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Vicious Circles
in
Disease



J. B. HURRY



PRESENTED BY

*Dr. Mitchell
Bruce*



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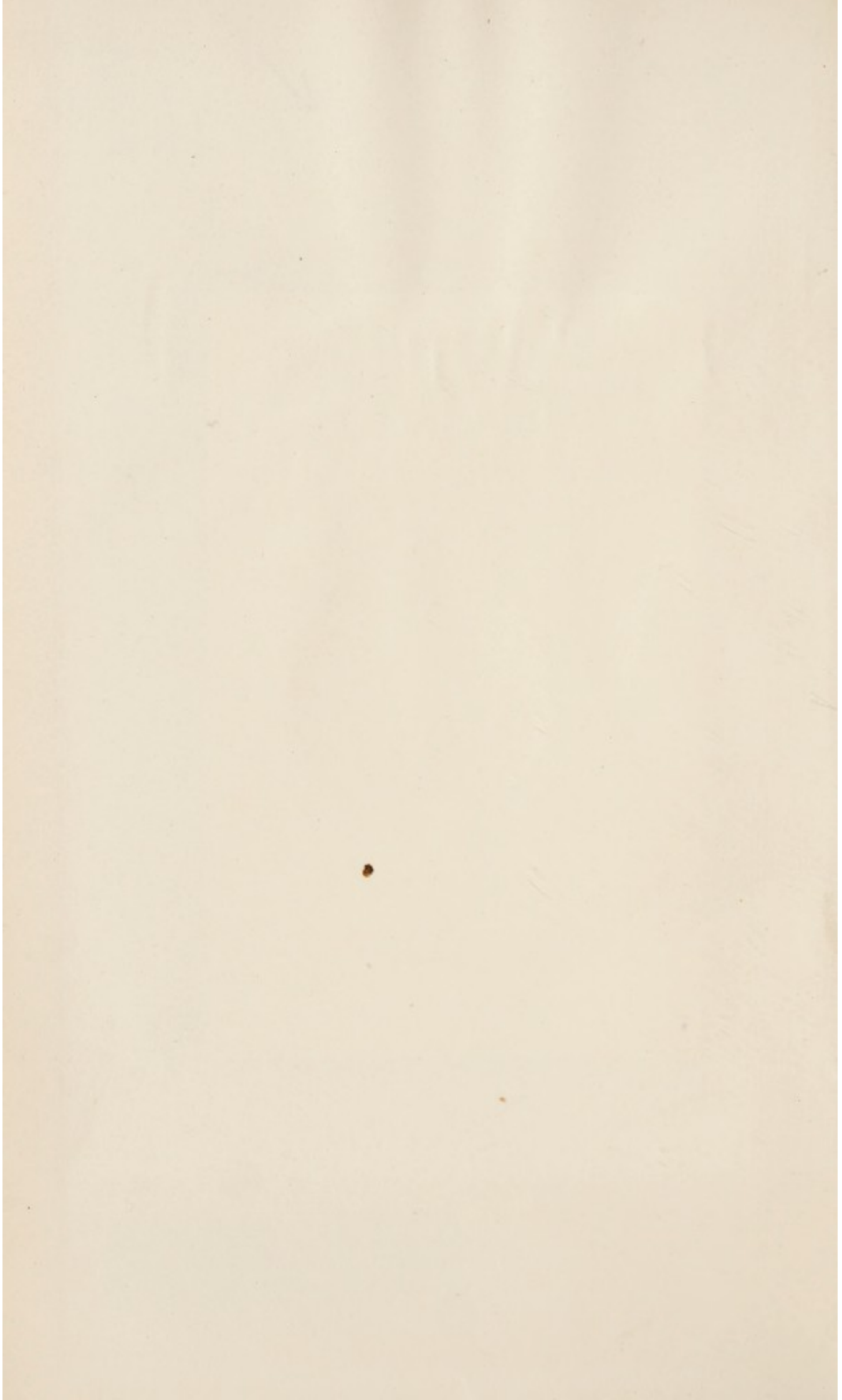
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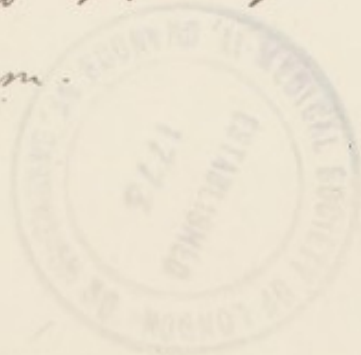
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With kind regards

Yours sincerely

J. B. Hurry.

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Vicious Circles

in

Disease



Vicious Circles in Disease



BY

JAMIESON B. HURRY, M.A., M.D. (Cantab.)

Ex-President Reading Pathological Society

With Illustrations

SECOND AND ENLARGED EDITION

LONDON :

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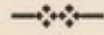
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Medicis

Medicus

Hoc **O**pus

Preface



THIS MONOGRAPH represents the first attempt to deal systematically with Vicious Circles in Disease, and is offered to the Profession with a consciousness of many shortcomings.

Such an exploration into a new field of pathological enquiry needs no small circumspection. But every effort has been made to supply the reader with independent testimony in support of the propositions advanced.

The issue of a new Edition affords a welcome opportunity for revision. Six new Chapters have been added in the hope of covering the ground more adequately.

Most of the material has appeared in the columns of the *British Medical Journal*, *The Lancet*, *The Practitioner* and the *Medical Press*, and I am indebted to the courtesy of the respective Editors for permission to reprint. Thanks are also due to many friends for assistance and encouragement.

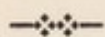
My friend Dr. Harry Campbell has kindly read through the proof-sheets.

J. B. H.

WESTFIELD, READING.

January, 1913.

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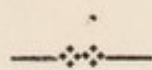


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Συμπαθία πάντα· κατὰ μὲν οὐλομελίην πάντα,
κάτα μέρος δὲ τὰ ἐν ἐκάστῳ μέρει μέρεα πρὸς
τὸ ἔργον.

Hippocrates

Introduction



BY a Vicious Circle (Circulus Vitiosus, Cercle Vicieux, Zirkelschluss) is meant a morbid process in which two or more disorders are so correlated that they reciprocally aggravate and perpetuate each other.

Vicious Circles are wide-spread in their distribution and play a great *rôle* in pathology. Chronic disease becomes more chronic and acute disease more acute in the presence of this complication. Even death frequently results from the forces that are warring with each other.

This important subject has hitherto attracted but scanty attention. No medical lexicon defines the Vicious Circle; no text-book of medicine discusses its pernicious influence on the progress of disease; no system of therapeutics guides the practitioner in his search for the *locus minoris resistentiæ*. Yet what a large part of the *Ars medendi* consists in "breaking the Circle."

The treatment of disease, when complicated by a Circle, presents problems peculiar to itself. For the physician is no longer confronted with a morbid process which Nature is doing her best to rectify, and where his task mainly consists in furthering and regulating her efforts. Where a Circle is present, her beneficent influence becomes maleficent; the *Vis medicatrix* becomes the *Vis devastatrix*. The gyration must be arrested before recovery can take place.

The following is a brief outline of the Scheme adopted in this Volume :—

Vicious Circles are first of all classified into what may be termed their natural orders, some examples from each order being given.

The various systems of the body are then taken *seriatim*, so that attention may be drawn to diseases which are liable to this complication. The principal ætiological factors are discussed in a special chapter entitled "The Genesis of the Circle." Numerous bibliographical references to original authorities are introduced.¹

Emphasis is next laid on the necessity of "breaking the Circle" before recovery can take place, instances being given to shew how Circles may be broken both by Nature and by Art.

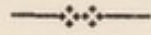
The study of the Circle deals with conditions in which Nature's attempt to cure reflects small credit on her provisions, and the study will be found full of suggestion and guidance for the philosophic physician. A clearer insight into the problems of pathology and of rational therapeutics is a reward well worth the winning.

Illustrations are so helpful in visualizing ideas that it has been thought well to introduce a considerable number. Especially may they be commended to teachers :

*Segnius irritant animos demissa per aurem
Quam quæ sunt oculis subjecta fidelibus.*

¹ The conception of the Vicious Circle is very ancient. Asclepiades (ca. B.C. 124) probably referred to it when he opposed the Hippocratic "Nature is the healer of disease" by the dictum "Not only is Nature useless, but it is sometimes harmful." Neuburger, *History of Medicine*, tr. by Playfair, Vol. I., p. 204.

Chapter One



The Classification of Circles



VICIOUS CIRCLES may be divided into the following generic Groups :

- Group I. Organic Circles.
- Group II. Mechanical Circles.
- Group III. Infective Circles.
- Group IV. Neurotic Circles.
- Group V. Chemical Circles.
- Group VI. Circles due to imperfect Repair.
- Group VII. Artificial Circles.

GROUP I.—ORGANIC CIRCLES

To this Group belong Circles formed between organs or parts of organs that are so interdependent that when one of them is attacked by disease, and consequently in difficulties, the other or others are affected in turn, and aggravate the disorder of the first.

Many organic Circles will be described in the following pages. Amongst them may be mentioned the Circles involving the heart and the lungs in pneumonia, the stomach and the brain in gastritis, the blood and the kidneys in nephritis.

Illustrations of Circles in which different parts of the same organ are concerned occur in connection with aortic incompetence and dilatation of the left ventricle, coronary insufficiency and degeneration of the myocardium, gastric ulcer and pyloric spasm.

GROUP II.—MECHANICAL CIRCLES

Mechanical Circles are formed when abnormal pressure or tension relations act reciprocally on each other.

This Group includes gastrectasis and kinking of the duodenum, increased intra-ocular tension and obliteration of the filtration angle, hydrocephalus and blocking of communicating channels in the cerebrum, retroversion of the gravid uterus and retention of urine.

GROUP III.—INFECTIVE CIRCLES

Diseases of the skin are frequently complicated by infective Circles, which will be found discussed under scabies, pediculosis, impetigo, tinea tonsurans. Other Circles, such as those associated with oxyurides, ascarides and ankylostomes, are dealt with in connection with the digestive system.

GROUP IV.—NEUROTIC CIRCLES

Neurasthenia presents many examples of neurotic Circles. In fact any of the manifestations of the disease, whether the vascular, the digestive, the renal, the sexual or other systems are involved, may be thus complicated.

Habit Circles due to exaggerated reflex irritability of the nervous system form a subsection of this Group. As examples may be mentioned some forms of cough, blushing, epilepsy and stammering.

Other neurotic Circles are associated with the use of morphia, tobacco and various drugs, and will be described in the Chapter devoted to Artificial Circles.

GROUP V.—CHEMICAL CIRCLES

Chemical correlations are met with in such disorders as asphyxia, hyperchlorydria, hyperthyroidism, anæmia and toxæmia.

GROUP VI.—CIRCLES DUE TO IMPERFECT REPAIR

Mitchell Bruce has drawn attention to Circles that are met with in various diseases in which recovery is incomplete, in which there is no *restitutio ad integrum* :

“ The patient does not die, but he remains permanently damaged, disabled, delicate, and possibly in distress. Such is the termination of a proportion of cases of cerebral hæmorrhage (hemiplegia), and acute endocarditis (valvular disease of the heart). A part of the brain, a valve of the heart, is permanently damaged ; the man is healthy but not sound. . . . The incompleteness of recovery is shown by a disposition to relapse, as in perityphlitis and gastric ulcer, by diminished resistance to the cause of fresh disease. . . . In this way, amongst others, a Vicious Circle forms and widens.”¹

¹ Principles of Treatment, p. 158.

As other illustrations may be mentioned asthma, pericarditis, pleurisy, appendicitis.

GROUP VII.—ARTIFICIAL CIRCLES

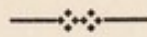
To this Group are relegated such Circles as do not arise in the natural course of disease but are artefacts. Many such are dependent on social customs ; for others, alas ! injudicious treatment has been responsible.

Numerous examples belonging to this Group will be found in the following pages. A few striking ones are collected in Chapter XIV. Let us hope that such atrocities as are there referred to will soon lose all but a historical interest, and that the day will soon dawn when the practitioner of medicine will merit at any rate in some measure the high eulogium pronounced upon him by Hippocrates :

Ἴατρος γὰρ φιλόσοφος ἰσόθεος.



Chapter Two



Circles associated with the Nervous System



THE central nervous system is the capital of the human microcosm, with whose remotest outposts it is, for good as well as for ill, in constant communication.

In health the closest correlations and polarities exist between it and every other organ ; in disease such correlations and polarities are no less intimate (Fig. 1.).

The reciprocal interdependencies met with in disorders of the nervous system are very numerous ; fresh illustrations are continually revealed by the progress of research. It will, however, be useful to draw attention to some striking examples, which every practitioner will be able to supplement from his own experience.

We shall deal in order with :

- I. Circles associated with Functional Disorders.
- II. Circles associated with Organic Disease.

I.—CIRCLES ASSOCIATED WITH FUNCTIONAL DISORDERS

(a) Neurasthenia

Perhaps the commonest and most protean of functional disorders is neurasthenia. "In no complaint does it happen more frequently that the patient gets into a Vicious Circle, the fundamental disorder producing symptoms which again maintain and aggravate the disease."¹ Owing to the infinite variety of its manifestations the disease has been described as *non morbus, sed morborum cohors*, and in truth there is scarcely an organ that may not at one time or another be affected. Any of the local disorders may be complicated by a Circle, whether the mental faculties or the digestive, vascular, sexual or other systems are involved.

Insomnia. A familiar example occurs in insomnia, an obstinate complication in the neurasthenic, and one which so disturbs the nerve centres as to intensify the primary trouble. Clifford Allbutt describes insomnia as "generally one of the links of the Vicious Circle in which the victim is enchained."²

¹ Ballet, *Neurasthenia*. Introduction by Campbell Smith, p. XXVI.

² Allbutt and Rolleston, *System of Medicine*, Vol. VIII., p. 750.

