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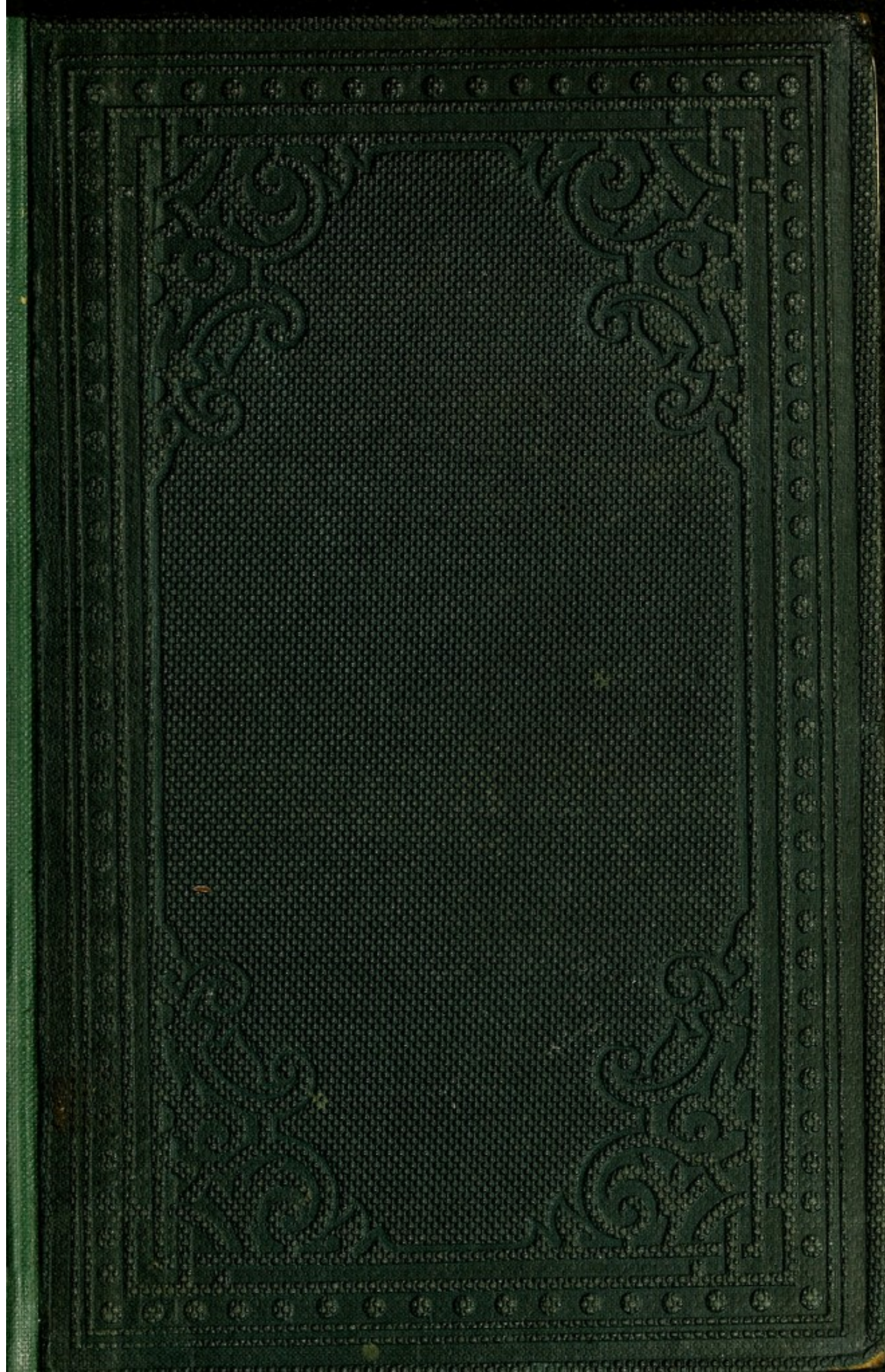
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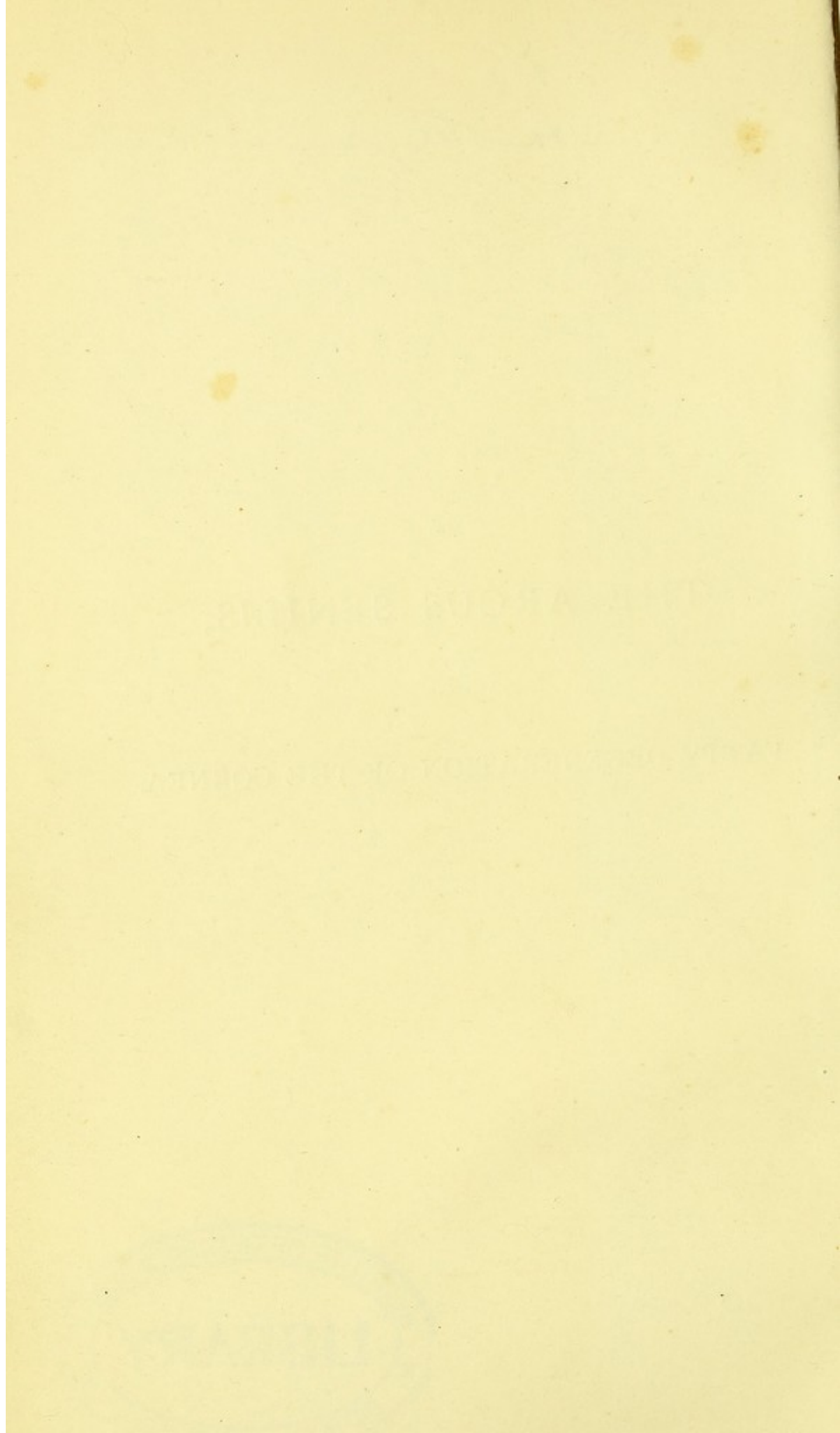
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Harold G. Fries

ON
THE ARCUS SENILIS,
OR,
FATTY DEGENERATION OF THE CORNEA.







