[2] "Hœmoptyſis,—including under this term even expectoration ſlightly ſtreaked with blood,—is a ſymptom of extreme frequency, occurring in about 81 per 100 caſes."—Walſhe, W. H., M.D. A Practical Treatiſe on Diſeaſes of the Lungs, 2nd ed. p. 504. Lond. 1854.

[3] Animal Chemiſtry, vol. i, p. 317.

ous, and, exceſſive loſs of blood muſt, neceſſarily, produce a change in the compoſition of that portion which remains in the ſyſtem" He analyſed the blood in a caſe of malœna, and, found that it did not coagulate on ſtanding, and, contained no fibrin. No blood-corpuſcles could be obſerved under the microſcope; but, merely, ſome yellow particles floating in a clear fluid. It was very rich in hœmaphæin.

Dr. Wilks[1] has related ſeven remarkable examples of fatal anœmia, and, fatty degeneration. "They are the more ſtriking, ſeeing that the ſubjects of it were, comparatively, young. It will be obſerved that a fatty degeneration of the heart is the moſt marked, and, important occurrence; and, that the liver, and, other organs, in moſt caſes, were, only moderately fatty. Alſo, that there was no exceſs of fat in other parts, and that, at the ſame time, the patients were not waſted." *In none of theſe inſtances was the arcus ſenilis preſent.*

I have, already, ſpoken of thoſe ſtates of the ſyſtem in which there exiſts great depreſſion of the conſtitutional powers, although the appearance of health is, at the ſame time, ſtrongly, ſimulated. We have frequent opportunities of obſerving this "debility of plethora" preſent in thoſe who, while they diſplay the greateſt attention to the ingeſtion of all that a depraved taſte leads them to indulge in, are totally unmindful of the watchfulneſs requiſite to be beſtowed on the quantity, and, quality of the egeſta. This, as a ſource of languor, and, debility has not, I

[1] Guy's Hoſp. Reports. 3rd Series, vol. iii, p. 205.

believe, been, ſufficiently, inſiſted on; and, in treatment we are, too often, oppoſed by patient, and, friends, who, ignorantly, imagine that our hygienic, evacuant, and, other corrective meaſures, are but tending to increaſe a debility which ſhould be met by ſtimulants, tonics, and, a generous diet. "Nay," obſerves Dr. E. Barlow,[1] "even the plump, and, bloated aſpect of the ſufferer, loudly, proclaim the exceſſes by which his pampered body has acquired its unnatural exuberance; and, under the very torments inflicted by thoſe maladies which have, directly, flowed from habitual, and, unreſtrained indulgence, is the medical adviſer, too often, aſſailed by ſolicitations to relinquiſh, or, poſtpone the meaſures his reaſon, and, his conſcience enjoin him to; and, inſtead thereof, to allow a little more nouriſhment, which, it is ſaid, the patient's ſtate of debility, ſo obviouſly, requires, were it only to enable him to bear the meaſures which the doctor has the cruelty to propoſe, and, inſiſt on! By ſuch ſenſeleſs jargon has

[1] Eding. Med. & Surg. Journal. Vol. ix, p. 178. 1813.

"Languor, in its marked form, is always aſſociated with other evidence of impaired general function. Its attacks, in moſt caſes, come in ſequel of profuſe, or, interrupted glandular ſecretion; or, are coincident with irregular development of the circulation, and, animal temperature. It is in cloſe relation with the great buſineſs of digeſtion; and, with the exerciſe of the generative function. . . . . It is the more neceſſary to inſiſt on moderation in diet with thoſe who are diſpoſed to languor, as they are generally impreſſed with the idea of exhauſtion by inanition. Thus, for the overtaſked ſtudent, or, indolent man of pleaſure, as by the jade of faſhion; a pretext is aſſumed for two, or, more meals of animal food in the twenty-four hours, when, even one ſhould, in many caſes, be avoided."—Wilſon, J. A., M.D. On Spaſm, Languor, &c., p. 149. Lond. 1843.

the better purpoſe of the practitioner been, too often, overruled, and, many a valuable life ſacrificed to vain terrors, and, ignorant pertinacity."

Among the various ſources of vital depreſſion, the following may be adduced, in ſtrong contraſt, to the caſes juſt ſpoken of, though, the reſulting debility continues to occupy, ſtill, a moſt prominent place in the hiſtory of impairment of nutrition. This we find exemplified in the hard-worked artiſan, whoſe phyſical powers are uequal to the fulfilment of the taſk in life he is called on to accompliſh. His weekly gains, barely, ſuffice for the maintenance of himſelf, his wife, and, a large, and, perhaps, increaſing family; whilſt, his occupation expoſes him to all the viciſſitudes of weather, or, the unhealthy atmoſphere of a crowded room. Day after day, his toils are continued, until he is forced to ſuccumb to the debility which overtaxed ſtrength has faſtened on him. There is no falſe colouring in this melancholy picture. Again, and, again in hoſpital practice are we called on to acknowledge the fidelity of the ſketch. Inadequate nutrition, having ſapped the foundation of vital power, we cannot feel ſurpriſed when degenerative proceſſes creep in to deſtroy where all is laid bare to their deadly attack. "To the exerciſe of the majority of employments, certain injuries of the health are traceable,—in gaining his bread, man deſtroys his body,—he ſhortens his years in lengthening his days. God did not, in the beginning, eſtabliſh this courſe of nature. He ſaid man ſhould eat his bread 'in the ſweat of his brow,' by healthy, bodily labour,

which increaſes the appetite, is ſauce to the food, ſtrengthens digeſtion, and, invigorates the muſcles. He does not ſay he ſhall eat it in wearing out of his body, and, the grinding down of his ſoul." [1]

In ſelecting the following caſes from many with which my note-book is ſtored, I have taken occaſion to retain, frequently, the patient's own expreſſions, as being moſt expreſſive :—