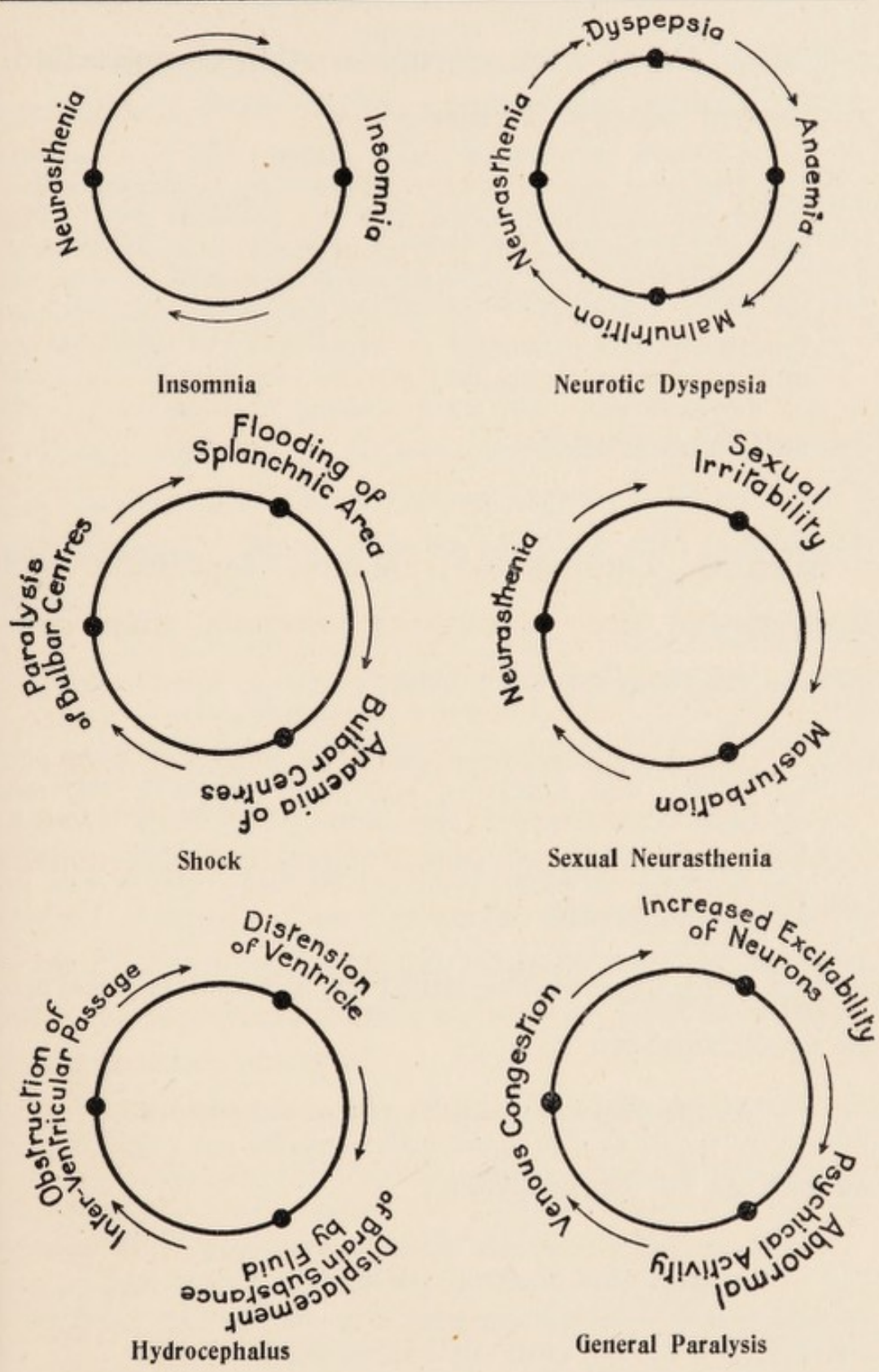


Fig. 1.—Circles associated with the Nervous System

Pain. Pain often forms another complication, as pointed out by Herman :

“ The great causes of neurasthenia are conditions which (a) cause continuous pain and (b) prevent sleep. The two things often form a Vicious Circle. A small local cause disturbs sleep, and want of sleep makes the nervous system over-sensitive. In proportion as the neurasthenic symptoms have coincided in time with the development of local pain, so surely may we conclude that the removal of the local pain and the procuring of sound sleep will cure the neurasthenia.”¹

Mental Depression. Mental depression and malnutrition often accompany insomnia, these conditions reacting on each other :

“ The mental depression reacts on nutrition, sleep and the other vital functions, and thus creates a grievous *Circulus Vitiosus* which aggravates the primary disorder. Various other neurotic and psychical phenomena, which can scarcely be called neurasthenic, may also sooner or later shew themselves.”²

This influence of the mind on disease is referred to by Euripides :

*Λῦπαι γὰρ ἀνθρώποισι τίκτουσιν νόσους.*³

as well as by Shakespeare :

“ So sorrow's heaviness doth heavier grow
For debt that bankrupt sleep doth sorrow owe.”

¹ *British Med. J.*, 1910, Vol. I., p. 183.

² Müller, *Handbuch der Neurasthenie*, p. 61.

³ *Fragments*, No. 896.

⁴ *M. N. Dream*, III., ii., 84.

Malnutrition. Even apart from insomnia melancholy often causes malnutrition, which in turn reacts on the mind. In Rayner's words :

"In diseased conditions, especially in the depressed emotional states, this interaction of the mind on the body and of the bodily state on the brain establishes a Vicious Cycle of nutritional disorder, which tends to increase and prolong the disease."¹

Dyspepsia. The closest correlations exist between the cerebral and the digestive organs both in health and disease. Thus Debove, Achard and Castaigne write :

"We have frequently alluded to the influence excited by the nervous system on all the functions of the stomach. But in neurasthenia the opposite relation holds good, and by means of a Vicious Circle which perpetuates and aggravates all such disorders, the stomach reacts on the central nervous system."²

This Circle involves many correlations of sociological interest. Thus amongst the poor, especially poor children, malnutrition leads to want of nervous tone, to imperfect digestion, and to further impairment of nerve power :

"The stock of nervous energy in these children is not sufficient for adequate digestion ; a Vicious Circle is soon established and their nervous system is further damaged by poisons formed during the processes of ill-achieved digestion."³

¹ Allbutt and Rolleston, System of Medicine, Vol. VIII., p. 965. Dr. Rayner and other writers substitute "Vicious Cycle" for "Vicious Circle." The latter seems preferable, as implying continuity, and not recurrence.

² Maladies du Tube Digestif, Vol. I., pp. 451, 509.

³ Clive Riviere, *Practitioner*, 1911, Vol. I., p. 42.

Gastroptosis. Neurasthenia is frequently associated with gastroptosis, opinions differing as to which is cause and which effect :

“ There is perhaps some truth in both views, and the gastroptotic patient may be one condemned to revolve in a Vicious Circle. The displacement of his stomach favours . . . functional dyspepsia, and the dyspepsia leads to impairment of nutrition and to nervous exhaustion, which in turn perpetuate the dyspepsia, and lessen the tone of the abdominal muscles which should support the stomach.”¹

Shock. Treves has given an excellent description of the Circle associated with traumatic neurasthenia :

“ The patient is irritable and ill-tempered, suffers from palpitation, and cannot bear the least disturbance or noise ; mental occupation increases the discomfort in the head, he cannot concentrate his thoughts upon anything—himself excepted—for any length of time, and he complains, therefore, that he has lost his memory. Sight seems to fail him, because the effort of ciliary accommodation is soon followed by fatigue ; he loses flesh and looks wasted, anxious and ill. Depression is the main and most prominent feature in this general state of malaise, and depression and despondency of mind are common. A Vicious Circle is soon established, in which loss of healthy nervous tone, both in the conscious life of the individual and in the unconscious and insentient working of the various inorganic processes of the animal economy, leads to serious derangement of function in the various parts of the system.”²

Not only may the happiness and usefulness of a life be ruined under such circumstances, but the Circle often widens so as to include a mother, sister

¹ Hutchison, *British Med. J.*, 1910, Vol. I., p. 1102.

² System of Surgery, Vol. II., p. 258.

or other relative of the sufferer, especially if the latter is of the female sex :

“ Nothing is more curious,” writes Weir Mitchell, “ nothing more sad and pitiful than these partnerships between the sick and selfish and the sound and over-loving. By slow but sure degrees the healthy life is absorbed by the sick life, in a manner more or less injurious to both, until, sometimes too late for remedy, the growth of the evil is seen by others. . . . A hysterical girl is (as Wendell Holmes has said) a vampire who sucks the blood of the healthy people about her.”¹

Auto-Suggestion. In many cases of neurasthenia in which some peripheral organs are reciprocally involved with the central nervous system, the sufferer, by fixing his consciousness with morbid intentness on his organs, creates not merely unhealthy sensations but also functional disorders, e.g. palpitation, flatulence, polyuria and nausea. It is indeed difficult to assign the limits to auto-suggestion in the *malade imaginaire*, so far-reaching and imposing may the resulting disturbance be.

As Jelliffe puts it :

“ The mind plays an important part in *exaggerating* symptoms which have a slight physical basis, such as a vascular derangement of a part.

The mind also plays an important part in the *perpetuation* of symptoms after the physical basis which had initiated them has passed away.”²

¹ Fat and Blood, pp. 40, 49.

² Osler and Macrae, System of Medicine, Vol. VII., p. 822.

Anæmia. Some striking correlations which may be observed in anæmia have been thus described by Löwenfeld :

“ In neurasthenic persons the anæmia is not so much the cause, as the result of the nervous condition. For this latter affects both appetite and digestion and so leads to malnutrition. A *Circulus Vitiosus* is now established, since the malnutrition perpetuates and intensifies the nervous exhaustion and so contributes to the nervous dyspepsia. All the resources of therapeutics will be required if this *Circulus Vitiosus* is to be broken.”¹

Hysteria. The various Circles associated with neurasthenia apply *mutatis mutandis* to the allied disorder hysteria :

“ In hysteria, as in neurasthenia, one must take into account the real fatigue of the nervous centres which on the one hand results directly from morbid states of mind, and, on the other, furnishes new food for auto-suggestions. Here we have the eternal Vicious Circle in which the neuroses travel. Their real ills give birth to their fears and their phobias, and, on the other hand, their mental representations of a pessimistic nature create new disorders.”²

(b) Other Functional Disorders

Head-Ache. Apart from neurasthenia various conditions are met with in which cause and effect bear reciprocal relations to each other. Over-work, for example, produces head-ache and insomnia, which react on each other and perpetuate the primary condition.

¹ Neurasthenie und Hysterie, pp. 79, 197.

² Dubois, *Psychic Treatment of Nervous Disorders*, tr. by Jeliffe and White, p. 180.

Insanity. Insomnia also plays a large part in the causation and perpetuation of insanity, as Jex-Blake points out :

“ Persistent inability to sleep is often a prominent and early feature of *nervous* or *mental disease*—melancholia, mania, general paralysis, hypochondriasis, neurasthenia, acute nervous exhaustion, paralysis agitans, and chronic alcoholism may here be mentioned; in old age, senile nocturnal mania may occur as a very troublesome form of insomnia. . . . Want of sleep throws a great strain on the nervous system generally, and so is a prominent factor in the production of insanity; the one aggravates the other, and a Vicious Circle is established.”¹

Shock. A dangerous Circle may be established by post-operative or other forms of shock, due to exhaustion of the vaso-motor centre. During health the activity of those centres is increased or diminished, according as arterial pressure falls or rises, the cerebral circulation being maintained by this compensatory mechanism; but when these centres are paralysed, exhausted or inhibited by shock, the vaso-motor mechanism is thrown out of gear, and a diminished blood supply weakens, instead of stimulating, the centre. In severe cases the blood-pressure falls so much as partially to empty the intrinsic cardiac and cerebral vessels. Less blood is

¹ French, Index of Differential Diagnosis of Main Symptoms, p. 358.

pumped up to the brain, and the bulbar centre is still further weakened.¹ A similar condition is occasionally produced during the administration of chloroform, which not only acts on the bulbar centres, but also causes enfeeblement and dilatation of the heart, and thus further interferes with the compensatory mechanism. Attacks of fainting and syncope are due to a like interference with the vaso-motor mechanism.

Migraine. According to some neurologists migraine is dependent on increased pressure in the ventricles of the brain, associated with stenosis of the foramen of Monro. Thus Spitzner writes :

“The occasional causing of a passive or active hyperæmia of the brain leads to a hyperæmia of the choroid plexus. This causes a more or less complete plugging of the foramen of Monro, with the production of an increase of pressure in one or both of the ventricles. The increased pressure on the vessels causes more distention and more pressure on the walls of the ventricles ; a Vicious Cycle is established, and the migraine mounts to its height, until the pressure is relieved either by a spontaneous reduction or by the sudden let down in tension due to a shock reaction—such as occurs in the act of vomiting, from the use of various vaso-dilators, etc.”²

¹ Crile, *British Med. J.*, 1910, Vol. II., p. 759 ; *Practitioner*, 1910, Vol. II., p. 169.

Über Migraine, p. 76 ; Osler and Macrae, *System of Medicine*, Vol. VII., p. 752.

Another explanation of the paradoxical contraction of arteries which establishes the Circle is given by Adami :

“ The higher the blood pressure, the greater becomes the contraction of the arterioles ; the less, therefore, the blood supply to the tissues and the greater the call upon the central nervous system for more blood. Whether from reflex stimulation of the heart to increased activity in order to supply the tissues, or from direct automatic action of the increased aortic pressure in raising the intraventricular pressure, and so stimulating the ventricles to more forcible contraction, the blood pressure becomes yet higher, and, as a result, the arteries still further contracted. It is along these lines that we would explain the progressive rise of blood pressure and contraction of the smaller arteries in migraine.”¹

Habit Circles. Habit Circles form a group of some interest, and arise from the progressive proclivity to neurosal paroxysms which may be acquired through mere repetition. Epilepsy supplies a good example, since every attack increases the labile condition of the nerve centres and facilitates recurrence. Again, excessive and prolonged coughing may so irritate and exhaust the medullary centre as to pervert the reflex mechanism. The cough becomes uncontrollable, and persists after all local irritation has ceased. A similar condition may result from persistent vomiting and diarrhoea, and was attributed by Hunter to “ the memory of the body.”

There is also a reciprocal relation between stuttering and nervousness, between flushing and self-consciousness. Vices of all kinds beget a craving which favours further indulgence.

¹ Principles of Pathology, Vol. II., p. 175.

II.—CIRCLES ASSOCIATED WITH ORGANIC DISEASE

Cerebral Hæmorrhage. Cerebral hæmorrhage gives rise to some remarkable Circles.

Under normal conditions the blood-pressure in the cerebral arteries is considerably higher than the intra-cranial pressure, this latter being about equal to venous pressure. Cerebral hæmorrhage, however, raises the intra-cranial pressure to a level approximating to arterial pressure, and in so doing squeezes the blood out of the vaso-motor centres, thus rendering them anæmic. In their urgent need for blood these centres respond by effecting a tremendous splanchnic vaso-motor constriction, so tremendous at times as to raise the pressure from a normal level of about 120 mm. Hg to 300 mm. or even more.