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Fig 1

Pl 17

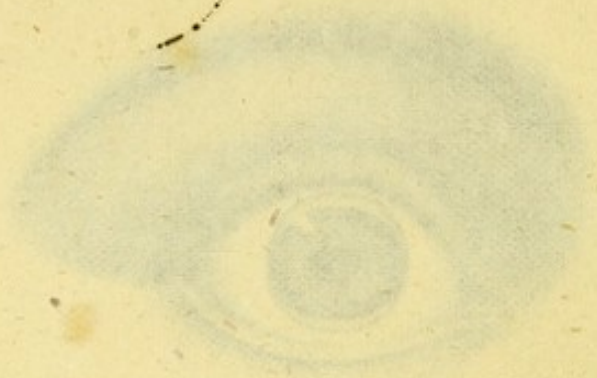
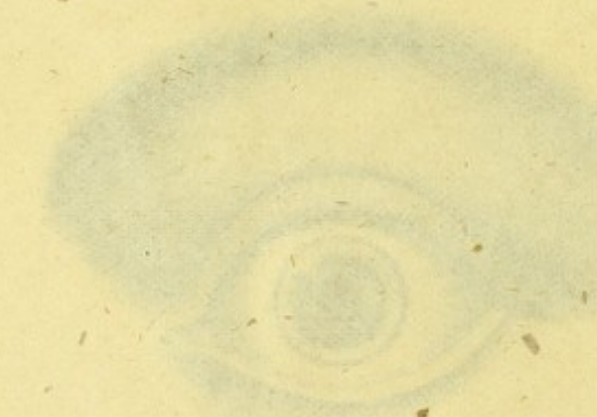


Fig 3





ON THE

ARCUS SENILIS,

OR,

FATTY DEGENERATION OF THE CORNEA.

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

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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:

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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.



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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 cor-née*.—*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. Furnani¹

from Mauchart (*De maculis corneæ*, p. 15, Tubing, 1743), who says: —“*Miramur à tot celeberr, atque lynceis oculariis medicis, ipso etiam Woolhusio, prætervisam fuisse hanc maculam 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 Septentrionale*, 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, Duddell¹ says:—“I have seen some that have had only a little transparency opposite the pupil and could see only right forward.” Ware² 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 Mackmurdo³ 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 Ophthalmia 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. Tyrrell¹ observes:—"The alteration generally commences at the inferior part, or, a little towards the nasal, or, temporal side;" and Walther² remarks:—"Dans le principe, 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 Jones² 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.”

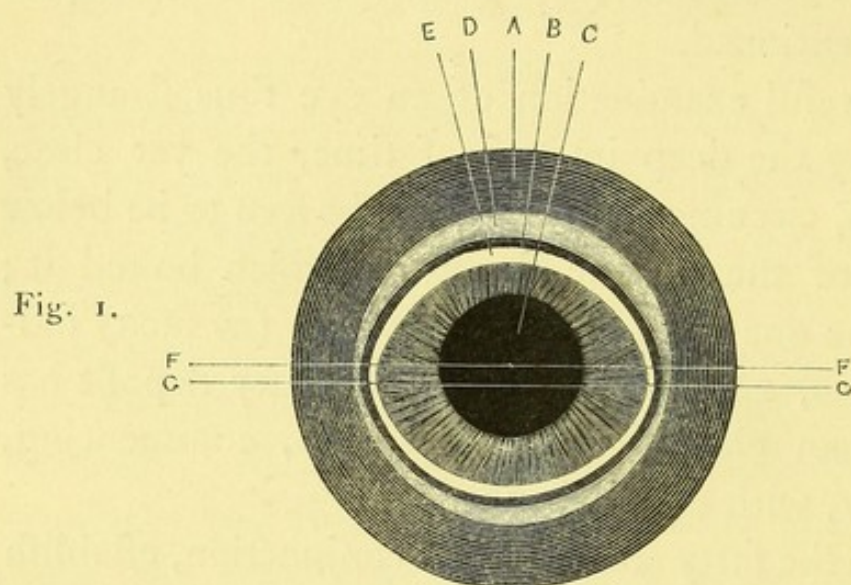
at the lower portion of the cornea. After the existence, for a variable period, of this opacity, the inner arch begins to present itself, pursuing the progress already described, and, consisting of a fatty degeneration of the *substantia propria* of the cornea, as previously mentioned.

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 laminae 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:—

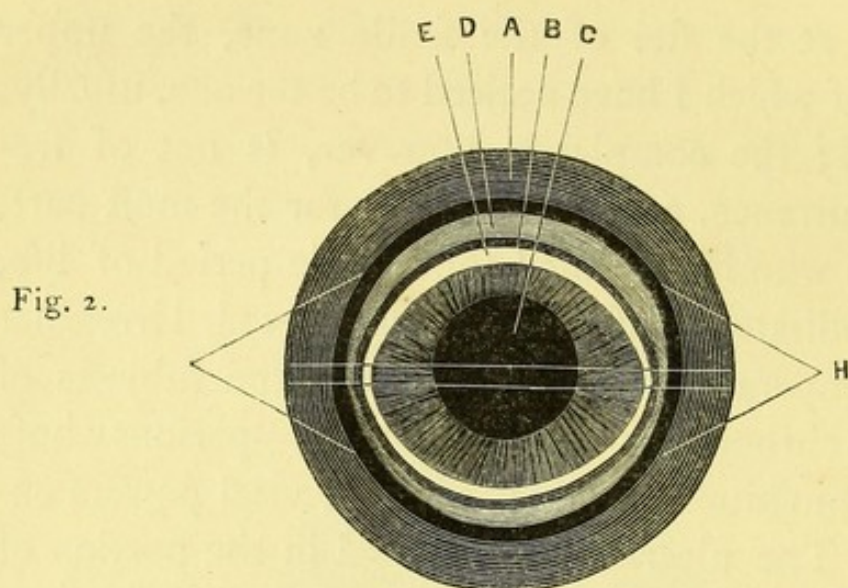


- A. The sclerotica.
- B. The unaffected, circumcorneal ring.
- C. The pupil.
- D. Overlapping conjunctiva and sclerotica.
- E. Fatty degeneration of the cornea.

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 conjunctiva (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:—



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. Middlemore¹ has truly remarked: "this ulceration is, by no means so manageable by treatment as similar diseases in other parts of the cornea."

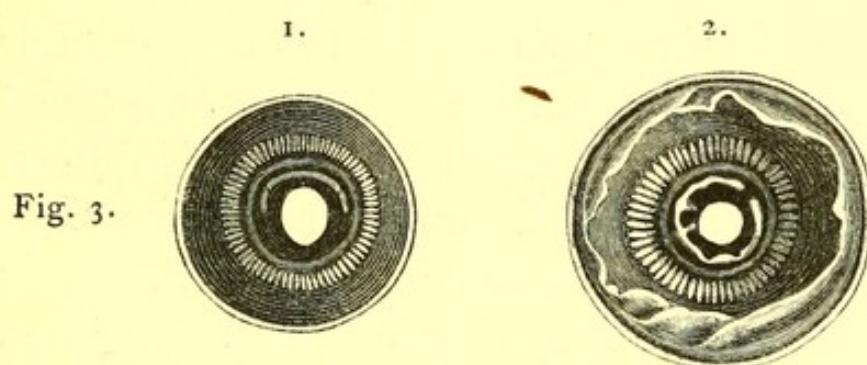
The arcus, when occurring prematurely, presents an excellent illustration of that law of the *symmetry of disease*, the principles of which have been so clearly set forth in the admirable, and, well-known papers of Dr. W. Budd, and, Mr. Paget,² and, is equally an example of a series of similar changes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



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 cristallin. 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. Kitchener² 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 Pourtrait 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.

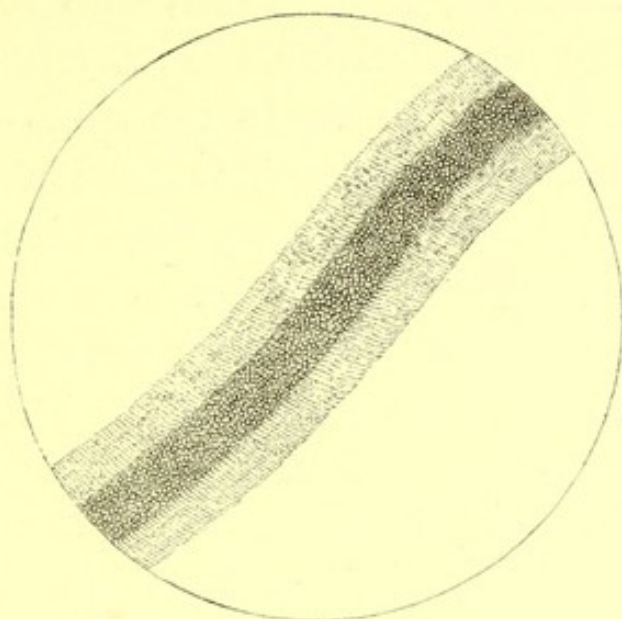
In association with well-marked arcs, or, circles occurring in the eyes of elderly persons, I have, very commonly, found the ophthalmic arteries, and, their branches to present atheromatous patches, affording an admirable illustration of that law of symmetrical change, which, in respect of the arterial 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." Virchow² 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. *Diff. inaug.* Würzburg, 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 paper¹ 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 inverted 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 conjunctival 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.