Thomas B——, aged forty-ſeven years. He is a tall, thin man, languid of movement, ſlow in ſpeech, with a ſallow, careworn, and, prematurely-wrinkled countenance. Within the laſt few years his hair has become very grey, and, fallen off conſiderably. By buſineſs he is a tailor—a buſineſs at which he has, unremittingly, worked, on the average, for twelve hours a day ſince he was eleven years of age, and, he is, ſtill, in this way, and, to this extent, occupied, daily. Few men, he ſays, "have taken leſs holiday." His health has, generally, been indifferent, and, even whilſt an apprentice, he ſuffered from headache, oppreſſion of the cheſt, and, frequent palpitation of the heart. He has been married for twenty years, and, had eight children. Shortly after marriage, his wife contracted very intemperate habits, and, would conſtantly ſquander all the money he had earned "in drink," which miſconduct cauſed him much "ſuffering inwardly." This ſtate of domeſtic diſcomfort continued for ſome years, and ſtill, perſiſts, "off and on." Thirteen years ago, he fell into a very de-

[1] Dr. Chambers. Lectures to Ladies on Practical Subjects. 3rd ed. Lecture ii, p. 136. Camb. 1857.

ſponding, and, weakly ſtate; and, became quite unable to follow his employment, without, at the ſame time, being affected by any very defined form of ailment. He now placed himſelf under the care of Dr. Rowe, who, ſeveral times, told him "he was too weak for this world," and, "medicine would do him no good," but, that "he muſt get into his native air." He went, alone, into the country for ſeveral weeks, and, returned conſiderably improved in health, and, capable of reſuming his buſineſs, though unfitted to purſue it for his accuſtomed twelve hours, daily, until the lapſe of three months, from which period, to the preſent time, he has, regularly, followed it for the above-mentioned number of hours. His reſpiration is rather oppreſſed: he, often, ſighs involuntarily: experiences, occaſionally, a "ſharpiſh" pain darting from the front of the cheſt "as if it went quite through him;" not unfrequently has pains extending down the arms, which he calls "rheumatics," but, has never ſuffered with rheumatiſm, or, pains in the joints. Palpitation of the heart, he ſays, is very common with him, and, he finds it to be augmented if he is at all "flurried," in mounting heights, or, even on walking faſt. He ſays he has a "difficulty, or, kind of preſſure in the breaſt-bone," and, there is a feeling of "tenderneſs, or, foreneſs" over the apex of the heart. Five weeks ago, he had an attack of ſyncope, or, as he ſtates it, "went off all of a minute," and, was ſome time before he "came to." Is, frequently, affected with giddineſs, and, pain in the head accompanies it; the ſight becomes "dizzy-

like;" and, he often has a ſenſation of "ſinking," and, a feeling "as though he muſt give up, he can't ſtand it any longer." The pulſe is ſmall, oppreſſed, and, languid. Between eleven, and, twelve o'clock he goes to bed, and, riſes again between five, and, ſix in the morning. It is a long time, always, before he falls aſleep, even though he feels much fatigued, or, exhauſted with his day's work. Can lie, with eaſe, on his right ſide, or, on his back, but, more comfortably in the latter poſture. He uſed to be much troubled with "curious, frightful dreams: ſuch as, the devil purſuing him, the world, ſuddenly, coming to an end, falling from a high place, or, the houſe on fire." His ſupper has been, invariably, a "bite of bread, and, cheeſe, with half a pint of beer." When troubled with dreams, he often "calls out luſtily in his ſleep," ſo as to awaken his wife, and, children; but, at theſe times, he has not awoke himſelf. On riſing in the morning, he feels he "can't buſtle about, and, rouſe himſelf, and, if anything puts him out of the way, beating of the heart comes on," and troubles him more, then, than at other times. Generally, feels as though he had not had ſleep enough, and, as though he was unequal to the work he had to do for the day; or, to uſe his own words, he "ſeems as though he had to work againſt collar;" and, whilſt dreſſing, a ſudden giddineſs, ſometimes, ſeizes him, eſpecially, on attempting to ſtoop. In winter, his hands, and, feet are colder than natural—that is to ſay, he finds them colder than thoſe of other perſons at that ſeaſon of the year; and, in ſummer, and,

winter, he, not unfrequently, finds, when preparing to dreſs, that his hands are "numbed, and, cramped" for a time, ſo that he is unable to uſe them; indeed, he is obliged to "ſtraighten, and, work them a bit before they ſeem to be of any uſe." He is a very ſparing eater, but, always enjoys his meals. Is not troubled with cough, expectoration, fluſhing after meals, pain, nor, inconvenience in the ſubclavian regions, and, has never brought up blood.

In each eye is a complete, and, diſtinct zone of fatty degeneration.

Ann J——, aged twenty-eight years, applied to me at the Royal Weſtminſter Ophthalmic Hoſpital, for failing ſight. She is unmarried; is a ſpare, and ſickly-looking woman; menſtruates regularly, and, is, occaſionally, ſubject to leucorrhœa. Says that ſhe has, for a long time, ſuffered from indifferent health; has loſt fleſh, and the hair has fallen off conſiderably, and, turned very grey within the laſt twelvemonth, though ſhe has not ſuffered from any particular illneſs. Complains of throbbing pain, and "ſwimming" in the head, with frequent giddineſs; ſometimes ſwoons, and, becomes, for a time, unconſcious: is not hyſterical: is diſtreſſed by a conſtant feeling of weakneſs, and, languor which often incapacitate her for work—that of a ſempſtreſs—in which employment ſhe has been engaged, and, is ſo at preſent, for ten hours, daily, ſince ſhe was fourteen years of age. Suffers much, and, frequently, from palpitation of the heart, eſpecially when excited, and, is very commonly troubled with "beating in the cheſt," on firſt

lying down on her ſide in bed, and, ſhe is, then, obliged to ſit up, for a while, to relieve this diſtreſſing ſenſation.