The irony of the situation thus produced is that the rise, so beneficent in one respect, is apt to prove disastrous by starting the hæmorrhage afresh. A further increase of intra-cranial pressure then results, and the whole sequence is repeated.

Janeway thus alludes to the Circle :

“ Too great emphasis cannot be laid on the fact that the rise in blood-pressure during acute cerebral compression is absolutely essential to the preservation of life. On the other hand . . . where the cause of the increased intra-cranial tension is a hæmorrhage, the hyper-tension augments it, so that a Vicious Circle is established.”¹

¹ Clinical Study of Blood-Pressure, pp. 142, 249. Cf. also Cushing, *American Journal of the Medical Sciences*, Vol. CXXIV., 1902, p. 392, and Vol. CXXV., 1903, p. 1017.

The progressive increase of cerebral hæmorrhage may be due to other correlations. As the diffused blood lacerates the soft brain tissues, an enlarging cavity is formed which is filled with blood at nearly arterial pressure. Then, on the principle of the hydraulic press, the larger the cavity the greater the pressure exerted by the blood, while conversely the greater the pressure the larger does the cavity become. "In fact," as Tooth says, "it is difficult to see how a hæmorrhage into the brain ever ceases, unless by pressure on the artery itself."¹

If the high pressure persists for any length of time, a further Circle is established. The vaso-motor centre becomes paralysed, and loses its grasp over the splanchnic area, which fills with blood. Hence results cerebral and cardiac anæmia, which leads to further paralysis of the centre.

To quote Janeway again :

"Complete loss of vaso-motor tone soon leads to death, because the ventricles discharge their contents into the flaccid arteries, and receive less and less blood from the relaxed veins. The diminished energy of contraction with diminished ventricular contents completes the Vicious Circle."²

Leonard Hill calls attention to the local effects produced, when intra-cranial hæmorrhage causes

¹ Allbutt and Rolleston, System of Medicine, Vol. VIII., p. 317.

² Clinical Study of Blood-Pressure, p. 160.

increased cerebral compression, and thus leads to a secondary increase of compression by the obliteration of the veins and capillaries in the affected area and a consequent congestive œdema :

“ The high blood pressure which exists in those capillary areas surrounding the seat of complete vascular obliteration will lead to increased transudation of fluid, since plasma may pass more easily into the brain substance than the blood through the compressed capillaries. The transudation will take place at almost arterial tension, will increase the volume of the foreign body, and so will lead to compression of other capillary areas. A *Circulus Vitiosus* is thus established and the cerebral anæmia may spread indefinitely.”¹

And again :

“ In meningitis, tubercular meningitis and cerebral abscess, compression can arise by the accumulation of inflammatory exudations, by inflammatory dilatation, by thrombosis and blocking of vascular areas ; and whenever the Sylvian aqueduct and the veins of Galen are obliterated by intraventricular transudation. In all these pathological states a *Circulus Vitiosus* can be established leading to advancing cerebral anæmia. The pathological cause of ventricular hydrocephalus is no doubt to be found in blocking of the veins of Galen and the Sylvian aqueduct.”²

Hydrocephalus. Another form of Circle may be responsible for the progressive development of hydrocephalus. The disorder may originate as a result of some obstruction in the foramen of Majendie or in one of the communicating channels, causing an accumulation of fluid in the ventricles. These dilated ventricles may so displace the adjacent parts as to increase the obstruction to which the

¹ Physiology and Pathology of the Cerebral Circulation, p. 188.

² L.c., pp. 197, 200.

accumulation of fluid was primarily due. For example, the cerebellum and medulla may be pressed down into the foramen magnum so as to plug that aperture. Such plugging in turn increases the distention of the ventricles and renders the condition a self-perpetuating one. Or the dilated ventricles (by compressing the membranes of the nerve roots) may close both lymphatics and veins, which closure in its turn leads to a greater accumulation of fluid.¹

Congestion. Inflammatory conditions, in which toxins dilate the blood-vessels, alter the metabolism of the tissues and raise the osmotic pressure (by increasing the crystalloidal cell-products), are often complicated by a Circle :

“ In inflammatory states the toxins produced by bacteria on the one hand dilate the blood-vessels, and on the other hand alter the metabolism of the tissues, and increasing those cell products which are crystalloidal in character, thus raise the osmotic pressure. The tissues swell and the blood-pressure rises, keeping pace with the pressure of the tissue lymph. The swelling must be at the expense of the blood supply of other surrounding parts, where there is no toxin to excite and no vaso-dilation or œdema. The anæmia so produced may in its turn damage the tissue metabolism of these parts, and set up congestion and œdema therein, and thus a Vicious Circle may be established.”²

¹ *British Med. J.*, 1911, Vol. I., p. 808.

² Leonard Hill, *Further Advances in Physiology*, p. 139.

Paralysis. F. W. Mott draws attention to the association of psychical activity and venous stasis in many cases of general paralysis and tabes. Where there is a tendency to stasis, as in the frontal and central convolutions, the mental activity and the accompanying hyperæmia may mutually perpetuate each other; this is especially common where syphilis has lowered the "durability" of the nervous system. He thus describes the condition :

"Psychical activity will cause hyperæmia and congestion of the brain, and in regions where there is a tendency to stasis the congestion may persist, especially if it leads to insomnia. A Vicious Circle becomes established by conditions which tend, on the one hand, to perpetual venous congestion in certain regions, and, on the other hand, to increased excitability of the neurons; these factors mutually interact."¹

Another Circle may be established in general paralysis and be associated with the rapid destruction of neurons. Mott describes

"two conditions which mutually interact upon one another in the establishment of a Vicious Circle, viz., degenerating nervous structures, the degenerated products of which accumulate and irritate the peri-vascular lymphatics surrounding the veins, causing a tendency to stasis and inflammation, combined with conditions which produce mechanical congestion in the veins; and this reacting back on the nerve structures leads to still further disintegration of nervous tissue: thus the one vicious condition feeds the other."²

¹ *Lancet*, 1900, Vol. II., pp. 81-3.

² *Archives of Neurology*, Vol. I., pp. 179, 188, 191, 501; cf. also H. Corner, *British Med. J.*, 1911, Vol. II., p. 1415.

Coma. High intra-cranial blood-pressure, whatever its cause, is often associated with coma, and this, by leading to respiratory embarrassment, tends to increase the pressure.

Thus Tooth writes :

“ High intra-cranial pressure is the main cause of coma. In deep coma the reflexes are lowered if not abolished. Hence saliva, secretions and often food and drink collect in the trachea, and, not being expelled by reflex cough, add greatly to the respiratory embarrassment and lead to venous engorgement, circumstances which aggravate the already high intra-cranial pressure.”¹

Epilepsy. The prolonged convulsions met with in the status epilepticus and in some cases of general paralysis may also establish reciprocal relations, owing to the increased venosity of the blood. Such venosity may both start the convulsions and be kept up by them until death closes the scene :

“ The mechanical conditions are such as to produce a Vicious Circle terminating in progressively increased venosity of the blood in the cortex, especially of that portion supplied by the carotid arteries, the veins of which drain into the longitudinal sinus. In fact, a pure case free from complications and intercurrent affections, such as respiratory failure of considerable duration, asphyxia or some cardiac failure, or some secondary infection, is rarely to be obtained.”²

Hemiplegia. Another Circle may be established in hemiplegia, owing to malnutrition of the neurons. During health the activity and nutrition of the

¹ Allbutt and Rolleston, System of Medicine, Vol. VIII., p. 332.

² Mott in Allbutt and Rolleston, System of Medicine, Vol. VII., p. 226.

neurons depend upon the regular maintenance of peripheral stimuli. Such stimuli are interfered with in hemiplegia, with the result that further degeneration of the neuron follows, leading in turn to greater helplessness and a still greater lack of afferent stimuli.¹

Acromegaly. Leonard Mark has drawn attention to a Circle in acromegaly, due to the interwoven relations between inflammatory changes at the base of the brain and the secretions of the pituitary body :

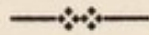
“ Any variation in the amount of pressure due to the thickening or congestion at the base of the brain will be felt in the pituitary body, and any variation in the quantity or quality of the secretion of that body, if it alters the blood-pressure, will, of course, exert its influence on all the parts at the base of the brain. Here are two questions intimately mixed up, forming a sort of Vicious Circle.”²



¹ Hutchison and Collier, Index of Treatment, pp. 431-4.

² Acromegaly, p. 145.

Chapter Three



Circles associated with the Cardio-Vascular System



OWING to the importance of the cardio-vascular system in the animal economy, and to the complexity of the vital and mechanical phenomena presented by that system, the morbid correlations created by disease are of the highest interest (Fig. II.).

The following Classification will be found convenient :

- I. Circles associated with the Myocardium.
- II. Circles associated with the Endocardium.
- III. Circles associated with the Pericardium.
- IV. Circles associated with Cardiac Neuroses.
- V. Circles associated with the Blood-vessels and Lymphatics.
- VI. Circles associated with the Blood.

I.—CIRCLES ASSOCIATED WITH THE MYOCARDIUM

Cardiac Strain. A striking example is met with in cases of acute cardiac dilatation due to over-exertion. The dilatation may cause such weakening of the coronary circulation that insufficient blood reaches the myocardium to allow of its full activity. The result is a further diminution in the coronary supply, followed by progressive weakening. This Circle results from the circumstance that the cardiac muscle is fed by the blood which it circulates and is thus self-dependent.

According to Ehrnrooth dilatation may partly be due to the gradually diminishing contact between the muscle cells. Such diminished contact results from, and aggravates, dilatation :

“Dilatation of the heart, whatever its origin, becomes of great importance if the myogenic theory is true. For the intimate contact between the muscle cells (contractile elements of Engelmann) gradually diminishes as dilatation increases. Since the conductivity of the muscle cells (where there are no nerve fibres) depends entirely on the contact between such cells, such conductivity must be more or less impaired by any interference with the intimate contact between the muscle cells. Moreover stasis supervenes before long, resulting in exudation which further diminishes contact. In this way a *Circulus Vitiosus* affecting the primary functions of the muscular tissue is formed.”¹

Another dangerous association sometimes met with is an over-strained and weakened heart with an abnormally high pressure. The slowing of the

¹ Über Plötzlichen Tod durch Herzlähmung, p. 24.

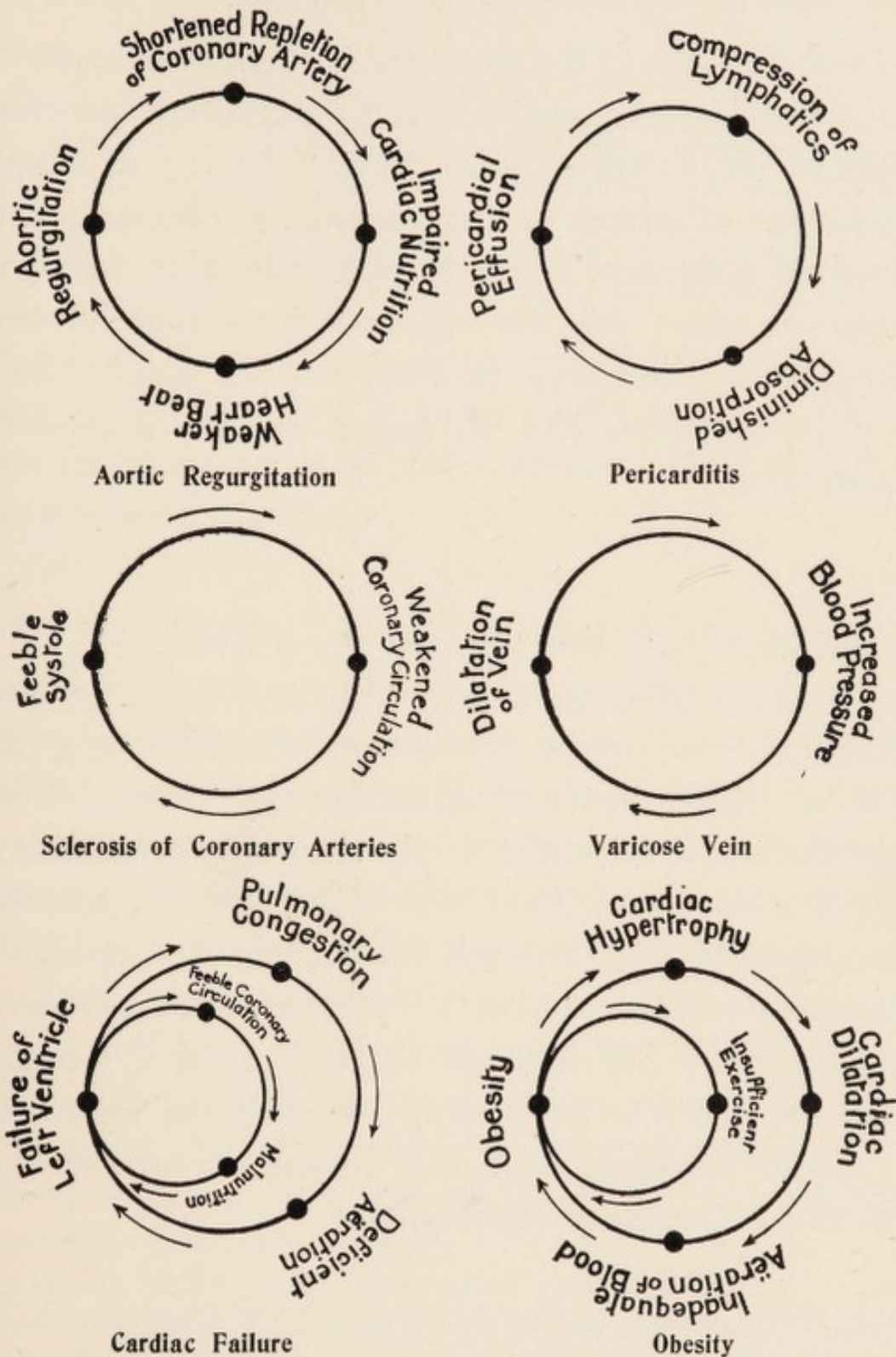


Fig. II.—Circles associated with the Cardio-Vascular System

The two lower Figures represent the double Circles which complicate cardiac failure and obesity.

circulation due to the strain tends to produce anæmia of the medullary centres, which respond by inducing intense vaso-constriction, thereby driving a larger quantity of blood to the medullary centres. The already weakened heart is called upon to make a supreme effort, and the weaker it is the more do the imperious medullary centres call for blood. The cardiac weakness and the bulbar anæmia aggravate each other.