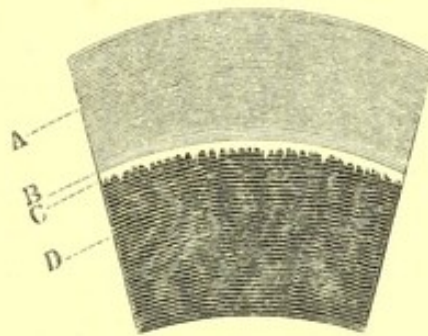
quently found at this latter situation, because, the corresponding eyelid being larger, keeps this part constantly covered, and, protected from evaporation. The form of the arcus is that of the edge of the eyelid closely applied against the periphery of the cornea. The resistance of the cornea in the 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 goat, 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 *Hornhauttrübung* of the Germans,—Keiser¹ 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.

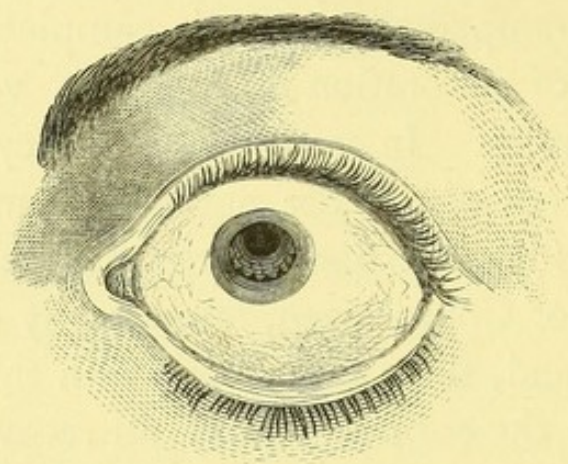
anterior chamber is, more or less, clouded, accompanied by no apparent inflammation. As the child affected with this disease advances in life, the obscurity is gradually diminished, so that, generally, in one or two years, the transparent cornea is completely restored. The period of restoration is, however, 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." Rognetta¹ remarks: "L'organe augmente a la vérité de dimension, mais faiblement: de là, la coincidence de ce défaut congénital avec la *microphthalmie*: presque toujours il y a, en même temps, manque de développement de l'iris et d'autres organes." Dalrymple² 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 foetal 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. Wilde¹ 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.” Sybel² says : “ I know a man, aged thirty-two, who has this pearl-coloured ring in both eyes, and, which is, probably, congenital.” Eggert³ notices the ap-

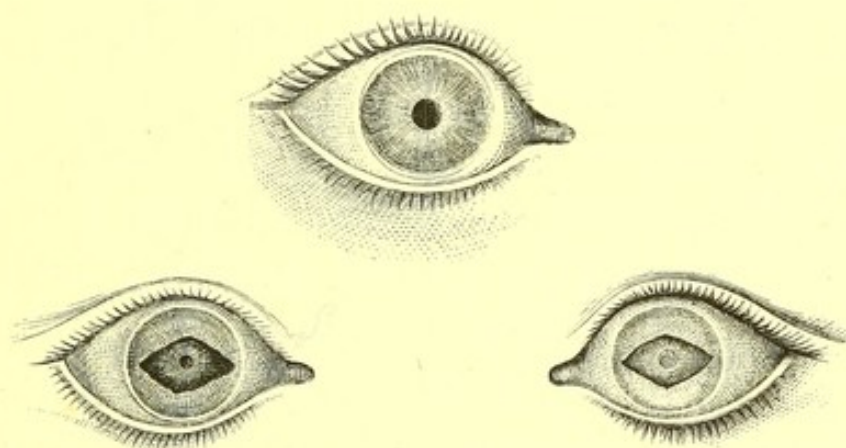
¹ On the Malformations and Congenital Diseases of the Organs of Vision. The Dublin Quarterly Journal of Med. Science.

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. Keifer's case¹ 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 Duddell² seriously affirms that, "if the eyes of persons who are turn'd of fixty 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.

Duddell⁵:—"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."

Plenck¹:—"Videtur a vasis pellucidis in senio concrefcentibus oriri."

Meckel²:—"It undoubtedly depends on the slowness with which the substance of the cornea is renewed, whence the fluids have more tendency to coagulate."

Walker³:—"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 secretory vessels, which cease to pour out healthy corneal tissue."

Hays⁴:—"A deposit of lymph formed, perhaps, by a slow, chronic inflammation."

Seiler⁵:—"It arises from the approximation, and, closer attachment of the individual laminae of the cornea, owing to the removal of the interstitial moisture."

Velpeau⁶:—"It cannot properly be attributed to disease of the cornea, the structure of that membrane not being altered, nor, its thickness increased."

Jeaffreson⁷:—"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.

Lawrence¹ :—"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."

Middlemore² :—"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."

Schön³ has "often examined the cornea affected with arcus, and, found the affected portion changed into a homogeneous—sometimes, fat-like (*fpekartige*) mass, often of considerable firmness. The laminated structure has entirely disappeared—the laminae being consolidated into one mass; this was more particularly the case with the external than the internal laminae."

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 Begründung der Augenkrankheiten, 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 knife, 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.

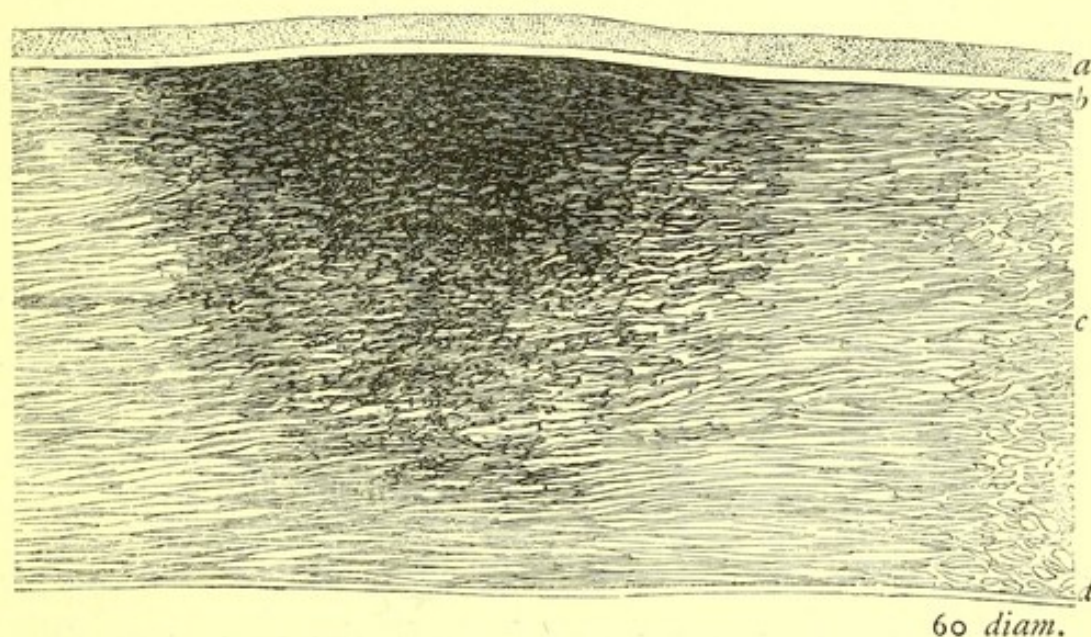
Examined by the microscope, first, with a power of 60 diameters, the specimen shows the *substantia propria*, at a short distance from the sclerotic, to be of a very light-brownish hue, and, its fibres appear as though matted, or, confused together. The depth of this tint is, ordinarily, greatest towards 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 lamina, 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.