There is a well-marked upper arcus in each eye.

Sarah D——, æt. 49, applied to me at the above hoſpital, complaining of *muſcæ volitantes*. Her figure is ſpare, and, the countenance anxious. Has had five children, and, ſtates her marriage to have been ſo unhappy as to cauſe her continual vexation, and, fretting. Previous to marriage, however, ſhe always enjoyed good health, and was "as lively as the day was long;" but, now ſhe feels, conſtantly, depreſſed, and, is often ſeized with fits of deſpondency which laſt for ſeveral days, accompanied by "nervous headache," chiefly affecting the vertex. She has once, been demented; and, though complaining, frequently, of giddineſs, and, "lightneſs of the head," ſhe feels herſelf, at other times, quite well, and, cheerful. The hair has fallen away from the upper part of the head, and, partially ſo from the temples; that which remains is, rapidly, turning grey. Her temper has, only latterly, become very irritable, and, peeviſh; appetite indifferent: ſays ſhe, often, feels "unnaturally drowſy, and, is annoyed with heats, and, breaking out in perſpirations," which are profuſe, and, brought on by even ſlight exertion, ſuch as bruſhing her hair, or, lacing her ſtays. Feels much exhauſted, and, faint, on mounting ſteep places, and, the breathing becomes ſhort, and, oppreſſed. The reſpiration, however, ſhe ſtates to be generally good; but, walking rather faſt, or, running, brings

on palpitation of the heart. The feet, and, hands often ſwell, and, are morbidly hot in ſummer, and, cold in winter. Palpitation, and, "fluttering" of the heart are, readily, induced by any ſudden ſurpriſe, or, excitement, and, when ſhe lies on the right ſide, the "beating" ſo diſturbs as to prevent ſleep, indeed, ſhe ſays it becomes audible to any one near her. Sleep is very much diſturbed by unpleaſant dreams: often, ſhe is very wakeful, and, not uncommonly, riſes in the morning quite tired, and, unrefreſhed; and, on firſt aſſuming the ſitting poſition, ſhe feels "light, and, giddy." Is ſubject to "fainting-fits," which ſhe ſtates to be, ſometimes, preceded by a "deadly languor," and, is, then, inconvenienced by a ſenſe of preſſure at the forepart of the cheſt. Pulſe 75, ſmall, and, compreſſible.

Each eye preſents a complete circle of fatty degeneration.

Sarah F——, æt. forty-one. Is a married woman of ſlight, delicate frame, and, ſickly, wan appearance. She has been married twenty-three years, and, had ten children, all of whom ſhe ſuckled. Has had three miſcarriages. Had been accuſtomed to work at ſhoe-binding ſince ſixteen years of age, until within the laſt eight years; and, ſhe was thus occupied, daily, from ſix a.m. to ten, or, eleven p.m. During the laſt eight years, ſhe has been each day engaged in turning a mangle for many hours, and, ſtill continues this employment. Has always been tolerably well until within the laſt three years, when her health began, rather ſuddenly, to fail, after having

ſat up for eight nights with a daughter who, at the end of that time, died. She, then, began to ſuffer from frequent giddineſs, and, "faintings," and, often, broke out into profuſe perſpiration from ſlight cauſes: ſhe was, alſo, much troubled with palpitation of the heart, and, when the pulſations were ſtrong, they prevented her from lying down, for, at theſe times, an oppreſſive, ſuffocative feeling would ſeize her. Is much diſturbed by dreams of an unpleaſant deſcription, which cauſe her, often, to wake affrighted in the midſt of them, and, ſhe, then, experiences a "tightneſs" at the cheſt, and, a "general trembling." Very commonly on riſing in the morning—even though ſhe has not paſſed a troubled night—feels as though ſhe had not ſlept, and, is as tired as when ſhe went to reſt. On firſt getting up, is, generally, ſo "light-headed, and, giddy" as to be obliged to ſit down, for a time, to recover herſelf." Suffers from a feeling of oppreſſion at the front of the cheſt, and, a ſharp pain, occaſionally, darts from this part towards the back, and, ſo ſuddenly attacks as to "force her to ſing out." Going up ſtairs rather quickly "takes away her breath," and, brings on "beating of the heart." Says ſhe, very commonly, feels exceedingly tired, even though ſhe has not been exerting herſelf. Is much afflicted with dejection of ſpirits, and, frequently deſires to be alone that ſhe may find relief in crying, which, from "a low feeling," ſhe is unable to reſiſt. Has, latterly, become very thin, and, loſt her appetite: her hair, which uſed to be very thick, and, long, is, now, ſcanty, and, lank.

Feels very drowſy after each meal, and, is obliged to rouſe herſelf to prevent ſleeping.

In each cornea there is a broad arcus above, and, a narrow one below.

It muſt not be aſſumed from the above caſes, and, the remarks which introduced them, that I imply the exiſtence, neceſſarily, of fatty degeneration of the cornea in all ſimilar inſtances; nor, on the other hand, that this condition is unlikely to be preſent without a concomitant want of energy, and, vigour of the ſyſtem being, alſo, manifeſt. Obſervation convinces us to the contrary; and, I recall to mind numerous inſtances where the arcus has been, prematurely, formed, and, for many years, has continued to increaſe, ſteadily, in definition, and, extent, without the conſtitution being, at the ſame time, *apparently*, unſhaken by debility. Nevertheleſs, I perfectly coincide with Mr. Paget that "The arcus ſeems to be, on the whole, the beſt indication which has, yet, been found of proneneſs to an extenſive, or, general fatty degeneration of the tiſſues. It is not, indeed, an infallible ſign thereof: for, there are caſes in which it exiſts with clear evidence of vigour in the nutrition of the reſt of the body; and, there are others in which its early occurrence is due to defective nutrition conſequent on purely local cauſes, ſuch as inflammatory affections of the choroid, or, other parts of the eye; but, allowing for ſuch exceptions, it appears to be the ſureſt, as well as the moſt viſible ſign, and, meaſure of thoſe primary degenerations which it has been the chief object of my two laſt lectures to deſcribe."