Coronary Sclerosis. When sclerosis of the coronary arteries interferes with the supply of blood to the myocardium, a condition arises which accounts for the sudden death of many elderly persons. After gradually advancing for years, the sclerosis may reach a stage when the lumen of the coronary arteries is almost blocked through the degenerative changes, leading to cardiac ischæmia. The increased resistance produced by the sclerosis requires a more forcible systole, if life is to continue, whereas the systole is actually weakened, and the weakening further impairs the coronary circulation :

“ The insufficiency is due to the Vicious Circle created by lowering the pressure in the coronary arteries, which occurs directly the ventricle is unable to maintain the required aortic pressure. Thus at the very time when the heart muscle requires the greatest supply of nutrition, the supply of blood to the myocardium lessens.”¹

¹ Osler and Macrae, System of Medicine, Vol. IV., p. 32.

And again :

“ The vasa that supply the heart and arteries are dependent for their own nutrition on the activities and soundness of these. Self-dependence of the circulation, and mutual dependence of its elements of this character, favour the development and extension of Vicious Circles of malnutrition, once disability or damage occurs in any part of the system.”¹

Angina pectoris is often associated with this Circle, the pain being probably due to spasm or cramp of the cardiac muscle which cannot obtain an adequate blood supply.

Failure of Compensation. A Circle frequently results from failure of the compensatory changes in the myocardium, which have been brought about owing to heightened arterial pressure in the pulmonary and systemic circuits. As years roll on, these compensatory changes are apt to wear out and be replaced by dilatation and consequent venous stasis. Hence we get interference with the functions of digestion, absorption, sanguification and elimination. The unfortunate myocardium, already labouring under special difficulties *a fronte*, is poisoned by the products of metabolism, which sap its nutrition and intensify its weakness.

The vortex increases by absorbing one organ after another. In fact, the process is “ like a circle in the water which never ceaseth to enlarge itself.”²

¹ M. Bruce, *Lancet*, 1911, Vol. II., pp. 70, 206.

² Henry VI., I., ii., 133.

Mitchell Bruce thus describes the condition :

“ Vicious Circles form and increase in area and in number, slowly but steadily sapping the nutrition and vigour of the heart. . . .By this time, as a rule, the condition of the patient is too complex for much good to be expected from dissociation from its elements—the primary degeneration, the effects of the additional causes of disturbance, the widespread involvement of the circulation and viscera in Vicious Circles.”¹

Paroxysmal Cardiac Dyspnoea. Cardiac failure is frequently complicated by paroxysms of dyspnoea (so-called cardiac asthma) which tend to aggravate the failure. The attacks occur during sleep or in the early morning, when the blood-pressure is low, and give rise to desperate air-hunger, tumultuous palpitation, acute distress, insomnia and prostration. A great variety of pathological conditions may be present. But broadly speaking the attacks occur in a heart that is inadequate to its duty, and in their turn increase the inadequacy. As Hope long ago pointed out :

“ A severe asthmatic attack from disease of the heart is in general far more injurious in its consequences than one from an affection of the lungs.”²

In the worst attacks “ the patient gasps, sinks and expires.”

Zymotic Disease. Attention has already been drawn to the Circle of myocardial and coronary insufficiency as a result of severe strain. Similar

¹ *Lancet*, 1911, Vol. II., p. 210.

² *Diseases of the Heart and Great Vessels*, 1839, pp. 401, 404.

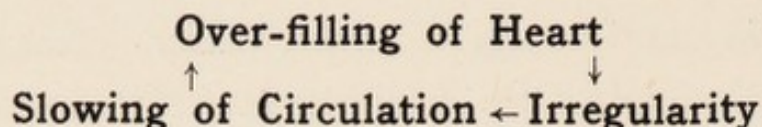
reciprocal relations are sometimes operative in acute, more especially zymotic, disease, such as influenza, diphtheria and enteric fever. Any disease that gravely diminishes the cardio-motive forces may bring this morbid correlation into play. In serious attacks "there is a Vicious Circle of conditions which precludes all hope of recovery."¹ Especially is this result probable when the blood supplied to the myocardium is laden with impurities, or when there is a progressive accumulation of residual blood leading to increasing dilatation of the ventricle. Then indeed does life hang by a thread which may snap at any moment.²

Arrhythmia. Hirschfelder draws attention to a Circle associated with cardiac arrhythmia. The arrhythmia on the one hand increases the CO₂ in the blood and thus diminishes the tone of the cardiac muscle, while the long pauses in turn increase the venous pressure and thus favour over-distention of the heart whose tone is diminished. The over-distention increases the endocardiac pressure and causes the heart to work at a disadvantage. "Thus

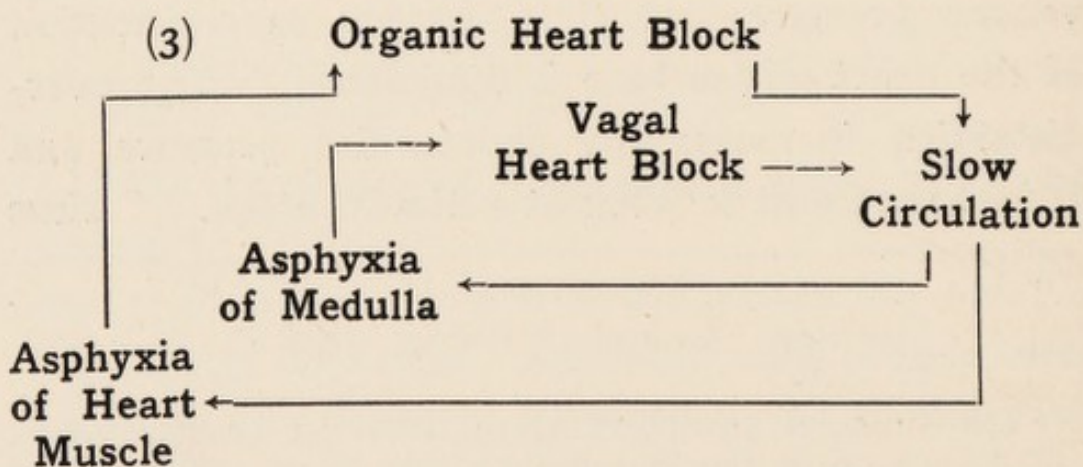
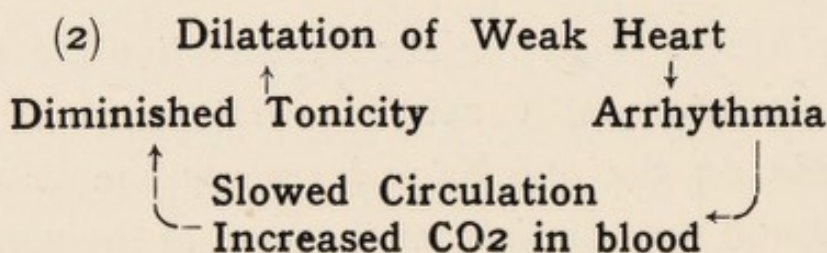
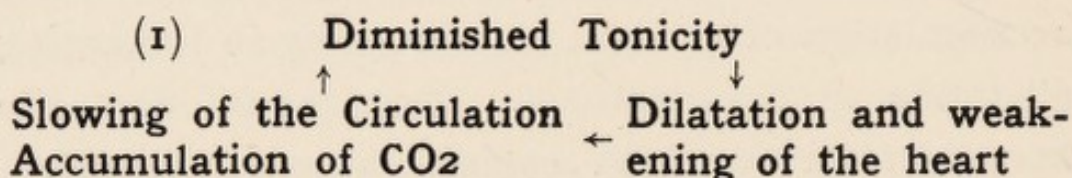
¹ Osler and Macrae, System of Medicine, Vol. IV., p. 108 ;
Cohnheim, General Pathology (N.S.S.), Vol. III.,
p. 1416.

² The opposite conditions give rise to a healthy Circle.
"Increase in the movement of the heart influences the movement of the blood in the heart walls, so that not only does increased nutriment increase the energy, but also increased energy increases the nutriment." Osler and Macrae, System of Medicine, Vol. IV., p. 193.

is established the Vicious Circle of the irregular heart."¹



Closely associated with the preceding condition are three Circles dependent on diminished tonicity, on dilatation and on heart-block, which Hirschfelder represents as follows :²



¹ Diseases of the Heart and Aorta, p. 78.

² *J. of American Med. Ass.*, 1908, Vol. II., p. 476. The last of these Circles was given by letter.

Tachycardia. Tachycardia sometimes gives rise to a Circle which ends fatally. The pulse-rate may reach 250 or even 300 per minute, and the pressure fall from 15 to 5 cm. Hg, the tachycardia and the lowered pressure being often reciprocally correlated. Huchard thus describes the condition :

“ The acceleration of the cardiac beat does not necessarily imply that the organ is doing more work. In fact the tachycardia, if extreme, in itself involves a condition of great danger. For the short interval between the cardiac beats does not allow of the proper repletion of the ventricle, and also interferes with the expulsion of the blood into the arterial system. A Vicious Circle is created, from which the sufferer cannot escape until his depressed arterial blood-pressure has been raised.”¹

Rupture of the Heart. Spontaneous rupture of the heart associated with progressive degenerative changes and dilation of the cardiac chambers may be due to a Circle. As the strain on the walls of a hollow sphere or spheroid increases with its superficies, so does the heart yield the more under the strain of the systolic pressure. Dilatation begets dilatation. When rupture has occurred, the fall of blood-pressure stimulates the vaso-motor centre. The result is a general vaso-constriction, which raises the blood-pressure and intensifies the hæmorrhage.

Obesity. Reciprocal conditions of a different

¹ *Maladies du Cœur et de l'Aorte*, Vol. I., pp. 16, 100.

kind may be met with in stout persons. Hastings Gilford thus describes them :

“ Muscular correlation is sometimes very defective, especially when fatness sets in after middle age, when the muscular system is no longer able to rise to the occasion. A Vicious Circle is often established. The tired muscles insist upon rest, but more rest means more fat, and so the inadequacy of the muscles is still further increased.”¹

At a later stage obesity frequently induces some cardiac hypertrophy, followed in due course by dilatation (“ myocardial incompetence of the obese”), dyspnoea on exertion, disinclination for active exercise, and eventually by increased obesity. The obesity, in fact, gives rise, in Sir Dyce Duckworth’s words, to “ a Vicious Circle of malign events.”

Ill-Health. Circles are not confined to the graver lesions of the myocardium. They often arise when temporary ill-health due to dyspepsia or over-work leads to a feeble action of the heart. For this in turn impairs the functions of digestion and elimination, which impairment reacts on the myocardium, a reciprocal relationship being established.

At other times a feeble myocardium leads to gastric congestion, fermentation of the ingesta, upward displacement of the diaphragm and tilting of the heart, which is thus further embarrassed. With all cardiac symptoms it is a good rule to examine the stomach, and to keep in remembrance the connection indicated by the expression “ heart-wind.”²

¹ Disorders of Post-Natal Growth and Development, p. 515.

² Lauder Brunton, Therapeutics of the Circulation, pp. 129, 138.

II.—CIRCLES ASSOCIATED WITH THE
ENDOCARDIUM

A beautiful example of the *Vis medicatrix naturæ* is presented by the compensatory changes which follow upon valvular lesions. But those changes generally prove inadequate as the years roll by. Decompensation follows and gives rise to similar Circles to those that have been already described in connection with the myocardium.

Gibson thus describes the terminal phenomena—a Circle which may begin imperceptibly and steadily widen until it involves well-nigh every organ :

“Sooner or later, according to its form and severity, chronic valvular disease with compensation itself disposes to failure, by establishing a Vicious Circle of slow progressive impairment of the viscera and their great vital functions—the lungs, liver, stomach, bowels, kidneys, indeed the myocardium itself.”¹

Special valvular lesions, however, may establish special correlations which are of considerable interest. In the words of Bouillaud, “Diverses maladies du cœur peuvent elles-mêmes devenir causes déterminantes d'autres maladies de cet organe,”² and it is in connexion with these secondary disorders that reciprocal relations occur.

Aortic Regurgitation. An aortic valve may suddenly rupture during violent exertion. The result is a severe strain on the heart. The period of repletion of the coronary arteries is curtailed, leading to impaired

¹ Textbook of Medicine, Vol. II., p. 127.

² Huchard, *Maladies du Cœur et de l'Aorte*, Vol. III., p. 717.

nutrition of the myocardium, lessened working capacity, increased regurgitation, and consequently a still less adequate repletion of the coronaries, culminating occasionally in sudden death.

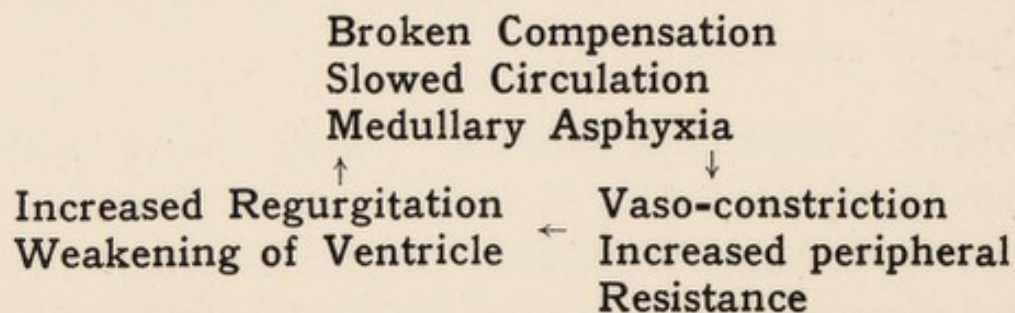
A similar Circle often causes death in chronic aortic regurgitation. After perhaps many years of fairly comfortable life, the compensatory hypertrophy fails and ends in marked dilatation. The fatal sequence may be described as follows : regurgitation, impaired coronary circulation, dilatation, weakened systole, and increased regurgitation.

It is well to bear in mind that incompetence of the aortic valve not uncommonly results from disease and dilatation of the aorta, especially in middle and old age :

“ At the same time the ventricle under these circumstances usually becomes dilated, partly as a result of fatty and fibrous degeneration, and partly the effect of mechanical causes set up by the defective aortic valve, so that a Vicious Circle is established.”¹

In some cases broken compensation in aortic insufficiency is associated with a high diastolic pressure which aggravates the insufficiency.