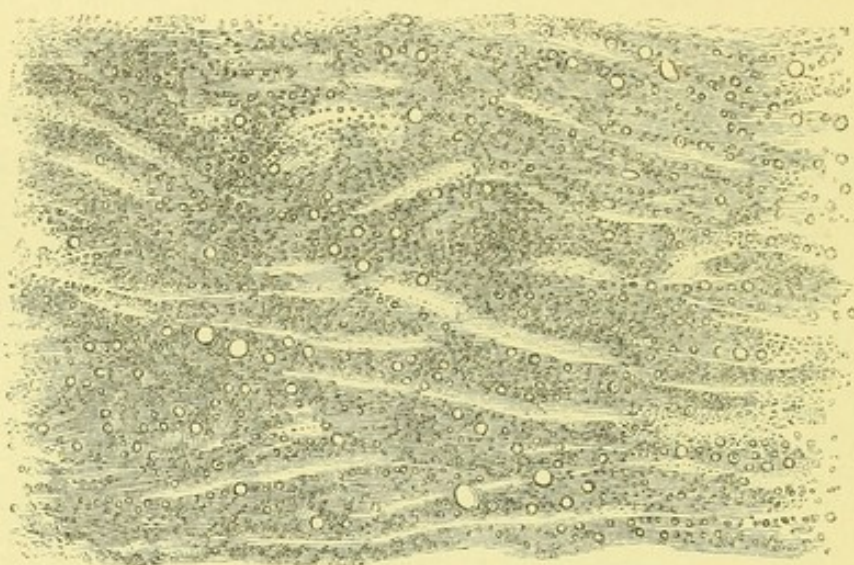


- a. Corneal epithelium.
- b. Bowman's membrane (*ant. elast. lam.*).
- c. Substantia propria.
- d. Descemet's membrane (*post. elast. lam.*).

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.

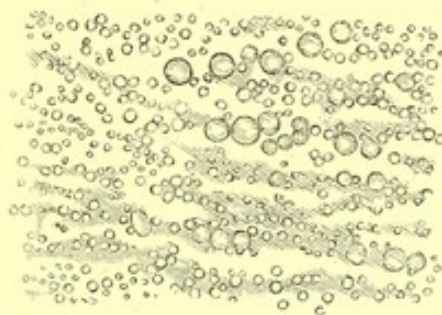


200 diam.

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 magnifying 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’ignorer l’histoire des maladies des familles qui étaient confiées à mes soins. Je ne doute pas que cette considération m’eût été utile pour les traiter mieux.”—PORTAL.

It has been truly observed by Dr. Barnes¹ 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-crisis 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 fire; 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. Simon¹ 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 supereffe.”—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. Watson¹ 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.



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, chromatodyfopia, &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 scleroticæ 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 sclerotic, 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 ft. 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, dyspnoea, 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. II, fig. 2) *aged fifty-three* : weight 7 ft. 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 hereditaryness, 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.*:—Middlemore¹

¹ Loc. cit. Vol. I, p. 455.

observes that it, sometimes, appears as early as at the age of 40. Lawrence¹ says, it is, occasionally, to be seen between 30, and, 40. Sybel² saw it in a man 32 years of age. Dixon³ 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, Wardrop⁴ has "met with it at *all* (?) periods of life." Dr. Laycock⁵ 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. Watson⁶ 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. Haskins⁷ mentions the case of

¹ Loc. cit. p. 356.

² Dessen. Beobachtungen. 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. Gros¹ 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*.

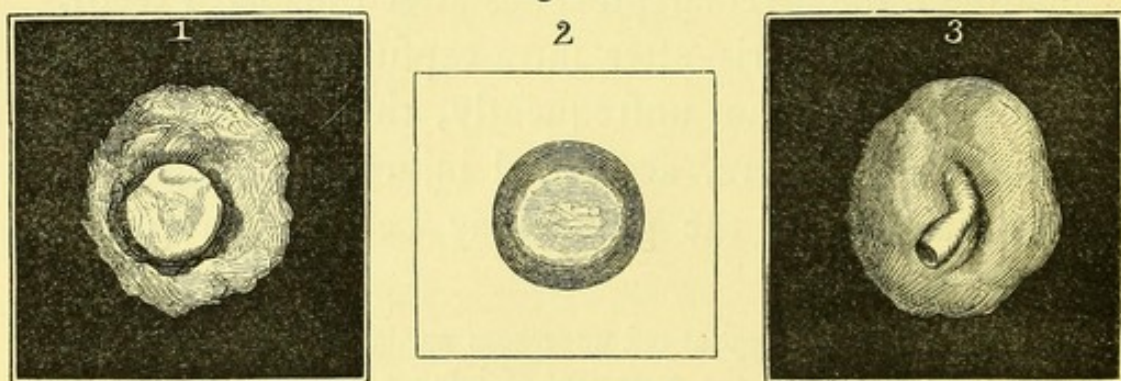
It is an acknowledged law that where the functions of a part have ceased, the organ through the medium of which those functions had been carried on, becomes atrophied, and, may almost entirely, or, indeed, wholly disappear.¹ All periods of life furnish illustrations of this fact: *e. g.*—the Wolffian 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, ankylosed 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 furrounding 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 (Obf. 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."

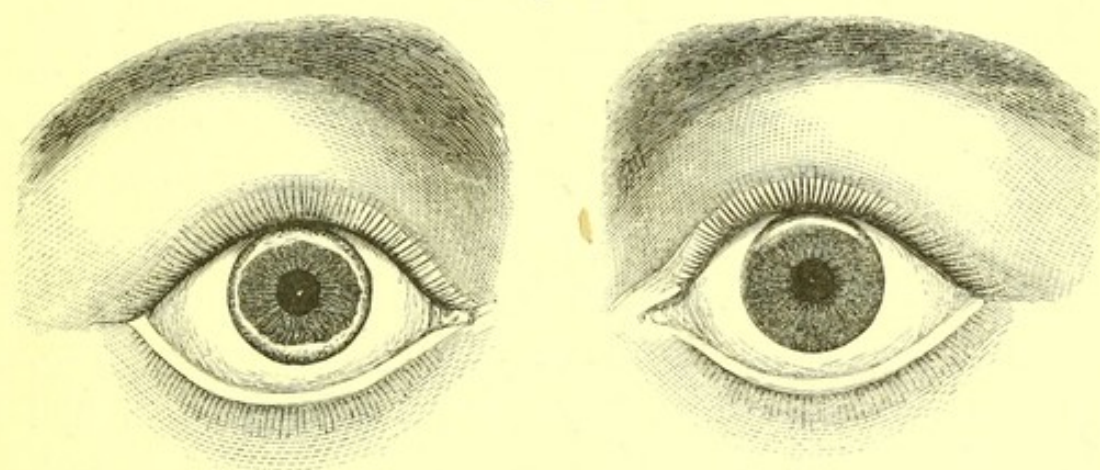
Scarpa, in his "*Pract. Obs. on the Principal Diseases of the Eye*," (transl. by Briggs) mentions a similar case, and, gives an engraving of the specimen (Pl. 2, fig. VIII.). Lond. 1806.

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 leeches, blistered, and, had her mouth made

fore." 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

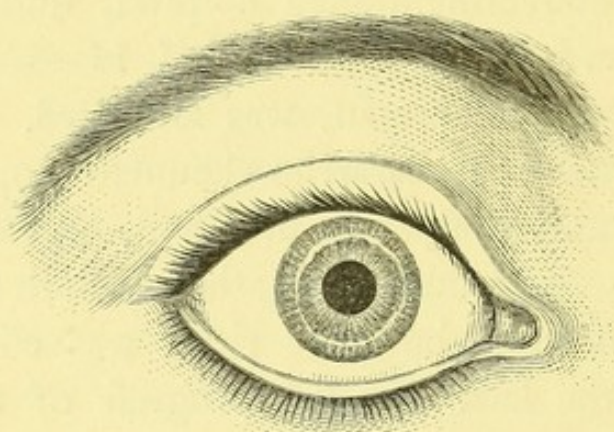
eye-balls, and, obscurity of vision. In each eye there are arcs of a dense white colour, and, they appear as though formed by the confluence of small, opaque patches, so as to confer irregularity of margins upon the completed arches.