Wherein, it may be aſked, conſiſts the eſſential difference which we have frequent occaſion to obſerve among individuals, all of whom are of the ſame age, ſex, family antecedents, diatheſis, &c., and, who appear to be poſſeſſed of the ſame frame of body, and, ſtrength of conſtitution? Subject a large number of ſuch perſons, however, to the ſame influence—whether of hot, cold, or, variable climate: malarious emanations: contagion, or, infection of diſeaſe: mental inactivity: diſquietude of mind: deprivation, or, exceſs of food: toil of body, or, mind, &c., and remark the reſpective power of endurance in each. No *a priori* conſideration could have led us to anticipate the, poſſibly, curious reſults which may be obtained. Though all circumſtances appeared to be equal, we find, nevertheleſs, that there exiſt as many different degrees, and, varieties of ſtaminal power as there are individuals poſſeſſing them. "In health as in life," obſerves Dr. Henry Bennett,[1] "the battle is not *always* to the ſtrong, nor, the race to the ſwift! Some whoſe family antecedents are good, as regards conſtitution, and, health, and, who have, always, appeared ſtrong, and, hardy, in the hour of trial ſhow no real ſtrength, and, at once, ſuccumb, if expoſed to hardſhips, or, if attacked by diſeaſe. Others, on the contrary, who can boaſt neither of good family antecedents, nor, of perſonal health, live on through every untoward ordeal, phyſical, and, mental, and, eventually, attain old age. With them, 'the graſp on life' is ſo ſtrong, that they, victoriouſly, reſiſt

[1] Nutrition in Health, and, Diſeaſe, p. 208. Lond. 1858.

every influence, however unfavourable to life. As children they may be neglected; as men they may be expoſed to fatigue, to mental diſtreſs, to malaria, and, to diſeaſe in every ſhape, and, yet through their ſtrong, inherent vital power, they reſiſt every morbid influence; or, ſuccumbing for a time, eventually rally, and, regain their footing on the ſhores of life.

"Belonging to this claſs are the habitual drunkard who, yet, attains old age: thoſe who paſs through three ſcore, and, ten years of diſeaſe, and, phyſical ſuffering: thoſe who live long years in malarious, and, death-giving diſtricts: the ſoldier who, if he eſcapes the enemy's ball, paſſes, ſcatheleſſly, through twenty campaigns; or, the barriſter who reaches the woolſack after half a century of mental toil, and, bodily exertion.

"In all the vital principle muſt have been, exceptionally, powerful; the hold upon life muſt have been, exceptionally, great from the moment they drew their firſt breath. They are exceptions to the general rules which regulate health, and, life; and, the exception has its explanation in this very intenſity of the vital power which we recogniſe in its reſults, but, can neither comprehend, nor, always, foreſee."

It has, too frequently, been ſurmiſed that, becauſe the ſyſtem has become the prey of cauſes which have led, eventually, to the development within it of the fatty form of degenerative change, the ſeal of early doom has been ſet on its victims. This, however, no more, neceſſarily, follows than if a well-marked ſcrofulous diatheſis were, equally, pervading, whilſt,

no organ eſſential to life has, yet, afforded any ſpecial, local manifeſtation of the prevailing miſchief. Each part of the organiſm is in the exerciſe of its function, all in a depraved condition, and, the concert of operation of the whole—although from ſuch harmonious action a feeble type of conſtitution, only, reſults—is ſo-called Health, which, if carefully tended, might ſtill be ſuſtained for years of comparative enjoyment, and, uſefulneſs. Nevertheleſs, we are too well aware that ſome vital organ, not unfrequently, becomes ſelected for the particular manifeſtation of the diſeaſe with which the conſtitution, in either caſe, is affected, and, life may be ſuddenly cloſed through fatty degeneration of the heart, or, lingering death be the iſſue of pulmonary phthiſis.

It has been moſt truly remarked by Seneca:—"Life is to be meaſured by action, not by time; and, a man may die old at thirty, and, young at fourſcore. Nay, the one lives after death, and, the other periſhed before he died."[1] Some years ago, a lawyer's clerk, *æt.* 25, became a patient of mine at the Royal Weſtminſter Ophthalmic Hoſpital, complain-

[1] "Does the phyſiological condition, or, the conſtitutional age of any two individuals, ever advance to preciſely the ſame point in preciſely the ſame number of years? Phyſically, and, mentally are not ſome perſons older at fifty than others at ſeventy? And, do not inſtances, occaſionally, occur, in which an old man who reaches even his hundredth year, retains as great a degree of juvenility as the majority of thoſe who attain to eighty?"—Southwood Smith, M.D. The Philoſophy of Health, p. 111. Lond. 1835.

"A man that is young in years may be old in hours, if he have loſt no time, *but, that happeneth rarely.*"—Lord Bacon's Works, ed. by Baſil Montagu, vol. i, p. 142. Lond. 1825.

ing of dimneſs of viſion. He was a tall, thin young man, having a paſty complexion, and, was much affected with *acne punctata* of the face. His manner was reſerved, ſpeech heſitating, and, look downcaſt. He ſtated that he had been, frequently, troubled with momentary loſs of viſion, and, confuſion in the head on ſtooping, or, making any ſudden exertion. Scintillations of light were, occaſionally, ſeen. Slight preſbyopia; zones of ſlight ſclerotic vaſcularity; veſſels of conjunctivæ, here and there, congeſted; pupils dilated; motions of irides ſluggiſh; corneæ unnaturally bright, ſomewhat prominent, and, preſenting well-defined arches of fatty degeneration in their upper, and, incipient ones in their lower ſegments. The patient ſuffered from great debility, nervouſneſs, depreſſion of ſpirits, and, a frequent feeling of total want of aptitude for buſineſs.