Hirschfelder thus represents the correlations :²

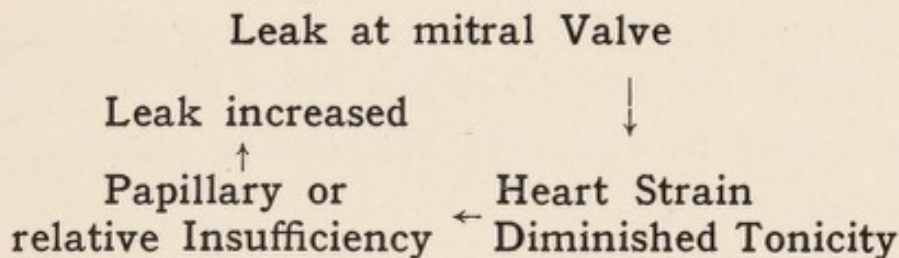


¹ Mc. Kisack, *British Med. J.*, 1911, Vol. II., p. 1397.

² Diseases of the Heart and Aorta, p. 378.

Mitral Regurgitation. When mitral regurgitation is consequent on aortic regurgitation or obstruction (owing to progressive dilatation of the ventricle and auriculo-ventricular orifice), a Circle arises through the reciprocal effect on each other of the aortic lesion and the mitral regurgitation.

Another sequence may be associated with mitral regurgitation, when the cusps of the valve are not brought tightly together, owing to want of cardiac tone. A small leak may thus be transformed into a serious one, leading to a further diminution of tonicity. Hirschfelder thus represents the condition :¹



Tricuspid Regurgitation. Tricuspid regurgitation sometimes results from the dilatation of the right ventricle secondary to mitral disease. For a time the reflux may relieve the overloaded ventricle, but its ultimate effect is to render the ventricle less competent to overcome the obstruction, thus tending to increased dilatation.

Septic Endocarditis. In the case of septic endocarditis an infective Circle is frequently started by the micro-organisms circulating in the blood.

¹ Diseases of the Heart and Aorta, p. 328.

These microbes lead to vegetations and erosions in the endocardium, especially that lining the valves, and these vegetations throw off showers of infective emboli carrying infection far and wide and leading to further endocardial lesions.

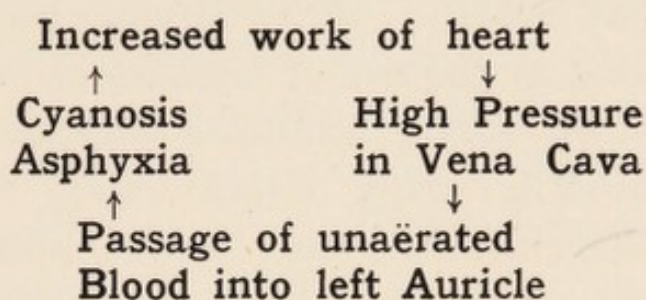
Endocarditis is a condition which often bequeaths permanent valvular mischief. The patient does not die, but remains an invalid, the *sanatio incompleta* being shown by a disposition to relapse, and by a diminished power of resistance to fresh attack. "As a taper just blown out will snatch the flame from the torch that scarcely touches it," so readily is the endocarditis rekindled. Thus the valvular mischief and the lowered resistance act and react on each other, often ending in extensive cumulative mischief.

Congenital Heart Disease. The correlations that complicate congenital heart disease are most appropriately mentioned here, since they often arise from imperfections either of the valves or of the septa caused by foetal endocarditis.

A patent foramen ovale associated with pulmonary stenosis may give rise to reciprocal disorders. So long as a quiet life is pursued, enough blood passes through the lungs to keep the blood aërated, while the remainder passes through the foramen ovale which offers less resistance ; but as soon as active exercise is taken, a larger quantity of blood passes directly into the left auricle and ventricle (owing to

the pulmonary stenosis), and thus escapes oxygenation. The consequence is a rise in venous pressure which drives still more blood through the foramen ovale.¹

Hirschfelder thus represents the "Vicious Circle of the open foramen ovale."²



Maude Abbott also describes the condition :

" A patent foramen ovale may exist without symptoms so long as pressure in the auricles is normal. But the advent of regurgitation into the left auricle creates a Vicious Circle, the raised pulmonary pressure acting on the right auricle, and the increased volume of blood in its cavity upon the left."³

In other forms of congenital morbus cordis the venous stasis gives rise to prolonged convulsions, and these two conditions aggravate each other and frequently involve a grave menace to life. A third Circle may occur in cases of congenital malformation of the heart associated with cyanosis ; for the general venous stagnation gives rise to general dilatation and

¹ Hirschfelder, Diseases of the Heart and Aorta, pp. 436, 447.

² Diseases of the Heart and Aorta, p. 436.

³ Osler and Macrae, System of Medicine, Vol. IV., p. 353.

tortuosity of the capillaries in the skin, as well as in the internal organs, and such dilatation increases the stasis. Carpenter suggests that

“ the changes thus produced in the lungs may lead to the cyanosis by producing pulmonary obstruction. Certainly a Vicious Circle is created.”¹

Physical Strain. When valvular lesions occur in such persons as navvies or coalheavers, whose daily work involves severe muscular exertion, disastrous consequences generally follow much earlier than they would do were the environment more favourable to compensation. Many a life has been sacrificed where poverty or adverse fortune has compelled a life of toil. The labour aggravates the heart lesion ; the heart lesion (owing to associated dyspnoea and palpitation) makes the daily task relatively, if not absolutely, harder.

III.—CIRCLES ASSOCIATED WITH THE PERICARDIUM

Pericarditis. In many attacks of pericarditis there is no satisfactory *restitutio ad integrum*. The acute attack subsides, but leaves behind a liability to recrudescence ; the damaged pericardium on trivial exposure is attacked afresh, and the mischief increases each time, until the pathological changes due

¹ Osler and Macrae, System of Medicine, Vol. IV., p. 334 ; St. Thomas' Hospital Reports, 1888, Vol. XVIII., p. 285.

to the several attacks may be enormous. The primary lesion has predisposed to the second attack ; the second attack has aggravated the primary lesion.

Pericardial Effusion. Pericardial effusion gives rise to several Circles through interference with the mechanism known as the lymphatic pump, by means of which a constant circulation of fluid into, and out of, the pericardial cavity is maintained. This pump is worked by the action of the cardiac and respiratory movements on the lymphatics and stomata.

In cases of effusion the stomata are readily blocked by fibrinous deposits, which check the escape and lead to an increase of the effusion. The stomata and superficial lymphatics are also liable to be compressed, the channels of absorption being thus blocked.

Again, the effusion impairs the cardiac movements on which depends the efficiency of the pump, and compresses the great vessels at the roots of the lungs, heart and pericardium. The circulation is hampered and the hampering increases the effusion. These reciprocally acting factors may explain why pericardial effusions are often very persistent. Sudden death is sometimes brought about by the pressure which the accumulated fluid exerts on the heart.

Hydro-Pericardium. Pericardial dropsy is a frequent complication of heart failure and results from general venous stasis, under similar conditions to hydrothorax and ascites. The fluid, if abundant, aggravates

the circulatory embarrassment by interference with the cardiac, especially the diastolic, movements. Indeed such dropsical effusion often constitutes a terminal phenomenon, as Gibson points out :

“ Hydro-pericardium may be said to step in as the closing link of a pathological chain, and once it has made its appearance it unites with the other morbid conditions to form a Vicious Circle of fatal import.”¹

IV.—CIRCLES ASSOCIATED WITH NEUROSES

“ Weak Heart.” A lamentable Circle is sometimes set up when a practitioner erroneously diagnoses a “ weak heart ” and excites in his patient an ever-present dread of serious illness or immediate death. The constant direction of the mind to the imaginary lesion leads to morbid consciousness of trivial sensations, to such an unwholesome *régime* as to induce a feeble and flabby heart, which at the slightest provocation reacts on the neurotic condition. The exaggerated fears, like Damocles’s sword, overshadow life and render all enjoyment impossible.

As an illustration Sir Douglas Powell tells the story of a young woman, formerly healthy and energetic, whose doctor had diagnosed a “ weak heart.” She had been taking the utmost care of a perfectly healthy organ ever since, resting half the day, never even walking upstairs, until she became fat, breathless,

¹ Diseases of the Heart and Aorta, p. 386.

anæmic and miserable. Many months must elapse before she could be weaned back to her former healthy activity, if indeed recovery were at all possible.¹

Angina Pectoris. Huchard has drawn attention to a similar Circle which is established in connection with angina pectoris when excessive repose is prescribed. The over-rested heart grows more and more unequal to its task, and more and more irritable when extra demands are made upon it :

“ The treatment prescribed in angina pectoris often gives rise to a pathological Vicious Circle. The absolute rest and avoidance of exercise that are ordered tend to make the sufferer grow obese. The abdominal circulation is retarded . . . and the heart . . . becomes more and more unequal to its task. In brief many sufferers from angina are made worse owing to the feeble circulation that has been brought about through want of exercise.”²

Neurasthenia. When a neurotic temperament is associated with real *morbus cordis*, another variety of Circle may be established, if the patient unduly “takes it to heart.” Hence the physician who realises the value of equanimity in the progress of compensation, and how a knowledge of the whole truth may rob his patient of his peace of mind, may well be in doubt how much he should reveal. In the words of Fraentzel : “ Das Wissen is oft viel schlimmer als die Krankheit selbst.”

¹ Treatment in Diseases and Disorders of the Heart, p. 15.

² Maladies du Coeur et de l'Aorte, Vol. II., p. 140.

Mitchell Bruce thus refers to the condition :

“ Depressing emotions contribute to failure of compensatory hypertrophy of the heart, and in this respect a Vicious Circle is formed, which can often be broken by judicious management.”¹

In other neurotic patients a functional disorder such as palpitation may start the morbid train of symptoms. The palpitation may be so violent as to cause an apprehension of sudden dissolution, and this apprehension in turn intensifies the palpitation.

Vomiting. A Circle may be set up when in heart disease an attack of vomiting is brought on either through the pneumogastric nerves or as a result of mechanical congestion of the stomach. The vomiting may aggravate the cardiac disorder, or even prove fatal, as **Mitchell Bruce** points out :

“ The vomiting forms a link in the Vicious Circle which may ultimately prove fatal ; and if it refuse to yield it accelerates the end.”²

Intermittent Action. Lastly, the habit of intermitting may become so confirmed as to continue even after the removal of the primary cause.

¹ Principles of Treatment, p. 81.

² L.c., p. 308.

V.—CIRCLES ASSOCIATED WITH THE BLOOD-VESSELS AND LYMPHATICS

The blood-vessels have already been frequently referred to as participating with the heart in the creation of Circles. But it will be convenient to describe under a separate heading some further disorders in which they play a prominent part.

Arterio-Sclerosis. Important correlations exist between arterial sclerosis and cardiac hypertrophy, although pathologists are not agreed as to their precise importance. The views of the older school have thus been stated by Hastings Gilford :

“ It was at one time believed that the thickening of the middle coat in hypermyotrophy was a physiological change and due to excessive action of the muscle in the pursuit of its normal function. This idea was carried to its logical conclusion by Dr. George Johnson when he started his “ stop-cock ” hypothesis. He pointed out that the blood in chronic Bright’s disease is probably poisoned by the products of metabolism, which are retained in the body instead of being cast out through the kidneys. To save the tissues from being damaged by this vitiated blood the arterioles contract and partially cut off the supply. Then the heart hypertrophies in order to propel an adequate supply of blood through the obstruction, and so the Vicious Circle is completed.”¹

¹ Disorders of Post-Natal Growth and Development, p. 346.

Modern pathologists, however, regard arterio-sclerosis as a wide-spread process affecting the arterio-capillary system generally, causing increased resistance to the flow of blood and compensatory hypertrophy of the left ventricle. The following description is given by Mott :

“ Arterio-sclerosis affecting a number of vessels must lead to an increase of arterial pressure, which, reacting on the heart, causes hypertrophy ; the two are progressively reciprocal, and although the cardiac hypertrophy is a necessary physiological compensation to overcome the increasing peripheral resistance, yet the high arterial pressure which it engenders leads to an increasing strain upon the walls of the aorta and arterio-capillary system generally. The arterial lesion may then be both the cause and effect of the hypertension.”¹

Mackenzie has alluded to the same Circle :

“ On the one hand, the changes in the blood-vessels undoubtedly tend to raise the blood-pressure, while it is contended that these are induced by the blood itself containing ingredients that provoke a contraction of the arterioles, in consequence of which the muscular coat hypertrophies. A rise in pressure seems to induce atheromatous degeneration and this in turn causes a rise in pressure, and thus a Vicious Circle may be formed.”²

Aneurysm. Aneurysm is frequently due to disease of the arterial walls, which consequently grow weak

¹ Allbutt and Rolleston, *System of Medicine*, Vol. VI., p. 606 ;
cf. also Barr, *British Med. J.*, 1909, Vol. II., p. 61 ;
and Oliver, *British Med. J.*, 1910, Vol. II., p. 1333.

² *Diseases of the Heart*, p. 101.

and yield to the blood-pressure. The more they yield the greater the tension, for vascular tension increases with vascular calibre. The greater the tension, the thinner and weaker do the aneurysmal walls become. The dilatation is therefore progressive.¹

When rupture has occurred, a similar Circle is established in connection with the vaso-motor centre, as has been alluded to in cases of rupture of the heart. The loss of blood paradoxically raises the blood-pressure, death resulting from general anæmia. As an illustration, Hensen² reports the case of an aneurysm of the descending aorta which perforated the left bronchus and on three occasions gave rise to profuse hæmoptysis. During one of these attacks careful measurements of the blood-pressure showed that whereas the pressure before an attack was 115 mm. Hg, a quarter of an hour later it had risen to 142 mm.

Although the patient survived the severe hæmoptysis of the attack (probably owing to the perforation being closed by a clot), he died shortly afterwards from a recurrence of the bleeding.

¹ If t stands for tension of vessel wall, r for radius of lumen, and p for blood-pressure, then $t = \frac{1}{2} rp$, *i.e.* with a constant blood-pressure the tension increases with the calibre of the vessel.

² Deutsches Archiv f. Klin. Medicin, 1900, Vol. LXVII., p. 497

Capillary Stasis. According to Cohnheim a Circle may be present when local inflammation leads to capillary stasis and coagulation, at any rate if the injury is so severe that complete repair is impossible. The inflammatory process leads to stasis and the stasis aggravates the inflammation.¹ He also draws attention to another Circle which is established during the processes of repair :

“It is the fact . . . that the newly formed vessels and tissues themselves constitute fresh causes of inflammation. At any rate they may become so ; for the most trifling noxa at once alters the flow through them, and immediately leads to a renewal of the transudation and extravasation. . . . A most pernicious *Circulus Vitiosus* now begins ; for while fresh exudation is repeatedly escaping from the new vessels, the exuded materials are meanwhile transformed into new vascularised membranes, so that, even when the original cause of the inflammation has long since disappeared, no rest is allowed the affected organ.”²

Varicose Veins and Lymphatics. Another Circle is associated with varicose veins, whether these are due to increased intra-venous pressure or to diminished resisting power of the vein-walls. In either case the dilatation leads to increased tension on the vein-walls, and the tension increases the

¹ General Pathology (N.S.S.), Vol. I., p. 339.