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 author¹ 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, fulphate 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-

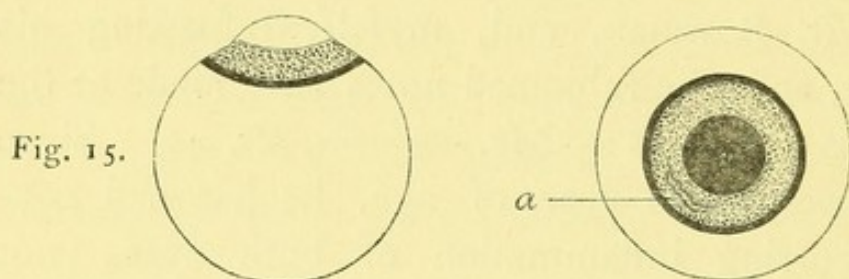
tion on the neck. The patient wrote to me, some time after, to say that these remedies had, likewise, been fruitless.

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

fenation 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:—



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 ophthalmia 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. Paget¹ 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 farcous 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.

ucceed 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.”

Vogel⁵ mentions that in the Walterian Museum, of Berlin, there was a piece of cornea preserved which had been converted into bone. Chelius⁶ states that

¹ Transf. 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 Über 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 albuginous 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, Wardrop² 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.

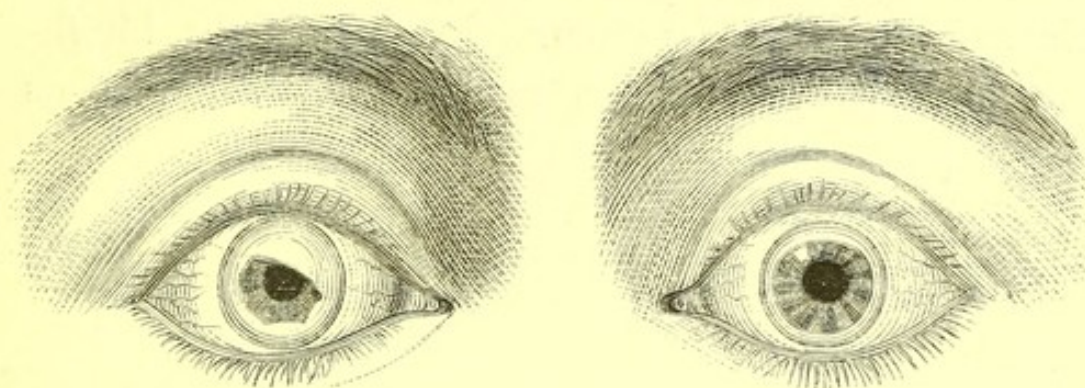
² Loc. cit. Vol. i, p. 74.

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 :—

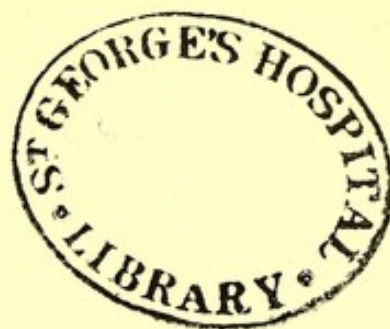
Fig. 16.



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, *etas ingravescens*, from the sixtieth to the seventieth: and, 3, *decrepitude*, 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-Parise¹ 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'où 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 Hoffman² are, *Infantia*, to the end of the seventh year: *Pueritia*, to the fourteenth: *Adolescentia*, the twenty-first; *Juventus*, the thirty-fifth: *Virilis-etas*, the forty-ninth; *Senectus*, the sixty-third: and, *Decrepita-etas*, to the end of life.

¹ Traité de la Vieillesse. Paris, 1853.

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

Flourens¹ 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 dozing 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. Hufeland¹ entertained the same opinion. Bacon² 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. Buffon³ 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, $20 \times 5 = 100$: 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 Galen³ 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 dogmatizing 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 Akenfide*.

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 infer-viendo 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 favour 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. Sinclair¹ 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's² 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 gainfaying 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, favours 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 fleet 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 unauthorized, 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. Carpenter¹ 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 *Transf. 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 exception¹ 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, foetid, 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 scirrhus 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. Rokitan sky 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 translucent 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. Lee¹ 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 Beale² 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 $69\frac{4}{5}$, and, of the females $69\frac{1}{2}\frac{2}{3}$, 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 vieillissent. 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 filular 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 ficescunt, 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. Barlow² 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 natus 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, resistant: 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. Otto² 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." Andral³ says:—"It has been observed, that, in phthical 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. Rokitsansky. 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 Bécclard :—*Elements of General Anatomy, transl. by Knox.* p. 248. Eding. 1830.

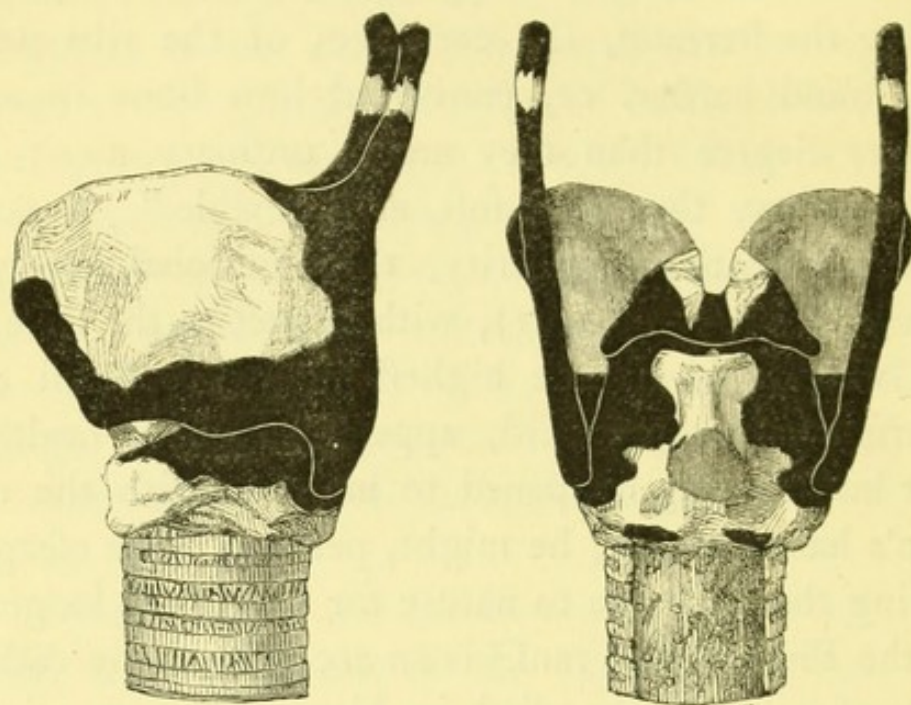
"Costarum quatuor spuriarum lateris dextri partes anteriores cum portione earundem cartilaginum, et ab interiore apposita lamina ossæ, ex cadavere militis, phthisi pulmonali atque asthmate mortui."—Sandifort, G. *Mus. Anatom.* Vol. iii, p. 228. No. CMLXXX. Lugd. Bat. 1827.

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 Bizot¹ 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 themselves, 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 *Microsc. 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, Kölliker² 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, *Verfalius*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 ficciori temperie quàm homines constantibus adeò est manifestum, ut haud mirum est. Galenum illorum præcipèrè animalium fabricam docentum, verarum costarum, cartilagine osseas; spuriarum autem cartilagine, exquisitas esse cartilagine 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 :—Cloquet² states that they are, only, to be seen in that condition in very advanced age : Gros³ speaks of their ossification as extremely rare : whilst, Andral⁴ 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 sæpius 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 cellulofam vidi, et, medullari liquore turgentem quamvis istas cartilagine videre offeas 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, ankylosis at these joints has never been seen. An observation by Sandifort¹ 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 Médecine (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 cartilagineum, 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, Columbus² wrote:—"Vero si humanum inspexeris, præsertim in consistente ætate, procul dubio officula 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 Heckeren⁶

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 medullio formatum, ita ut ab omni parte cartilagine inclusus." Gros¹ 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 indurisset 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, uncumbered 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:—Seiler¹ observes:—"Arteriæ asperæ, et, bronchiorum cartilaginee haud raro, in osseas mutantur," whereas, Cloquet² says:—"The tracheal, and, bronchial rings seldom ossify,—even in the most advanced age." Morgagni³ remarks:—"These cartilages become bony, sometimes, even, before the person is far advanced in years." Grofs,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, Grofs 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.” Lit-tre¹ 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.” Vieussens² 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 Gernet³:—“Incrustationem vero similem ei, quam in cartilaginibus, sterni deprehendimus, in alio la-

¹ Histoir. 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. *Diff. 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.”—Blasius. *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.*, Placentinus¹ quotes two cases, upon the authority of Cardanus:— . . . de eo Bononiæ suspensus, et, tanquàm mortuus à patibulo solutus, vivus inventus est, quod asperam arteriam, ossëam 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 phthifical 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 feruatus, tertio Judicis solertia perijt : cujus caussam, ossream tracheam fuisse, postea compertum est." Bartholinus¹ observes :—" Cartilagine 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 Anecdotes³ 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 Balsbam, 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. Thomson⁴ 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.