A cloſe enquiry into the cauſe from which ſo oppreſſive a ſenſe of languor, and, debility had ſprung, proved onaniſm to have been, ſyſtematically, perſevered in for ſeveral years: and, in proportion to the purſuit of this practice, had ſtrength, and, energy declined. How fertile a ſource of debility is this unchaſte bane of youth, and, how ſubverſive of the normal operation of all thoſe proceſſes through which the due nutrition of the body is to be executed, and, thus life, and, health ſecured!

The above is but one caſe from among many I have ſeen of bodily, and, mental proſtration ſpringing from indulgence in this deſtructive vice, and, where a premature occurrence of the arcus ſenilis was to be

obſerved. Furnani[1] ſays: " . . . . tout récemment on a obſervée cette tache périférique de la cornée chez un ſeminariſte, âgée de vingt ans, adonée à la maſturbation, et, menacée de phthiſie."

It is well known that, in both ſexes, phthiſis has, in numberleſs inſtances, followed cloſely in the train of the debility ariſing from the above-mentioned cauſe; and, the victims of this habit are many whom death, through conſumption, has conſigned to an untimely grave. Portal[2] relates the caſe of a young man, *æt.* 17, of lank ſtature, and, who, in the ſpace

[1] Voyage Médical dans l'Afrique Septentrionale; ou de l'Ophthalmologie conſiderée dans ſes Rapports avec Differentes Races, p. 33. Paris, 1846.

[2] This author gives a harrowing account of the effects of onaniſm, where the practice originates even in childhood. He obſerves:—" Les enfans qui commence à ſe maſturber de bonne heure, ſont ſujets à la même eſpèce de rachitiſme. J'ai vu pluſieurs de ces malheureuſes petites créatures, tellement adonnées à cette paſſion deſtructive, qu'il falloit, non ſeulement, attacher les mains, mais encore leur corps, pour les empêcher, le plus poſſibles, de ſ'y livrer pendant la nuit, et, qu'on étoit encore forcée de leur ſurveiller pendant la jour. Tous ces ſoins, et, la plus grand ſurveillance, ont été très-ſouvent inutiles. . . . . Ont eût dit, ſi on eût volu juger de leur âge par la developpement de leur corps, qu'ils n'avoient pas plus de douze ans; ils étoient d'une foibleſſe extrême, tant pour la phyſique que pour le moral, et, ils ſont devenus imbécilles long-temps avant leur mort."—Obſ. ſur la Nature du Rachitiſme, pp. 220 & 224. Paris, 1796.

Might we not, in many ſuch caſes as the above, ſuſpect ſome phyſical agency to be in operation, leading to the adoption of this habit in order to allay local irritation? Might not attention be, profitably, directed to the correction of errors of the *ingeſta*, whilſt a few active doſes of ſcammony, and, jalap would have probably brought to light, *aſcarides in the egeſta?*

That a phyſical cauſe, alſo, may operate, in riper years, to the inducement to onaniſm, the following inſtructive caſe will demonſtrate:—" Two young men, from 18 to 20 years of age, reduced themſelves to a

of a year grew rapidly. His ſpine, alſo, became ſo greatly bent that, in leſs than ſix months, he was, conſiderably hump-backed. His head was thrown forward, and, the cheſt ſo depreſſed towards the lower portion of the ſternum, that, a great depreſſion was ſeen at the epigaſtric, whilſt, a correſponding ſaliency was formed in the hypogaſtric region. It is added:—"Ce jeune homme ſ'étoit, habituellement, livré à la maſturbation; les crachements de ſang ſurvinrent, et, il périt de la phthiſie pulmonaire."

There is, perhaps, no diſeaſe in which for a longer period previous to the development of the more grave, and, active ſymptoms, the debility is greater than in pulmonary phthiſis: all the powers of life appear, gradually, to wane,—the digeſtive, reſpiratory, circulating, and, nervo-muſcular ſyſtems becoming, more and more, faulty in their operation; whilſt, *pari paſſu* with their failure, is the progreſs of emaciation. Repeated hœmoptyſis, ſevere cough, profuſe expectoration, copious ſweats, and, colliquative diarrhœa, complete the ſum of ſymptoms which, in exhauſtive combination, terminate the life of the

ſtate of the moſt appalling moral, and, phyſical degradation by the act of ſelf-pollution. Both of them died from its effects: one of them having often declared he was compelled towards the gratification of a deſire which he had no power to control; for he had, frequently, attempted the conſummation of it after the prepuce had been exciſed as a means of prevention; and, when the glaus, and, part of the penis were in a ſtate of active inflammation. In each of theſe patients the cerebellum was the ſeat of a tumour as large as a hen's egg, compoſed entirely of medullary ſarcoma."—Carſwell, Path. Anatomy, *art.* "Atrophy."

ſufferer.[1] "The accuracy of the anatomical reſearches of Louis, and, others," obſerves Dr. William Addiſon,[2] "with reſpect to phthiſis has been, fully, ſubſtantiated by more recent obſervers. It may, therefore, be conſidered as demonſtrated, that, in conſumption, it is not only the lung that is diſeaſed, and, diſabled in its function; but, that almoſt every texture in the body ſhares, more or leſs, prominently."

In paſſing through the Hoſpital wards, ſome time ſince, my attention was arreſted by a man, *æt.* 45, who was dying from phthiſis. His eyes were blue, bright, and, prominent; and, each preſented a complete, well-defined, and, denſely opaque circle of fatty degeneration of the cornea. At the *autopſy*, I found a large cavity in the upper lobe of the right lung, and, ſeveral ſmaller excavations exiſted in the lower lobes. The left lung was crowded with tubercles in various ſtages of ſoftening. The heart was of average ſize: but, pale, flabby, and, friable. Dr. R. Quain, in kindly reporting to me on its microſcopical characters, ſtated:—"There is no doubt whatever of its ſtructure being in a ſtate of fatty degeneration. I examined both ventricles, and, found each to be in a like degenerated ſtate." The arch of the aorta preſented ſeveral atheromatous patches, varying in

[1] "Whilſt meagre Phthiſis gives a ſilent Blow;
Her Stroakes are ſure, but, her Advances ſlow.
No loud Alarms, nor, fierce Aſſaults are ſhown;
She ſtarves the Fortreſs firſt, then, takes the Town."
Dr. Garth. "The Diſpenſary," 5th ed. p. 85. Lond. 1703.