² L.c., Vol. I., pp. 374-5.

dilatation. Incompetence of the valves acts as a further aggravating factor. Similar correlations are met with in lymphangiectasis :

“ It is often impossible to say how the disorder originates. For the venous dilatation (due to some mechanical obstruction) and the anatomical changes in the vein-walls act reciprocally on one another. Thus a *Circulus Vitiosus* whose pathogenesis is obscure controls the course of events.”¹

Handley describes a Circle in which the lymphatics take part in cases of dropsy of the arm due to cancer of the breast. The dropsy resulting from transudation of lymph from the capillaries causes venous obstruction, leading to a further rise in the capillary pressure and increased transudation :

“ The rise of pressure thus produced in the capillaries tends in its turn to increase the transudation of lymph and to aggravate the dropsy, and thus a Vicious Circle is set up.”²

VI.—CIRCLES ASSOCIATED WITH THE BLOOD

The blood is the clearing-house of the organism. Into it are poured the products of digestion and of metabolism, while from it are derived the materials

¹ Romberg, *Krankheiten des Herzens und der Blutgefäße*, p. 496.

² *British Med. J.*, 1910, Vol. I., p. 854.

required for the activity of tissues, and from it also are eliminated the waste products that are of no further use. Although during health the composition of the blood is ever varying, yet the sum total of gains and losses tends to preserve a general equilibrium, both in the quantity and in the quality of this fluid on which vital activity depends.

When this equilibrium is disturbed by disease, morbid correlations are readily established. Disorder of the blood breeds disorder of the tissues and *vice versa*.

Anæmia. A familiar Circle occurs when anæmia is associated with dyspepsia both as cause and as effect. The impoverished condition of the blood tends to perpetuate itself :

“ The very causes which produce anæmia by perverted digestion or assimilation are intensified by the anæmia itself, so that a Vicious Circle is determined which tends to prolong and aggravate the condition.”¹

The nervous system is frequently affected, giving rise to a familiar symptom-complex in neurotic women. Anæmia and malnutrition are both cause and consequence of brain-fag and nerve-fag :

“ A Vicious Circle is set up, the organs being first ill-nourished through failure of the nervous control and then failing to supply the brain and nerves with good rich blood.”²

¹ Buchanan, *The Blood in Health and Disease*, p. 164.

² *British Med. J.*, 1906, Vol. II., p. 13.

A similar sequence may be established in relation to the heart and other organs. Even the respiratory functions are depressed by anæmia, and the diminished activity intensifies the anæmia. In Clifford Allbutt's words :

“ The patient lies in the Vicious Circle of a reduced activity of the respiratory centre, due to the anæmia it should help to dispel.”¹

Hæmorrhage and anæmia are often reciprocally correlated, and in this way, as Buchanan has pointed out, the impoverished state of the blood is perpetuated :

“ In reference to blood loss or drain, hæmorrhage as a cause is self-evident ; it is rapidly recovered from when sudden and profuse within limits ; but continued and intermittent and small hæmorrhages from the mucous surfaces may produce an anæmic state, which may, from lack of recuperative power of the hæmogenetic tissues, become “ progressive ” and fatal. It is quite conceivable that here, also, a Vicious Circle is established, so that the impoverished state of the blood itself increases the tendency to hæmorrhage, which originally produced it.”²

Some interesting correlations are established in cases of anæmia due to angiomas (telangiectases) of the skin and mucous membranes associated with recurring hæmorrhages :

“ The bleeding and anæmia become more severe in later life, and a Vicious Circle is set up, the bleeding causing anæmia, and the anæmia disposing to further bleeding.”³

¹ Allbutt and Rolleston, System of Medicine, Vol. V., p. 723.

² The Blood in Health and Disease, p. 164.

³ Whitfield, in Allbutt and Rolleston, System of Medicine, Vol. IX., p. 587; cf. also Parkes Weber, *Lancet*, 1907, Vol. II., p. 162.

At other times hæmorrhages appear due to fatty degeneration of the endothelial cells of the blood-vessels. Thus Cabot writes :

“To the fatty degeneration of the endothelial cells of the blood-vessels may be attributed the fact that in many anæmic conditions a general hæmorrhagic diathesis develops, which not infrequently combines with the primary disease to form a Vicious Circle.”¹

Chlorosis. A similar condition doubtless explains why chlorosis, although usually a cause of scanty menstruation, at times leads to menorrhagia and metrorrhagia, which in turn aggravate the chlorosis :

“When a woman is chlorotic she fortunately has generally amenorrhœa, but if not, she will be very likely to have menorrhagia. And you have here an illustration of a Vicious pathological Circle. The menorrhagia increases the chlorosis, and, *vice versa*, the chlorosis aggravates the menorrhagia.”²

Thrombosis. Thrombosis or embolism of the heart or large vessels may give rise to a Circle. If not immediately fatal, the embolus or thrombus causes an obstruction, and thus sets up eddies which in their turn lead to rapid and extensive clotting. The size of the thrombus or embolus grows and thus increases the obstruction. The greater the obstruction the larger the surface on which the blood can coagulate and the more rapidly does the thrombus increase. In this way the circulation may be completely arrested.

¹ Diseases of Metabolism and of the Blood, p. 308.

² Matthews Duncan, Lectures on the Diseases of Women, p. 124.

Toxæmia. Toxæmia frequently impairs the efficiency of the excretory apparatus, and this in turn leads to an accumulation of toxins :

“ Whether the inflammation be local or general, toxins are thrown into the body in solution in the body-fluids and must be excreted. Although clinically circulating toxins are intangible, they are infallible in their powers, and it must be remembered that the cumulative action is important, the whole process working in a kind of Vicious Circle, so that the greater the severity of the toxin, the less able does the body become to excrete it, and this disproportion becomes greater hour by hour.”¹

Increased Viscosity. Determann has drawn attention to an important Circle in connection with the viscosity of the blood, arising from the fact that excess of CO₂ increases the viscosity and *vice versa*.² The reciprocation is thus described by Clifford Allbutt :

“ It would seem indeed that of all factors of viscosity carbon dioxide is the chief, for the changes of viscosity by these gases (i.e. CO₂ and O) are less of the plasma than of the corpuscles ; so that in diseases of the heart and lungs, as Determann says, a Vicious Circle is established of plus viscosity, plus resistance, plus CO₂, and so round to plus viscosity again ; a gyration which the heart may be unable by increasing the velocity to break through.”³

¹ Keen, Surgery, Vol. I., p. 225.

² Die Viscosität des Menschlichen Blutes, p. 81.

³ *Quarterly J. of Medicine*, 1910, Vol. IV., p. 355.

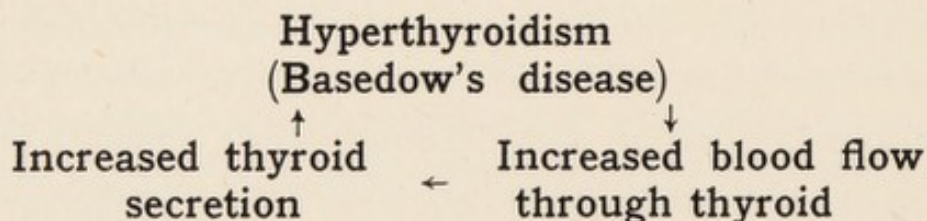
The opposite order of events creates a healthy Circle, viz. diminished viscosity : accelerated circulation : improved oxygenation : diminished viscosity.

Another factor may also contribute to the increased resistance to toxic blood, viz. swelling of the cells constituting the capillaries :

“ With a delayed circulation of toxic blood bathing the capillary walls, the constituent cells of these will swell and further obstruct the flow, whilst spasm will be constantly kept up, so as to constitute an ideal Vicious Circle of obstruction.”¹

Hyperthyroidism. A Circle also occurs in Basedow's disease (hyperthyroidism) which has recently been shown by Cyon to be dependent upon an increased quantity of blood passing through the thyroid. The increased flow appears to cause an increased secretion of thyreo-globulin, and this causes more blood to pass through the thyroid and completes the Circle.

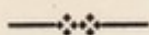
Hirschfelder² represents the sequence by the following diagram :



¹ *British Med. J.*, 1911, Vol. II., p. 111.

² *Diseases of the Heart and Aorta*, pp. 579, 585, 587 ; cf. also Rogers, *Annals of Surgery*, 1910, Vol. I., p. 151.

Chapter Four



Circles associated with the Respiratory System



S separate Chapters are devoted to Circles associated with the Nose and Throat, we shall deal here with :

- I. Circles associated with the Bronchi.
- II. Circles associated with the Lungs.
- III. Circles associated with the Pleura.

I.—CIRCLES ASSOCIATED WITH THE BRONCHI

Bronchitis. A Circle is frequently present in acute bronchitis. For the bronchitis impedes the circulation through the lungs and thus leads to defective aëration of the blood. To overcome this obstruction the right ventricle at first beats more violently ; but in severe attacks the heart frequently proves unequal to the extra work imposed upon it : the right ventricle and auricle undergo dilatation, and this is followed by venous congestion which spreads to the venæ azygos and the left superior intercostal vein, to the bronchial veins, and thus further aggravates the bronchitis.

Another Circle results from congestion of the coronary veins, which impairs the nutrition of the whole of the myocardium. As S. West points out :

“As soon as the left ventricle fails, a fresh cause of pulmonary congestion is added, for there can be no greater obstruction to the circulation than a left ventricle which cannot drive the blood onwards. The pulmonary veins become congested, and the aëration of the blood is still further interfered with. This adds to the congestion of the right side, embarrasses still more the coronary circulation, and by further impairing the nutrition of the heart makes the left ventricle weaker still. The Vicious Circle thus established explains the rapid failure of the heart, which is so striking a feature in the later stage of many cases of bronchitis.”¹

Similar complications arise in chronic bronchitis when the compensatory hypertrophy of the right ventricle fails and is replaced by dilatation. The resulting congestion increases the bronchitis. Romberg thus writes :

“Under such circumstances attacks of chronic bronchitis are very common, and are materially intensified by the obstruction to the pulmonary circulation. The dyspnoea caused by the bronchitis in its turn increases the cardiac weakness, and the resulting *Circulus Vitiosus* can only be broken by an improvement in the action of the heart.”²

Emphysema. Chronic bronchitis and emphy-

¹ Diseases of the Organs of Respiration, Vol. I., p. 129.

² Krankheiten des Herzens und der Blutgefäße, pp. 156-7.

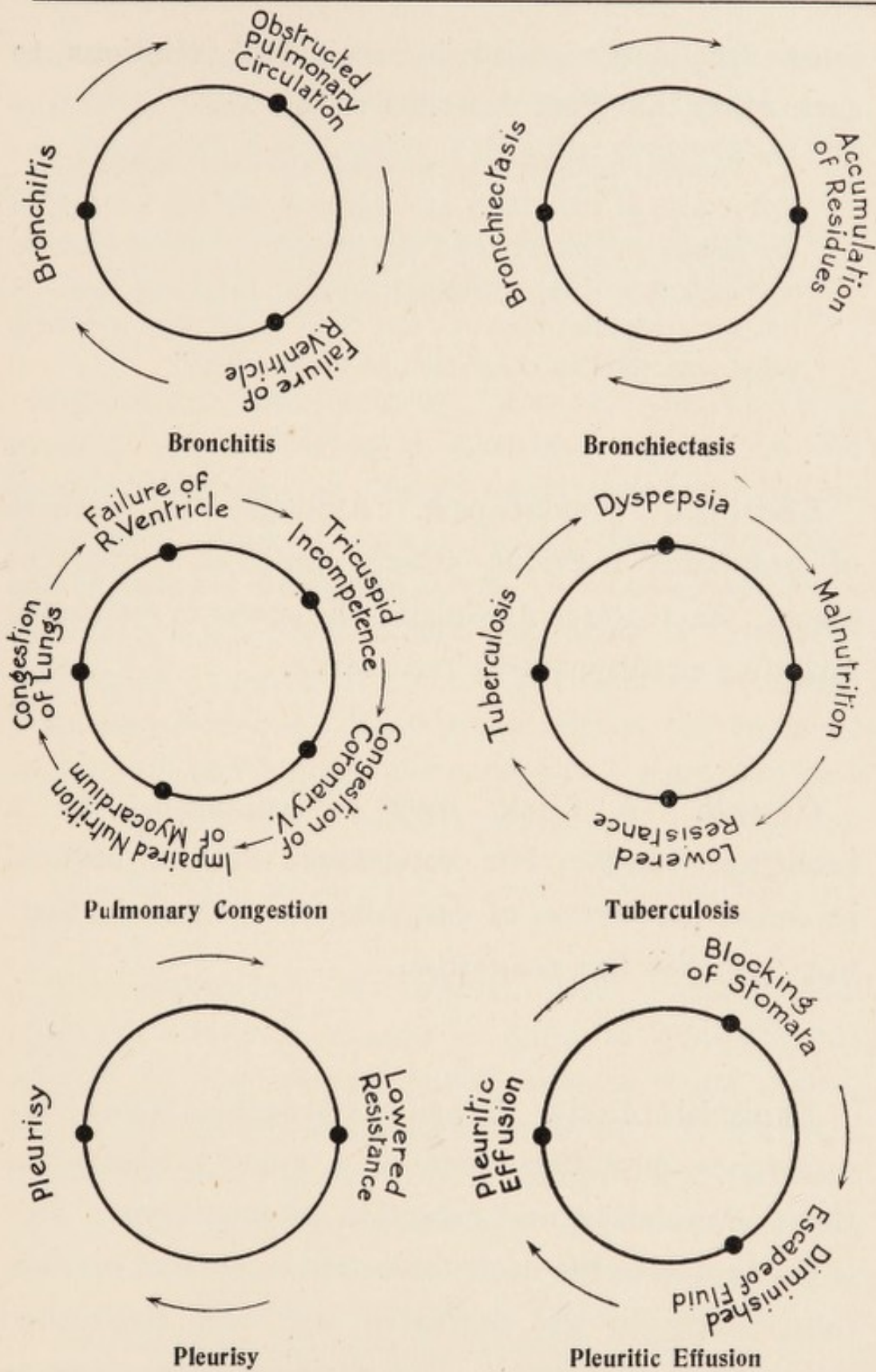


Fig. III.—Circles associated with the Respiratory System

sema frequently stand in reciprocal relations to each other, as West describes :

“ Though emphysema is commonly the result of bronchitis, still it also in turn leads to bronchitis, for the wasting of the alveoli and consequent destruction of vessels leads to obstruction to the circulation through the lungs, and, in the end, to dilatation of the right heart and systemic veins, and thus to congestion of the bronchi.”¹

Lowered Resistance. Amongst the causes of bronchitis previous attacks hold an important place. Each attack diminishes the power of resistance and thus predisposes to recurrence.