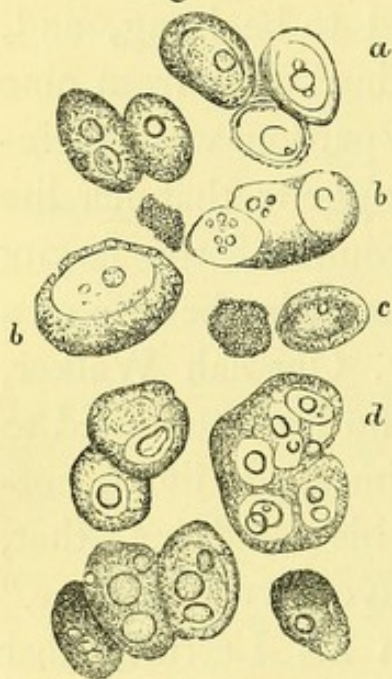
Morgagni (loc. cit. vol. ii, p. 637) states that from hanging the parts situated in the neck sustain a diversity of lesion. In some persons

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

Fig. 18.



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,

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

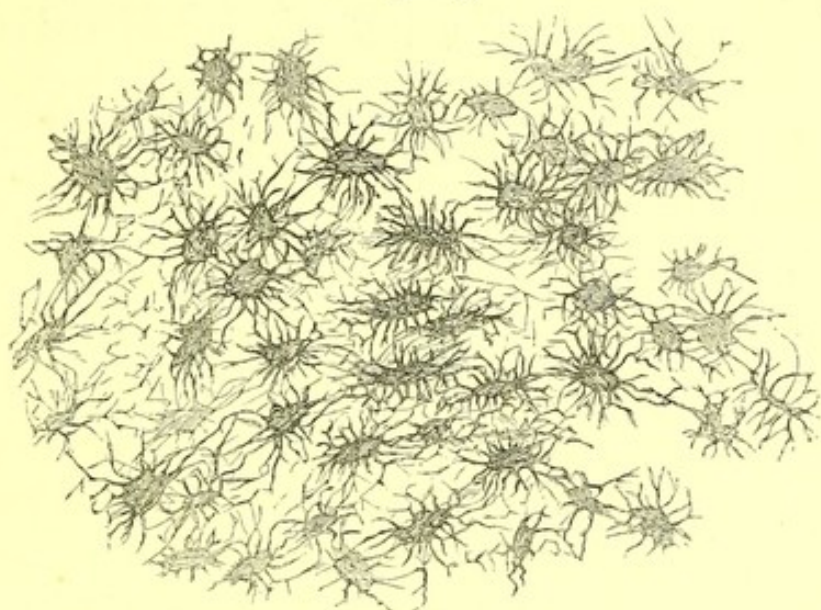
age," observes Tones,¹ "as the formation of osseous tissue goes on, but slowly, the process may be observed with ease. In this case, the corpuscles do not develop others, as in the temporary cartilage where increase of size is required, but, retain their usual appearance. With the osseous granules in 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 significance 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, Rokitanfky¹ 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, Andral¹ 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.”

Morgagni² 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. Ormerod¹ 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. Kennedy² 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 dyspnœa¹ 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. Neison¹ 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, although, 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 cumberst 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 *acclimated*. 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, altogether ; 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 toxæmic 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 Hufs,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 hæmatine 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 reaction 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 Hufs,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 hæmorrhages, 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, Hufs found the lungs healthy, only, in three. Dr. Ogston¹ 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. Christison² 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."

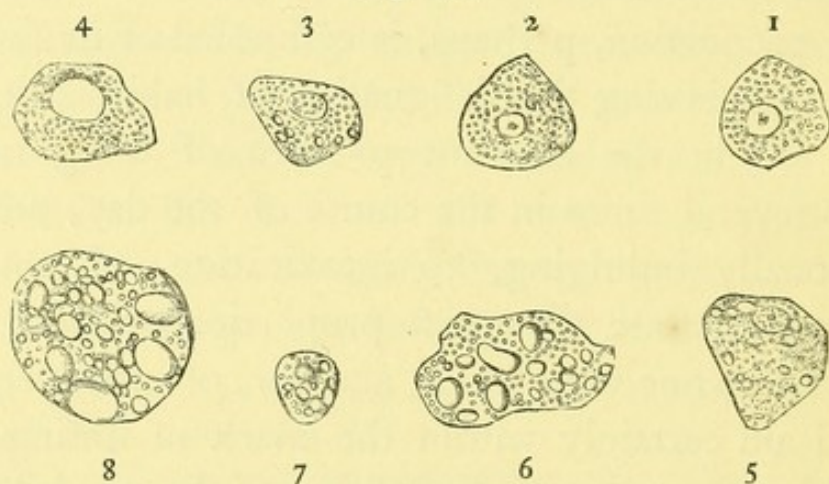
That the kidneys should suffer from the long-continued, and, habitual excitement to which they

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. Johnson¹ 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 quarter 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. Williams² 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 confi-

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 feat 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.

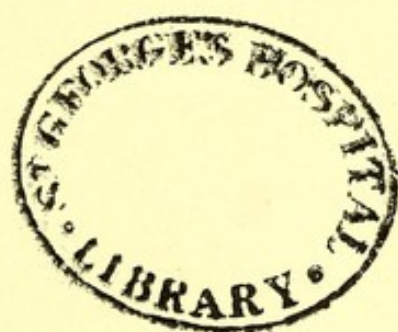
It would be foreign to my purpose to enter into a lengthened consideration of this subject, but, the following opinion is so much in accordance with my own views, and, bears, so closely, on the account, above given, of the condition of the blood, and, solids in the bodies of drunkards, that I am induced 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 foregoing 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 ankle-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 occurred, 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 pyæmia.

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 pyæmia,—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, diffuent. 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.

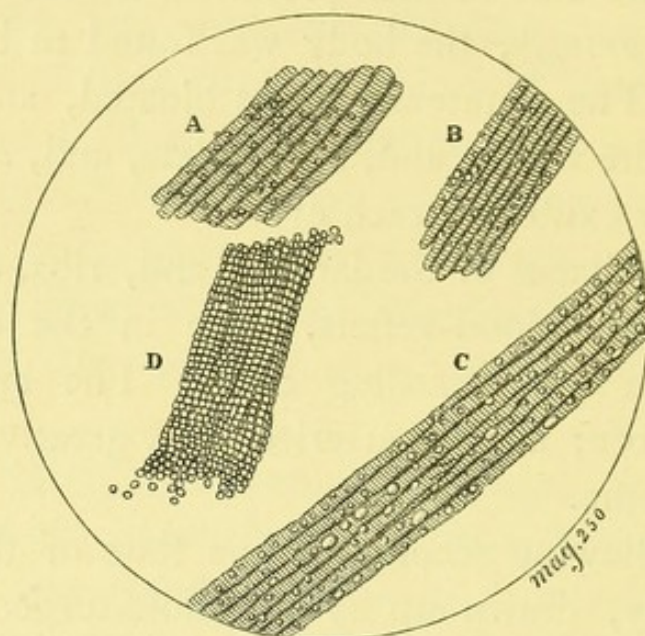
At the *autopsy*, the body was found to be stored with fat. The countenance was bloated, and, pasty, the hair quite white, and, a complete, and, *broad circulus senilis* existed in each eye.