[2] On Healthy, and, Diſeaſed Structure, p. 187. Lond. 1849.

ſize, and, conſiſtence; and, many ſimilar ones exiſted along the whole courſe of this veſſel, and alſo, in the primitive iliacs.[1] The liver, and, kidneys were, carefully, examined by Dr. Hyde Salter. He obſerved:—"The liver was, I think, the moſt fatty I ever ſaw; its ſtructure was, almoſt entirely, ſupplanted by free oil-globules. The kidneys were fatty, but, leſs ſo; there was leſs free fat which was more confined to the ſecreting cells, where it was moſt abundant."[2] In aſſociation with theſe changes in ſo many organs, I deemed it a point of conſiderable intereſt to enquire into the condition of the ſkeleton of the larynx, and, of the coſtal cartilages. I found in both that calcification had proceeded to a great extent, and, many parts in the immediate neighbourhood of thoſe ſo altered were in a ſtate of fatty degeneration.

I regret that, in this caſe, an examination of the minute blood-veſſels, in connection with the ſtate of

[1] "Organic alterations of the aorta—the ſoft yellow patch, and, white cartilaginous patch, with the ulcerations they ſo frequently entail,—and, laſtly, the oſſeous patch, were noticed (*in phthiſis*) with ſomewhat leſs frequency than red diſcoloration,—namely, in the ſixth part, only, of my caſes, either ſimple, or, complicated, in perſons varying in age from 35 to 75 years."—Louis. Reſearches on Phthiſis. Syd. Soc. Trans. p. 53.

[2] The minute anatomy of fatty degeneration of the liver was firſt deſcribed by Bowman in the "Lancet," 1841-2. Vol. i, p. 560.

Louis found this condition of the liver in one-third of his caſes, and, exactly the ſame proportion is recorded by Andral as the reſult of his experience.

Vide an intereſting paper by Dr. Peacock on "The co-exiſtence of Granular Diſeaſe of the Kidneys with Pulmonary Conſumption," in the Lond. and, Eding. Monthly Jour. Vol. v, 1845.

the lungs deſcribed, was not inſtituted. Analogical conſideration would induce the belief that much intereſt is likely to attach to ſuch enquiries; and, Dr. C. R. Hall, in directing attention to this point, obſerves:—"Beneath the ſoft, pyogenic lining of a large cavity, I have, in two inſtances, found blood-veſſels in a ſtate of fatty degeneration. In another inſtance, I found fatty blood-veſſels in a portion of diſtenſible lung, half an inch diſtant from any depoſit of tubercle, the epithelium of the air-veſicles being, here, fattily degenerate. This makes four caſes in which I have, now, ſeen fatty degeneration of the ſmall blood-veſſels of the lung in phthiſis: near to but not mixed up with tubercle in one; within grey tubercle on the encloſed wall of an air-veſicle in one; in the wall of a large cavity in two."

The complication of phthiſis by degeneration is one of great practical intereſt; and, implication of the heart in this latter alteration adds a material obſtacle to the even otherwiſe great difficulty experienced in the treatment of this intractable complaint. "Not long ago," obſerves Mr. Barlow,[1] "I examined a man far advanced in conſumption, who, having a ſeverely degenerated heart, turned ſuddenly pale, and, fell dead on the floor. There was no act of dying, he was inſtantly dead. Louis[2] has a chapter on "Caſes of un-

[1] Loc. cit. p. 6.

[2] Loc. cit. p. 397.

"In its higher degrees of development fatty degeneration of the heart is, moſt frequently, met with in perſons who have paſſed the prime of life; but, minor ſhades of it appear in young patients, eſpecially where there is complication with other viſceral diſeaſes,—as, for example,

expected death which are not explicable by the condition of the organs," and deſcribes the caſe of a woman who died ſuddenly, to the great ſurpriſe of the occupants of the neighbouring beds. * * * * The heart was ſomewhat ſoft, and, there is no great boldneſs in conjecturing that it had undergone the fatty converſion. Louis remarks, "No doubt in this caſe the amount of diſease in the lungs was conſiderable ; but, a fair portion of theſe organs was ſtill permeable to air, and, reſpiration performed with regularity a few minutes before death. Between that time, and, the moment at which life ſuddenly ceaſed, no change—at leaſt of an appreciable kind—appears to have been effected in theſe organs. How, then, can we explain the unexpected death ? Is it juſtifiable to compare the viſcera with the locomotive muſcles, and, admit that, under certain circumſtances, they become, ſuddenly, incapable of performing their functions from a kind of fatigue ?"

"That phthiſis," continues Mr. Barlow, "ſhould lead to fatty degeneration of the heart can give no ſurpriſe : it runs, often, a ſlow, and, tedious courſe, while, an emaciation which ſhows the ſkeleton in outline is but too common. The obſervations of Louis on the ſoftening of the tiſſues in caſes of this affection muſt be well conſidered in reference to fatty degeneration. What he ſays of the fatty liver, the ſoftened bones, the atheromatous aorta, and, the condition of the heart is of great intereſt : but, the obſer-

pulmonary tubercle."—Dr. Stokes. The Diſeaſes of the Heart, and, Aorta ; p. 231. Dublin, 1854.

vations ſhould be repeated with all the help that the microſcope can afford. It would be important to examine, carefully, the ſoftened brains which, occaſionally, occur in phthiſical patients with the view of detecting fatty degeneration of the ſmall blood-veſſels. The other day I viſited a man aged 40, who was dying of conſumption: he had an arcus ſenilis and ſlight hemiplegia. His body was not permitted to be examined, and, it remains uncertain whether his paralyſis was due to the preſence of tubercle, or, fatty degeneration, or, ſome other cauſe."