Cough. A Circle may be established by a bronchial cough. For congestion of the bronchi produces paroxysms of coughing, and these in their turn increase the congestion.

Bronchiectasis. When the bronchial tubes have undergone dilatation, there is a great tendency for the accumulation and retention of secretions. This is partly due to the destruction of the ciliated epithelium, partly to the increased size and diminished elasticity of the tubes. The residues then serve as

¹ L.c., Diseases of the Organs of Respiration, Vol. I., p. 112.

a nidus for bacterial decomposition, which perpetuates irritation, inflammation and secretion. Gases, too, are generated which exert a dilating pressure on the enfeebled walls :

“ In this way the residual dilatation is progressive unless the cause of it be brief, by starting a Vicious Circle which ends by aggravating the original disability.”¹

Asthma. Asthma may give rise to a Circle through the following mechanism. Owing to the greater force exerted during inspiration than during expiration, more air enters during the former than can be expelled during the latter. A second inspiration therefore takes place before expiration is complete, leading to a progressive over-distention of the lungs. This over-distention further diminishes the force of expiration, and hinders the escape of carbon dioxide :

“ As less air is able to escape, so much the greater becomes the respiratory stimulus of the accumulating carbonic dioxide, until the hypercapnia reaches an asphyxial percentage and breaks the Vicious Circle.”²

The recurrence of asthma, that “ paroxysmal neurosis,” may in course of time so diminish the control of the nerve centres that a fresh attack supervenes on less and less provocation. Recurrence indeed is largely the result of previous attacks. The labile condition resembles that met with in epilepsy and in some forms of insanity.

¹ Mitchell Bruce, Principles of Treatment, p. 101.

² Ewart, *British Med. J.*, 1911, Vol. II., p. 1627 ; Dixon, *Proc. Royal S. of Medicine*, 1909, Vol. III. (*Therapeutics*), p. 120.

II.—CIRCLES ASSOCIATED WITH THE LUNGS

Pneumonia. As a common example may be mentioned the Circle that frequently complicates pneumonia. Owing partly to the impeded pulmonary circulation and deficient aëration, partly to the action of toxins, an unusual strain is thrown upon the right ventricle with a consequent risk of its dilatation and failure. When such failure supervenes, the weakened myocardium in its turn reacts on the lungs by further retarding the pulmonary circulation and diminishing the oxygenation of the blood. The lungs and heart reciprocally embarrass one another. As Frænkel says :

“ The heart thus gets into a *Circulus Vitiosus*, since the blood-stasis causes a further diminution in the supply of oxygen on which the increased cardiac activity depends.”¹

Especially grave is the prognosis if the heart was unsound to begin with. Then the pneumonic patient is indeed *inter malleum et incudem*.²

Congestion of Lungs. Reciprocal relations may also be established in cases of mechanical

¹ *Lungenkrankheiten*, p. 300.

² Fothergill gives an excellent account of the pathological sequences established between the heart and the lungs, “ as the Vicious Circle of disease spreads and widens.” *Lancet*, 1874, Vol. II., pp. 682.

congestion of the lungs associated with general venous stasis due to cardiac failure :

“ When the congestion travels beyond the right ventricle, one of the first sets of veins to feel its effects is the coronary. In this way the circulation of the whole heart is affected, and its nutrition suffers still more. The weakness of the left ventricle is thus further increased, and therefore the congestion produced by it, and so a Vicious Circle is established which, if not broken, quickly leads to a fatal issue.”¹

Tuberculosis. Hare has admirably described the Circle associated with hæmoptysis. He writes as follows :

“ In phthisical hæmoptysis there is in operation one of the most highly Vicious Circles in pathology—a Circle which is largely responsible for the profuseness and prolongation of the hæmorrhage. The intra-pulmonary irritation of the effused blood causes cough : each act of coughing, like any other sudden exertion, causes rise of blood-pressure : each rise of blood-pressure is apt to cause fresh hæmorrhage ; and so on over again, the Circle continuing to revolve in many cases until the loss of blood has been sufficient to reduce the blood-pressure materially and thus terminate the hæmorrhage. This natural cure of hæmoptysis was, at one period in the history of Medicine, imitated by physicians who resorted to venesection in this emergency—a somewhat expensive, but by no means irrational, imitation.”²

Tuberculosis and dyspepsia frequently complicate each other. Barbier, for example, in describing the

¹ S. West, Diseases of the Organs of Respiration, Vol. I., p. 237.

² Food Factor in Disease, Vol. II., p. 97.

dyspepsia associated with pulmonary tuberculosis, says :

“ These visceral troubles add to the wretchedness of the sufferer. Not only are they caused by the tuberculosis, but they accelerate its progress, both by diminishing the power of resistance and by inducing other complications associated with tubercle. . . . Thus is established in all its mischievous correlations that Vicious Circle which so often complicates phthisis.”¹

Again, where the cough of a consumptive patient is accompanied by much vomiting, an inadequate supply of food may be retained, thus giving rise to malnutrition. This diminishes the power of resistance and accelerates the progress of disease.²

Many phthisical patients are inveterate optimists. But the opposite condition may also be met with. Nervous pessimism and melancholy are then highly prejudicial to convalescence, by rendering the consumptive person disinclined for the struggle back to health, and by robbing him of the pluck necessary for successful treatment. In this way the neurosis militates against recovery :

“ Pour guérir de la tuberculose, il faut vouloir guérir, le vouloir bien, le vouloir longtemps.”

¹ Brouardel et Gilbert, *Maladies des Bronches et des Poumons*, p. 495.

² It is well to remember that correlations that appear to us to establish a Circle may in the future bear a different explanation. For example, Liebermeister taught that a tubercular lesion was the cause of pyrexia and that this pyrexia increased the lesion, thus giving rise to a *Circulus Vitiosus*—a view which is not in harmony with modern pathology. Cf. Ziemssen, *Handbook of Therapeutics*, Vol. II., p. 145.

Toxic psychoses are also occasionally met with, as Mott points out :

“ It is impossible to say whether the tuberculous toxin is a cause or an additional factor in the production of the mental phenomena. Certainly a Vicious Circle tends to be produced, for refusal of food and impaired nutrition, with slow and shallow respiration and feeble circulation, tend toward rapid progress of the infective process, and thereby an increased amount of tuberculous toxin is poured into the blood.”¹

Another Circle may complicate phthisis owing to the associated colliquative perspirations. According to Bouveret, the excessive diaphoresis results from the debility associated with phthisis, and contributes materially to that debility both directly and by means of the resulting insomnia.²

Auto-infection may give rise to a Circle, as when a tuberculous patient re-inoculates himself with sputa coughed up from a primary lesion in the lung. For example, infective sputa may start a secondary focus in the larynx, and hence be aspirated into the sound lung. Similar infections may occur between the lungs and the mouth or nose. In this way the mischief may spread far and wide.

¹ Allbutt and Rolleston, System of Medicine, Vol. VII., p. 225.

² Les Sueurs Morbides, pp. 78, 129.

Cough. Occasionally excessive and prolonged coughing may so irritate and exhaust the medullary centre as to pervert the reflex mechanism. The cough becomes uncontrollable, and persists even after the local irritation has ceased, causing further exhaustion of the centre.

Obesity. Reciprocal correlations are often present in very obese persons. The play of the lungs is hampered, oxygenation is defective, and there follows an increased tendency to obesity. Indeed feeble respiratory movements from any cause whatever may lead to defective nutrition of the lungs, since such nutrition depends largely on adequate movements. Feeble movements and impaired nutrition thus come to act and react on each other.

Emphysema. Another Circle is sometimes associated with emphysema, especially in stout and plethoric patients with too good an appetite, who require more oxygen than the lungs can supply. The plethora and cyanosis lead to congestion of the lungs and to greater respiratory efforts, whereby the emphysema is increased. In the words of Sir James Barr :

“ The patient thus gets into a Vicious Circle, from which it requires some judgment and determination to extricate him.”¹

¹ *British Med. J.*, 1908, Vol. I., p. 913.

Rickets. The thoracic deformity of rickets appears at times to be not merely a result of softening, but also a cause of further softening owing to the continued irritation :

“ It is a well-recognised fact that the rickety deformity manifests itself most in those parts exposed to mechanical strain. The mechanical strain produces a deformity in the first place and in the second excites further rachitic softening by its irritation, thus producing for a time a Vicious Cycle of events.”¹

Atelectasis. Atelectasis, or pulmonary collapse, is a frequent cause of sudden death in weakly or rickety infants, the rapidity of death giving rise to great consternation, especially as a trifling catarrh may suffice to start the process which ends in a fatal Circle.

Wilson Fox has well described the correlations :

“ Collapse, having once begun, furnishes by its very presence a cause for its further extension ; firstly, because the accumulation of mucus tends to increase in proportion to the diminution in the amount of air entering the lungs ; and secondly, because of the increasing impurity of the blood, from imperfect aëration, impeding the muscular and nervous functions.”²

¹ McKenzie, *British Med. J.*, 1911, Vol. I., p. 930.

² Diseases of the Lungs and Pleura, p. 189.

Another pernicious factor operates in cases in which the lower ribs and even the lower part of the sternum are drawn inwards, instead of rising, during the act of inspiration. This condition may induce pulmonary collapse, which by producing dyspnoea may stimulate the respiratory activity, lead to further drawing in of the ribs, and thus aggravate the collapse.¹

A Circle often present towards the close of life is that due to slow progressive asphyxia brought about by the interruption to the function of respiration. The oxygen-content may fall to a mere trace. The effect of the non-oxygenated blood on the brain is a general narcosis resulting in frequent and shallow respirations which do but little to aërate the blood and gradually weaken until life ebbs away.

III.—CIRCLES ASSOCIATED WITH THE PLEURA

Pleurisy. After an attack of pleurisy there is often no *restitutio ad integrum*. Recovery takes place at the cost of some residual lesion, and of lowered resistance. The damaged pleura on trivial exposure

¹ Fagge and Pye-Smith, Textbook of Medicine, Vol. I., p. 1057.

is attacked afresh, and each time the mischief increases, until the cumulative effect is considerable. The primary lesion by lowering resistance has led to recurrence ; recurrence has aggravated the primary lesion.

Pleuritic Effusion. Pleuritic effusion gives rise to several Circles, owing to interference with the lymphatic pump by which a constant circulation of fluid into, and out of, the pleuritic cavity is maintained. During health that pump is worked by means of the respiratory movements acting on the lymphatics and stomata. In cases of effusion, however, deposits of fibrin may block the stomata and check the removal, in this way causing an increase of the effusion. It is much as if with a leaking ship the pumps were plugged by sea-weeds pouring in with the water.

The effusion may exert such pressure on the stomata and superficial lymphatics as to block the channels by which it should be absorbed. It may further make difficulties for itself by reducing or abolishing the respiratory movements on which the efficiency of the pump depends.¹ The improve-

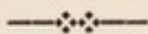
¹ S. West, *Lancet*, 1905, Vol. I., p. 787.

ment that so often follows paracentesis, even when only a small quantity of fluid is removed, is probably due to the breaking of the Circle by such removal. The lymphatic pump has again begun to work.

Hydro-Thorax. Dropsy of the pleura is not as a rule an independent affection but part of a general venous stasis due to respiratory or cardiac disease. The dropsy in its turn leads to further respiratory embarrassment, and combines with other secondary disorders to form a Circle which frequently gives the *coup de grâce*.



Chapter Five



Circles associated with the Digestive System



DISORDERS of digestion are usually complicated by the presence of a Circle (Fig. IV.). This liability arises in part from the interdependence of the chemical, physical and vital processes associated with digestion ; in part also from the close sympathy between the gastro-intestinal tract and other organs, even the most remote. Disease here breeds disease there, action and reaction being in continuous operation. A regional Classification will be found most convenient :

- I. Circles associated with the Mouth.
- II. Circles associated with the Œsophagus.
- III. Circles associated with the Stomach.
- IV. Circles associated with the Intestines.
- V. Circles associated with the Rectum and Anus.

I.—CIRCLES ASSOCIATED WITH THE MOUTH

To this Group belong some Circles of interest both to the medical and to the dental practitioner.

Oral Sepsis. A common Circle occurs in connection with caries. If the teeth are not properly cleansed, retained particles of carbohydrate food undergo fermentative changes due to bacteria, with the formation of lactic acid as the end product. The acid in its turn dissolves the enamel and thus gives rise to pockets in which food and bacteria lodge, leading to further fermentation and more acid.

The deposition of tartar from the saliva may establish morbid correlations, by irritating the gum and causing it to recede from the tooth, leaving the neck and fang exposed. The exposed fang in its turn receives a coating of tartar, which excites further irritation and recession. So the process continues, and we have, in Pickerill's words, "the first step in the establishment of a Vicious Circle."¹

Diminution in the activity of the muscles of the oro-pharynx is another result of oral sepsis. Unhealthy secretions are unduly retained; the oral sepsis is increased, creating, as Stewart has pointed out, a "true Vicious Circle."²

Still more important are the constitutional results

¹ Stomatology, pp. 57, 58.

² *Lancet*, 1909, Vol. I., p. 1822.