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 farcous 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, varicofed: 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, crufted 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, hæmoptysis.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,

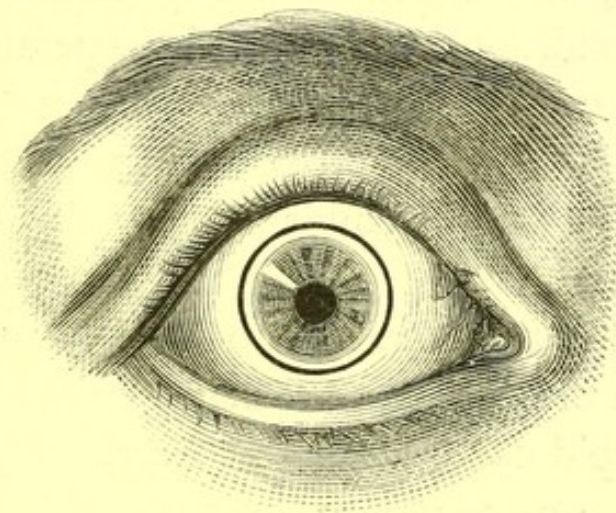
¹ Clinical Observ. on a Characteristic of the Urine in Rheumatism, and, Gout, with especial reference to Diathetic Diagnosis. Eding. Med. Journal, Aug. 1857, p. 116.

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 consciousness, to a great extent, regained ; but, there was complete hemiplegia 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, feverely, 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’âge 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’arthritisme. 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 rappelle l’appauvrissement des os dans la goutte, leur déformation 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 développement de l’arthritisme. Serait-ce aussi la raison pour laquelle les artères des extrémités inférieures 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. Hodgson² 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, cretaceous 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 organe tend à s'atrophier, une matière grasse vient à se sécréter autour de cet organe, ou, à la place de ces molécules."—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. Paget¹ 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 hæmorrhage, 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 *ramollissement*

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, Rokitanaky (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 Roftan, 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 favourable 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 orifice.
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.

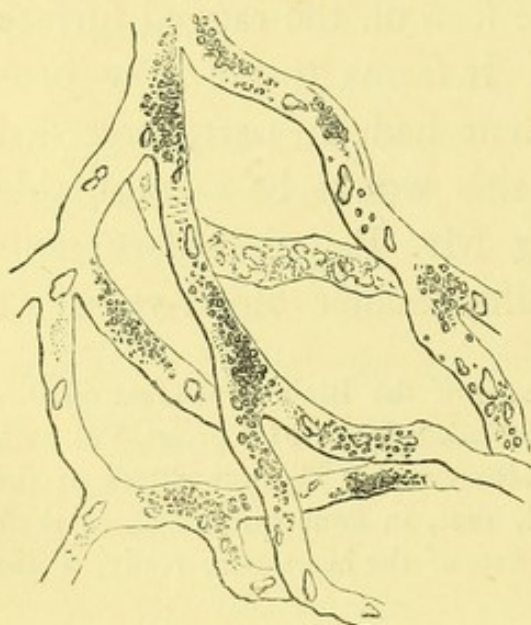


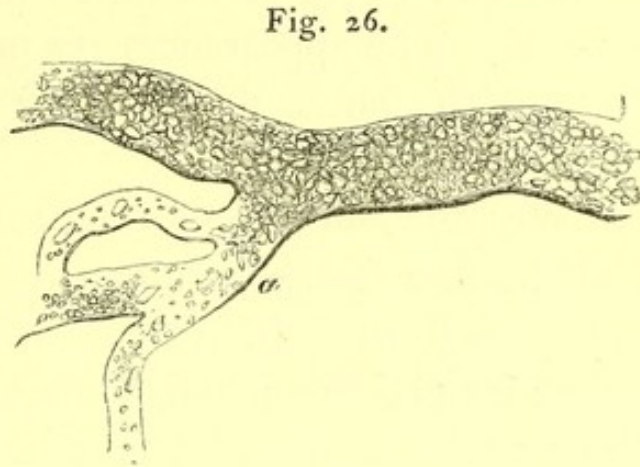
Fig. 24. A vessel $\frac{1}{800}$ th of an inch in diameter, with branches up to $\frac{1}{800}$ th of an inch : only a single apparent coat ; exhibiting persistent nuclei, and, fatty granules, of a dark, yellow colour, closely aggregated together in the coat. Granules from $\frac{1}{800}$ th of an inch to smallest appreciable size.

Fig. 25.



Fig. 25. A small vessel, with branches of diameter $\frac{1}{800}$ 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. A vessel $\frac{3}{4}$ 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. Lobstein² observes:—"C'est le propre du principe gouteux, 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 oséo-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 conséquent," remarks Lobstein,

y amène le phosphate calcaire dont le sang des arthritiques est surchargé, de là ces végétations osseuses, et, oséo-pétreuses des parties fibreuses du cœur, qui ne font nullement l'effet d'une cardite chronique (Broussais. Examen. des Doctrines Médic. 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 dilations 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. Stokes¹ 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. Gaidner¹ 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.*

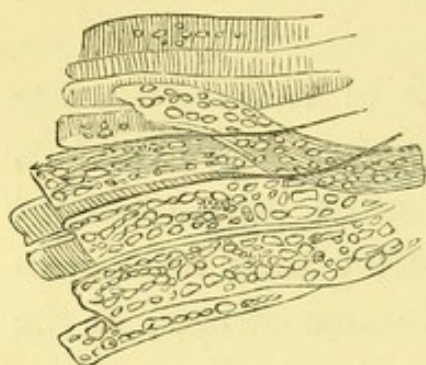
Heart.—Size, and, thickness of its parietes, natural. Aortic valves, *very nearly*, not *absolutely*, healthy. Some points of ossification were observed about their roots, but, not affecting their form. In the mitral valve, some of the columnæ carneæ, at the points of insertion into the chordæ tendiniæ, 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 anæmic. 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's³ 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 found. 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 corpulence² 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. Saunders³ 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. Quain¹ 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. Transf. 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 between 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, psysical 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 idiocy, 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 others²—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, morbid 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. Paget¹ 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, *Transf. 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—hæmorrhage 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-crisis 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 dégénération 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 dégénération 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 dégénération elles mêmes, en étudiant sérieusement les caractères, la marche, et, la tendance des actes vitaux qui les préparent, et, qui les produisent, réellement.”—Cayol, Leçons 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 hæmorrhoids, 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. Ormerod¹ 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. Bristowe² 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, anæmic, 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; hæmorrhage, occasionally copious, took place from the nose; and, sometimes, blood was vomited, and, passed by the bowels. He became so anæmic 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 Transf. of Pathol. Soc. of Lond. Vol. v, p. 87, 1854.

Mr. Barlow¹ relates a case in which the arcus senilis was seen in a man, aged forty, who had suffered from frequent nasal hæmorrhage, 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 hæmorrhage. The conversion of this part must be caused by atrophy before the latter can be indicated by it. The frequent, and, often, profuse hæmoptysis which occurs in phthisis² 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. Simon³ observes:—"Continu-

¹ Loc. cit. p. 12.

² "Hæmoptysis,—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 malæna, 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 hæmaphæin.

Dr. Wilks¹ has related seven remarkable examples of fatal anæmia, 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 overtaxed 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 unequal 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 fauce 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 fallow, 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, soreness" 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 "finking," 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

fat 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 stamina 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 woolfack 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. Furnani¹ says: “. . . tout récemment on a observée cette tache périphérique de la cornée chez un feminariste, âgée de vingt ans, adonnée 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. Portal² 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 considérée dans ses Rapports avec Différentes 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 voulu juger de leur âge par la développement 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 hæmoptysis, severe cough, profuse expectoration, copious sweats, and, colliquative diarrhoea, 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 glans, 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 Strokes are sure, but, her Advances slow.
No loud Alarms, nor, fierce Assaults are shown;
She starves the Fortrefs 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. Louis² 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.

ventions 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 phthifical 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. Lee¹, "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 anæmia, with blowing sound, a year ago successfully. Now prostrate, and anæmic to the last degree. Dyspnoea. 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 Johnson¹ 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 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.