In the communication, already alluded to, by Dr. B. Lee[1], "On the ſymptomatic value of the arcus ſenilis" will be found the following caſes:—

[1] The American Medical Monthly. October, 1855, p. 482.

No.	Sex.	Age.	Arcus.	History.	State of Heart.
1.	Male.	30.	Above and below.	Has phthiſis pulmonalis. Rheumatic pains during the laſt three months.	A ſlight crack with the first ſound. Impulſe normal.
2.	Male.	30.	Slight above.	Phthiſis. Died, May 18th.	Signs of enlargement, with dilatation. Poſt-mortem: large, ſoft, flabby, with ſome fatty degeneration.
3.	Male.	31.	Very marked above and below.	Rheumatic for twelve years. Incipient phthiſis. Tongue flabby and indented with teeth. Died ſuddenly of acute pleuriſy, with effuſion. Liver ſmall, with patches of fatty degeneration.	Poſt-mortem: large; large amount of fat anteriorly, leſs poſteriorly; decided fatty degeneration.
4.	Female.	32.	Slight above.	Was treated for anœmia, with blowing ſound, a year ago ſucceſſfully. Now proſtrate, and anœmic to the laſt degree. Dyſpnœa. Died, April 15th, in fit of ſyncope. Incipient phthiſis. Poſt-mortem. Kidney fatty and cyſtic: large fibrous tumour of uterus. An unuſual amount of normal fat. Liver fatty. Degeneration throughout.	A peculiar clack heard with firſt ſound over aortic valves. Poſt-mortem: ſlightly hypertrophied; no valvular diſeaſe; pale, very flabby, utterly drained of blood, and conſiderable fatty depoſit on anterior wall; fatty degeneration.
16.	Female.	48.	Slight above.	Entered two months ſince with debility, which has gradually increaſed, reſulting in a decay of the vital powers and a lingering death, without apparent cauſe. Treated as incipient phthiſis. Poſt-mortem: Liver ſlightly fatty, kidneys ditto; a large fibrous tumour of uterus tubercles in lungs, and lymphatics in earlieſt ſtage.	Sounds indicate diſeaſe of aortic valves. Poſt-mortem: ſmall and ſlightly fatty. Calcareous depoſit above aortic valves and baſe of mitral valves.
17.	Female.	49.	Above.	Rapid phthiſis. Died, December 4th. Poſt-mortem: Liver large, light-coloured, fatty. Kidneys ſoftened, fibrous tumour of uterus.	Poſt-mortem: ſoft, flabby and ſomewhat fatty; pale.
34.	Male.	53.	Circle dim.	Phthiſis. Aſcites a year ſince. Died, June 22nd, 1856.	Roughneſs of ſecond ſounds. Poſt-mortem: large, pale, flabby, ſomewhat fatty.

Caſes are not unfrequently appealed to by authors, in ſupport of their view that, though an arcus ſenilis is preſent, and, has continued, ſteadily, to increaſe for many years in definition, and extent, without any heart-ſymptoms having ſhown themſelves, it is a fair preſumption that fatty diſeaſe of this organ does not exiſt; *e. g.* Dr. Watſon,[1] in ſpeaking of the arcus, obſerves:—"The cornea is, ſometimes, alone in ſuffering the change. I am acquainted with a gentleman, under 40 years of age, who, enjoying excellent health, preſents a well-pronounced arcus in both his eyes, eſpecially at the ſummit, and, at the baſe of the circle, and, in whom that appearance has remained unaltered, certainly, ſince he was 24 years old, and, perhaps, from an earlier date." The circumſtance of the enjoyment of excellent health (apparently) is no argument in favour of the non-exiſtence of fatty degeneration of the heart; and, in proof of this ſtatement I have, already, adduced ſufficient evidence, corroborated by the unimpeachable teſtimony afforded by the autopſies. The late lamented death of an eminent judge is, ſtill, freſh in the memories of all. He had met with a, comparatively, trifling injury, and, whilſt progreſſing favourably, ſuddenly expired. He had always conſidered himſelf an eſpecially healthy man: and, was mentioning, ſhortly after his accident, that, he had never had a day's illneſs, and, had never conſulted a phyſician ſince he left ſchool. He had, lately, become ſomewhat ſuddenly corpulent: but, it was never ſuſpected by him-

[1] Loc. cit. 4th ed. vol ii, p. 272.

ſelf, or, by any other perſon that the hand of diſeaſe had ſeized him ſo firmly though ſilently.

The *poſt mortem* was performed by Mr. Charles Hawkins, Mr. James Lane, and, Dr. Bader. Examination of the cheſt ſhowed that the heart was the ſole ſeat of diſeaſe. It was loaded with fat: the walls of the ventricular cavities were thin, and, weak, and the muſcular fibres pale: the valves were competent. Throughout the reſt of the body the organs were found in a healthy condition, although, in parts, much loaded with fat. The cauſe of death was, doubtleſs, ſevere ſyncope, fatal becauſe occurring in a weak heart fattily degenerated;—moſt truly has Paget obſerved:—they who labour under fatty degeneration of the heart may be fit for all the ordinary events of calm, and, quiet life: but, they are unable to reſiſt the ſtorm of a ſickneſs, an accident, or, an operation.