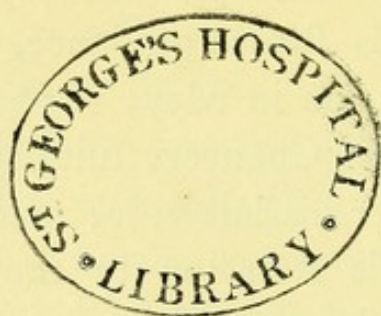
This case seems to show :—

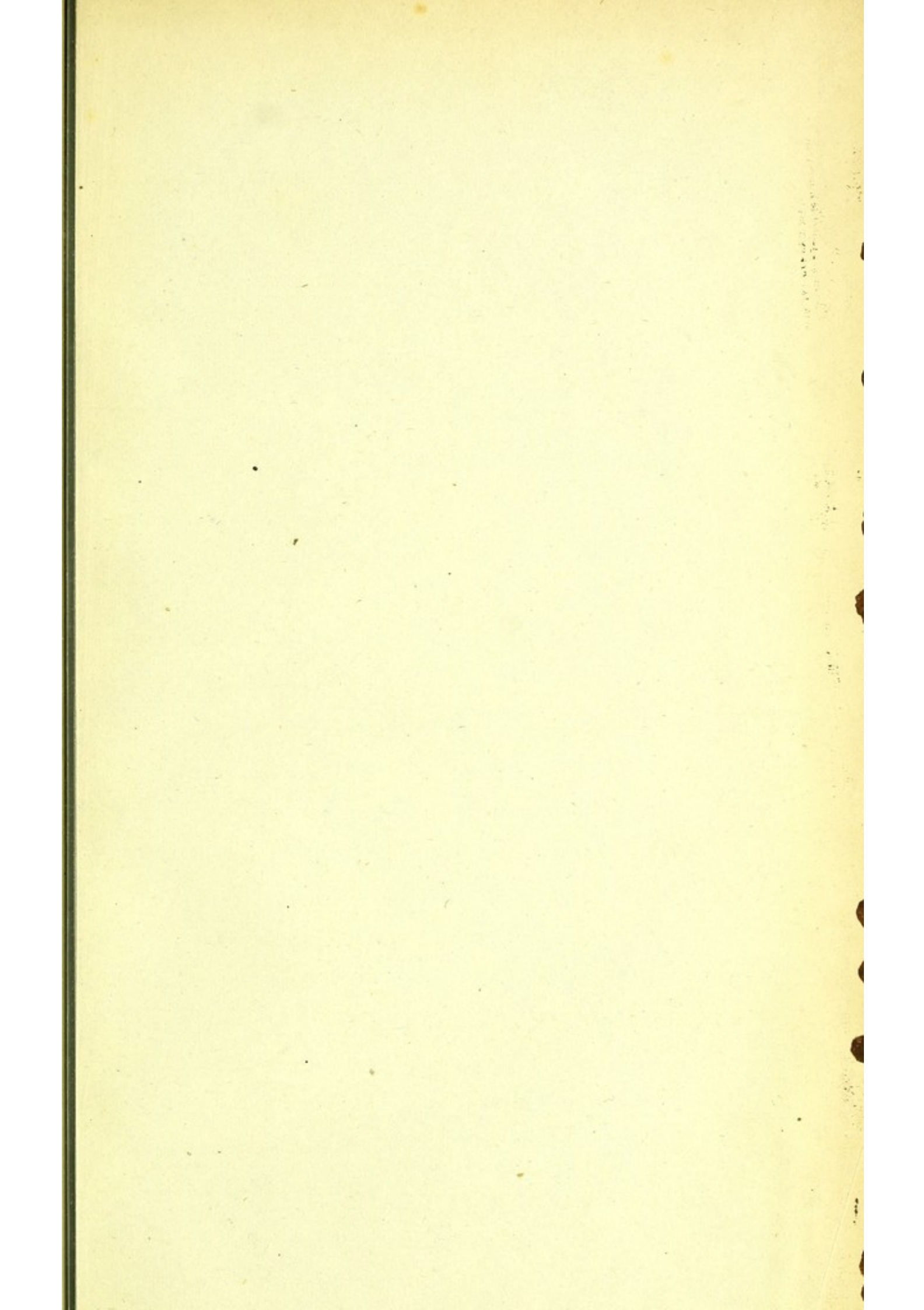
1st. The value of the arcus as an aid to a diagnosis.

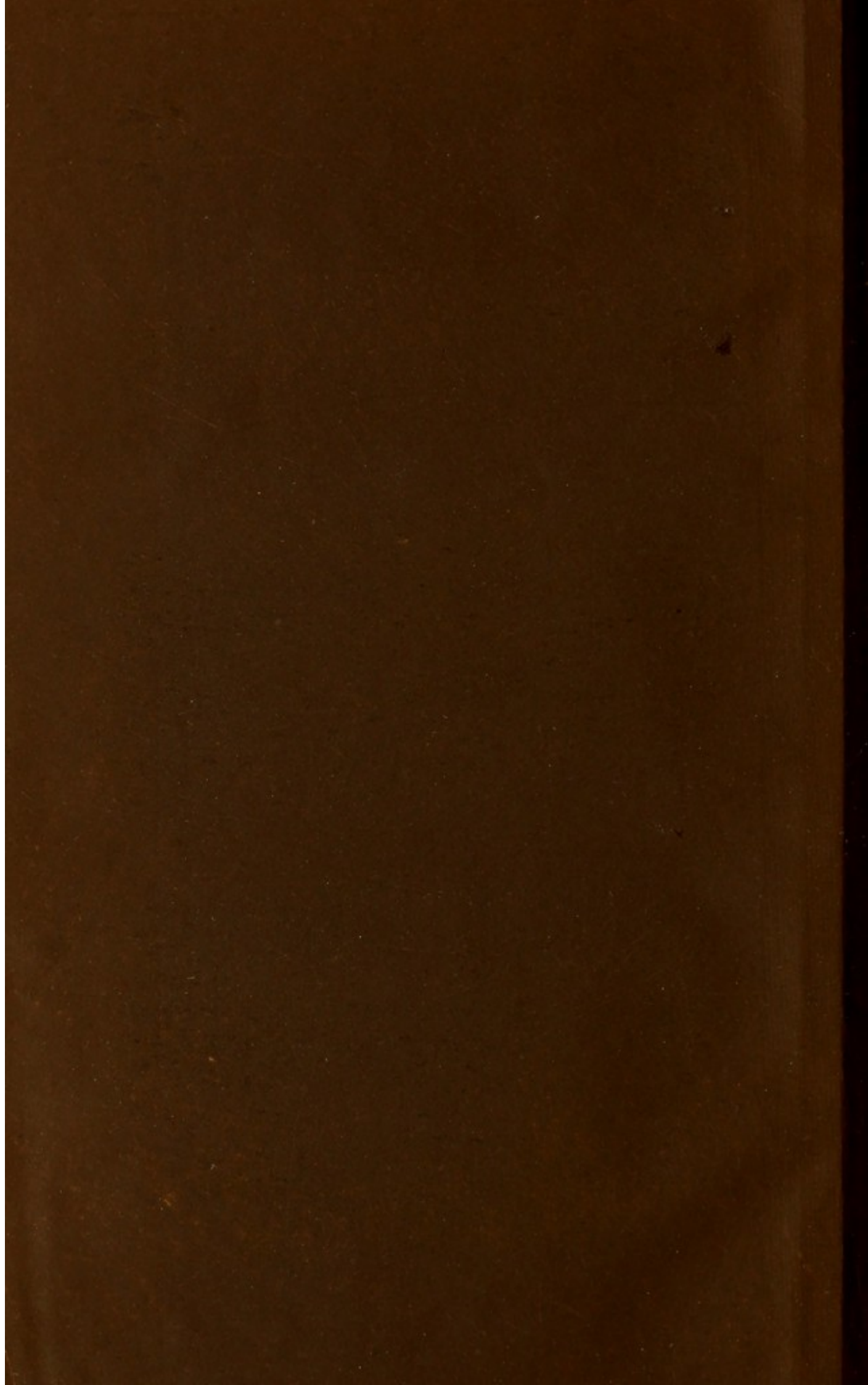
2dly. The circumstances which, impairing health, tend to the production of that premature decay, or, degeneration recognised as “fatty.”

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.







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