Dr. George Johnſon[1] ſays:—"The arcus ſenilis may co-exiſt, for many years, in the perſons of men of robuſt health who have never manifeſted a symptom of internal diſeaſe, and, who may, at length, attain an extreme old age. We could point to ſeveral living illuſtrations of it." I could, myſelf, aſſiſt to ſwell the liſt of ſuch examples,—as I have, already, done on the other hand, in ſhowing, with the addition of the above melancholy caſe, that in the midſt of ſuch *health* as would deceive the moſt able phyſicians, perſons, nevertheleſs, die ſuddenly from fatty degeneration of the heart, and ſometimes, even at a, comparatively,

[1] Brit. and, For. Med-chir-Review. April, p. 369. 1856.

early age.[1] Dr. Johnſon continues:—"We proteſt againſt the haſty aſſumption of a doctrine which would be a fearful addition to the ſources of hypochondriaſis, and, which would perſuade thouſands of men, juſt paſt the meridian of life, and, deſtined to live to a good old age that death is, viſibly, written in the opaque margin of the cornea."

We muſt, *at leaſt*, not ignore the fact that "*the arcus ſenilis ſeems to be, on the whole, the beſt indication which has, yet, been found to proneneſs to an extenſive, or, general fatty degeneration of the tiſſues*" (Paget). Nor, is it attempted to be argued that in thoſe who have juſt paſſed the meridian of life, and, in whom the arcus is beginning to be formed, ſuch change has taken place in the fibres of the heart as would conſtitute ſufficient in amount to kill. Moreover, it muſt not be forgotten that it may happen whilſt certain heart-fibres are being atrophied and, become, degenerate, others ſhall, at the ſame time, be ſtrengthened, in order to compenſate for the loſs of power; and, theſe latter will, by degrees, accommodate them-

[1] "Diſeaſes of the heart often exiſt, for a long time, without a ſingle ſymptom to attract the attention of the patient, or, his friends: and, often, prove inſtantly fatal without a ſingle precurſory warning. Nothing can exceed the irregularity of the circumſtances in which ſuch diſeaſes prove fatal. Not only may one man ſuſtain, without inconvenience, an amount of organic injury which cuts ſhort the life of another; not only may one ſuffer long, and, cruelly from the ſame affection in kind as well as degree which kills another without a moment's previous ſuffering; but, likewiſe, one perſon may die of a limited extent, or, degree of a diſorder which in another reaches an extraordinary height without giving a ſingle indication of its preſence." Dr. Chriſtiſon. Cyclop. Prac. Med. *Art.* Latent diſeaſes.

ſelves to the performance of thoſe ſpecial movements which have been loſt, though from their poſition they had not been, originally deſigned to operate in that particular manner.

There can be no doubt that much may be accompliſhed, in proceſs of time, by means of medical treatment, where it is aſcertained that ſuch conditions are preſent as tend towards a general, or, ſyſtemic decadence; and, in which is, not uncommonly, implied an atrophying ſtate of many, and, diverſe tiſſues. Numerous caſes, of this deſcription have come under my obſervation, during the paſt twelve years: and, it it is extremely intereſting to have had occaſion to notice that, *pari paſſu*, with amendment of health has been *the diſappearance of the arcus*, in thoſe inſtances where this symptom was preſent, and, by its preſence had afforded the clue to the peculiar character of the miſchief in progreſs.

Being anxious to aſcertain whether others had made the ſame obſervation as myſelf, I applied to Dr. R. Quain, who informed me that he, too, had ſeen ſeveral examples of the diſappearance of the arcus; and, at the ſame time, he kindly furniſhed me with the following caſe which, as he obſerved, will illuſtrate many of a ſimilar character:—

A clergyman, aged 46, came under my notice in March, 1851, as propoſing his life for inſurance. He was tall, portly, ſtout, in proportion to his height, and, one who, in common talk, would be deſcribed as "a fine, healthy-looking man."

A glance at his features, placed in a good light,

happened to detect a well marked, though not broad, arcus ſenilis. This was the key to the following ſhort hiſtory. He had been accuſtomed, until five, or, ſix years before I ſaw him, to active purſuits both in his profeſſion, and, out of it. Then, his wife became the ſubject of a painful, and, protracted diſeaſe, which impoſed upon him much anxiety, and, fatigue. From this ſtate he was relieved by her death; but, only to be involved in a Chancery ſuit. He had endured theſe troubles for five years before his viſit to me. He ſaid that he was not conſcious of ſuffering from any diſeaſe; a little inquiry, however, ſhowed that he was no longer equal to any exertion, a hill or a ſtair aſcent rendered him faint, and, breathleſs. His pulſe was weak, and, compreſſible. His functions, generally, ſeemed tolerably well performed, ſave that the heart's ſounds were feeble, and, languid, and, that his digeſtion was occaſionally ſomewhat out of order. After a ſhort interview, he thus ſummed up his feelings:—"I *do* feel that I am wearing out." Some ſuggeſtions were made to him for his future guidance, and, he came again under obſervation in May, 1852 (after a period of 14 months). His Chancery ſuit had ended to his ſatiſfaction ſoon after his laſt viſit; and, he had ſince devoted much of his attention to the reſtoration of his loſt ſtrength, and, ſucceſſfully.

He was now, he ſaid, "ten years younger, and, equal to any amount of exertion." There was much truth in his obſervation. He was evidently now vigorous. His pulſe, and, heart's action were ſtronger. The arcus had almoſt altogether diſappeared, and,

would not have been perceived had not a previous knowledge pointed to its exiſtence. His life was, now, accepted at a moderate increaſe of premium.

This caſe ſeems to ſhow :—

1ſt. The value of the arcus as an aid to a diagnoſis.

2dly. The circumſtances which, impairing health, tend to the production of that premature decay, or, degeneration recogniſed as "fatty."

3rdly. The poſſibility of arreſting, and, removing this condition.

And, here, let me call your attention to the fact that the reſearches of Rainey, and others, ſhow that the uterus, which, emptied of its contents by delivery, degenerates and is replaced by a new tiſſue, afford ſtrong analogical evidence in favour of this important propoſition.

PRINTED BY HARRISON AND SONS, ST. MARTIN'S LANE, W C.