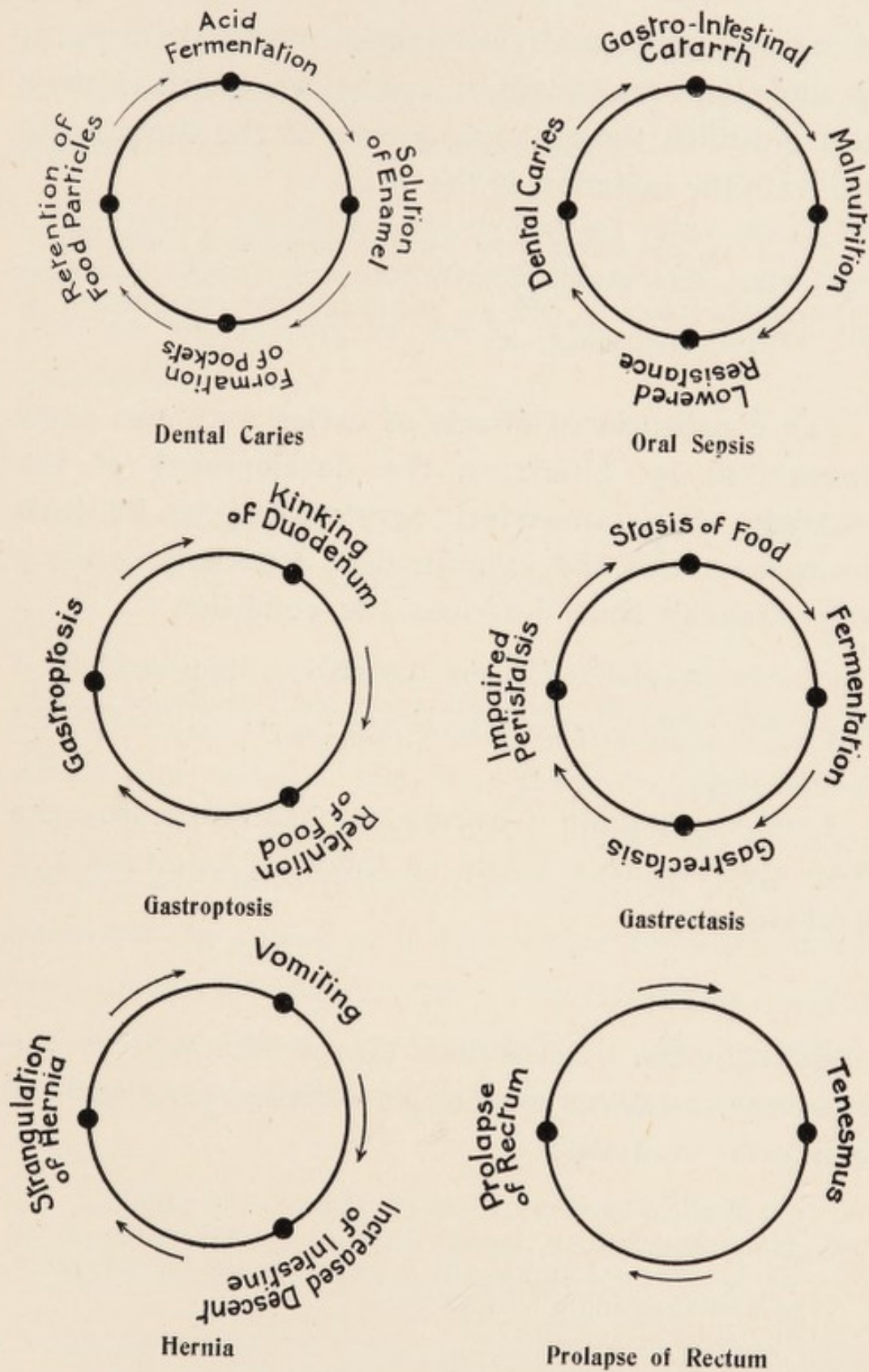


Fig. IV.—Circles associated with the Digestive System

of oral sepsis, such as gastro-intestinal catarrh, toxæmia and malnutrition, conditions which in their turn diminish the resisting power of the tissues and facilitate the infection of the gums :

“A Vicious Circle may become established ; oral sepsis leading to systemic disturbances will tend to lower the resistance locally and to encourage the continuance of infection and absorption.”¹

The constitutional effects of caries may also shew themselves by hindering the development of the maxillæ. Such imperfect development in its turn promotes caries and malnutrition, especially in early life. Goadby thus describes the condition :

“ Among children we find impaired nutrition and with it impaired growth ; with this, again, badly developed maxillæ and thus the Vicious Circle is complete.”²

Even so common a trouble as obstinate tooth-ache may give rise to a Circle by inducing insomnia and neurasthenia.

Stomatitis. Krehl has drawn attention to the reciprocal relations established between ptyalism and mercurial stomatitis :

“ Mercurial stomatitis usually follows the ptyalism, and is due to some irritating mercurial compound present in the saliva. This stomatitis will, in turn, increase the salivation, thus establishing a Vicious Circle.”³

¹ Spokes, *Lancet*, 1906, Vol. I., p. 509.

² *British Med. J.*, 1904, Vol. II., p. 440.

³ *Clinical Pathology*, tr. by Hewlett, p. 247.

Sordes. Sordes due to extreme exhaustion interfere with mastication and digestion ; the impaired digestion tends to further exhaustion.

Thrush. Aphthous stomatitis, so common in the wasting diseases of infancy, causes difficulty and pain in the taking of food. This aggravates the malnutrition.

II.—CIRCLES ASSOCIATED WITH THE ŒSOPHAGUS

Œsophageal Pouches. Œsophageal pouches¹ may give rise to a very troublesome Circle. As food enters and distends the sac, the œsophagus below is apt to be compressed, causing more food to enter the sac and consequently increasing the distention. Moreover the pouch, as it grows, may form the direct continuation of the pharynx, and this again causes more food to enter. Decomposition is liable to occur, leading to inflammation, spasm and increased obstruction :

“ When this occurs a Vicious Circle is established ; inflammation is followed by spasm, spasm by obstruction, and obstruction by further inflammation.”²

¹ Pharyngeal pouch is a more accurate name, since the neck of the diverticulum passes through the lower constrictor of the pharynx.

² *British Med. J.*, 1911, Vol. II., p. 1599.

III.—CIRCLES ASSOCIATED WITH THE STOMACH¹

Owing to the large number of these Circles it will be convenient to arrange them in two divisions :

- (a) Circles affecting the Stomach and other Digestive Organs.

Atonic Dyspepsia. A familiar example occurs in atonic dyspepsia, a disorder in which peristalsis, secretion and absorption are all involved. Indeed these three functions are so closely connected that

¹ The term Vicious Circle has sometimes been applied to conditions where there are no reciprocal forces in operation and which, therefore, do not fall under the definition given in the Introduction. Such a Circle is occasionally established after the operation of gastro-enterostomy, where the contents of the stomach pass through the anastomosis made by the operation and return to the stomach through the duodenum, or else pass first into the duodenum and return to the stomach through the anastomosis.

Trendelenburg has also described a "Vicious venous Circle," which may complicate varicose veins of the leg where the valves are incompetent. After passing through the saphena vein into the veins which connect the superficial with the deep veins, the blood flows into the popliteal and femoral veins back into the saphena vein, thus flowing from, instead of towards, the heart and completing the circuit. Da Costa, *Modern Surgery*, 1910, p. 409.

disturbance of the one affects the other two. Ewald thus describes the correlations :

“ Defective muscular movement reacts by diminishing the activity of absorption, defective absorption leads to stasis in the venous area, and this again to injury to secretion, so that a Vicious Circle is created. You can easily perceive that it is quite the same at whichever end you begin this chain ; whether the first trouble is secretory or motor, or absorption is affected, the same results must always follow, unless the failure of one function can be compensated for by the stronger action of another, by which the disturbance might be rectified.”¹

Anæmia. Anæmia may be associated with atonic dyspepsia, especially in young women. The impaired secretion, peristalsis and absorption due to the anæmia lead to further deterioration of the blood and this in turn to defective nutrition of the stomach. It must never be forgotten that the stomach, like the heart, depends largely on its movements for its blood-supply, and consequently for its adequate nutrition.

Retention of Ingesta. Another complication arises when imperfectly digested food is retained too long. Irritation and catarrh are readily set up, and further enfeeble the musculature.

Strümpell thus describes the condition :

“ Imperfect digestion or dyspepsia excites a catarrh of the gastric and intestinal mucous membrane, by which again, in a Vicious Circle, the digestive power is still further reduced.”²

¹ Diseases of the Digestive Organs (N.S.S.), Vol. II., p. 484.
Cf. also Rosenheim, Krankheiten der Speiseröhre und des Magens, p. 96.

² Textbook of Medicine, 1887, p. 387.

Dilatation of Stomach. Progressive dilatation of the stomach is a still more serious consequence of the prolonged retention of food, owing to the associated decomposition and fermentation. Such enormous quantities of gas may be generated that the stomach yields more and more to the pressure. The dilatation and the stasis perpetuate each other :

“Dilatation may be the cause, accompaniment or sequel of chronic gastritis ; subacidity with fermentation and stagnation forms a Vicious Circle constituting Cohnheim’s so-called vinegar and gas factory, and may likewise be regarded as an important etiological factor.”¹

Boulimia. In many of these cases boulimia is present, resulting from, as well as aggravating, the gastric dilatation :

“The subjects of chronic gastric catarrh, associated with a degree of dilatation of the stomach from atony of the wall develop an excessive appetite and eat largely. A Vicious Circle is established, and the morbid condition aggravates itself automatically.”²

Gastroptosis. Occasionally the enlarged and loaded stomach sinks in the abdomen and pulls down the horizontal section of the duodenum. The result is a kink which hinders the escape of the contents

¹ Osler and Macrae, *System of Medicine*, Vol. V., p. 285 ; Cohnheim, *Lectures on General Pathology* (N.S.S.), pp. 859, 862 ; *British Med. J.*, 1902, Vol. II., pp. 1390, 1393.

² M. Bruce, *Principles of Treatment*, p. 471.

of the stomach and favours further ptosis. As Billings, speaking of displacements of the stomach, says :

“ The greater the distention of the stomach in the course of the affection, the more difficult, naturally, is the propulsion of chyle into the duodenum. The affection therefore spontaneously forms a Vicious Circle.”¹

Such gastropptosis is an illustration of a sequence which may be observed in many parts of the digestive tract :

“ Whenever the progress of the ingesta is impeded owing to atony or spasm or impaired nutrition, so that the ligamentous supports of the viscera are unequal to their task and stretch, a Vicious Circle is established. For the mechanical disturbance aggravates the very disorder to which it is due.”²

Gastritis. When acute gastritis results from food that is either irritating in quality or excessive in quantity, an even graver condition results. For the correlations above described are intensified by the presence of inflammation, as Ewald has well described :

“ The impaired secretion and peristalsis give rise to inflammation of the mucosa, which in its turn further checks the gastric secretion and thus establishes a Vicious Circle *in optima forma*. Putrefactive and fermentative decomposition supervenes as an aggravating factor.”³

¹ Diseases of the Digestive System, tr. by Salinger, p. 271 ; *British Med. J.*, 1902, Vol. II., p. 1397 ; *Lancet*, 1911, Vol. II., p. 215.

² Debove, Achard and Castaigne, *Maladies du Tube Digestif*, Vol. II., p. 42.

³ Eulenburg, *Real-Encyclopädie der gesammten Heilkunde*, Vol. XIV., p. 258.

Gastric Ulcer. Roux and other authors believe that a Circle may be created by the interaction between hyperchlordria and gastric ulcer :

“ The hyperchlordria, which is so constantly present in cases of gastric ulcer, may be due to reflex irritation. On the other hand clinical observations seem to indicate that in many cases the hyperchlordria precedes the ulcer. We may therefore conclude that the hyperchlordria promotes the formation of the ulcer, while on the other hand, by means of a Vicious Circle, the ulcer once formed increases the hypersecretion and the hyperchlordria. This concatenation of phenomena may well explain the tendency of the ulcer to become chronic.”¹

Pyloric spasm and gastric ulcer are often closely correlated. The irritation due to the ulcer may provoke the spasm, which in its turn keeps up the ulcer by causing an undue retention of the abnormally acid gastric juice. In brief, ulceration, hyperchlordria and pyloric spasm mutually perpetuate each other.

A Circle may be established when adhesions have formed round the base of the ulcer, doubtless due to an effort of Nature to prevent perforation, or to localise the subsequent peritonitis, should the ulcer give way. Such adhesions, however, are by no means an unmixed blessing, since they cause fixation of the ulcer, prevent its undergoing the contraction which is so necessary for repair, and thus hinder recovery.

¹ Debove, Achard and Castaigne, *Maladies du Tube Digestif*, Vol. I., p. 205.

Intestinal Catarrh. Somewhat wider Circles embrace the intestines and the liver, the portal area in fact. If, for example, imperfectly digested food escapes through the pylorus, a catarrh of the intestines is set up which in its turn reacts on the stomach. Ewald¹ goes so far as to say that this Circle (Zirkelschluss) occurs in all gastric disorders.

Equally intimate is the correlation between stomach and liver. Every gastric and intestinal derangement reacts on the liver, while conversely every liver derangement reacts on the stomach. Lauder Brunton who noticed how the composition of the blood made to circulate through an excised liver affected the rate of flow, suggests the following explanation :

“ Indiscretion in eating or drinking disturbs the digestive processes in the stomach and intestines ; the products of imperfect digestion or of decomposition in the intestine being absorbed into the veins pass to the liver ; they may there induce an obstructed flow through the hepatic capillaries ; the venous blood returning from the stomach and intestines will no longer be able to find an easy passage into the general circulation, and venous congestion of the stomach and intestines will be the result. Such venous engorgement as this will interfere with gastric and intestinal digestion, and this again will react upon the liver. Here, then, is a Vicious Circle which it is necessary to break.”²

Aerophagia. Aerophagia is a not uncommon gastric neurosis which is complicated by a Circle. Persons who have swallowed air gain some relief from

¹ Eulenburg, l.c., p. 269 ; Lectures on Diseases of the Digestive Organs (N.S.S.), Vol. II., pp. 486, 487, 526.

² Disorders of Digestion, p. 25.

the gastric discomfort by forcing themselves to belch. The forced belching, however, while of some benefit, really aggravates the discomfort, and produces the sensation of an object lying just behind the larynx. They therefore belch again to remove it and the habit of belching may thus be indefinitely repeated. ¹

Pica. An infective Circle is sometimes established, particularly in children, by the presence of the *ascaris lumbricoides* or the *ankylostoma duodenale*. These parasites are apt to cause a perverted appetite, taking the form of pica or geophagy. Earth or even fæces may be eaten, and as the ova are excessively common in the soil this indulgence often increases the infection. In other words the earth hunger is both cause and effect of the infection. ²

(b) Circles affecting the Stomach and other Organs
not concerned in Digestion.

We now come to Circles associated with the stomach in its so to speak foreign relations, in its relations to organs unconnected with digestion.

¹ Hirschfelder, Diseases of the Heart and Aorta, p. 604.

² Allbutt and Rolleston, System of Medicine, Vol. II. (II.), pp. 901, 903.

Hippocrates has a famous aphorism :

ὡσπερ τοῖσι δένδρεσιν ἡ γῆ, οὕτω τοῖσι
ζώοισιν ἡ γαστήρ.¹

and it is on this relation of the stomach to the animal that many Circles depend. If the animal is out of health, the stomach suffers. If the stomach is out of health, the animal suffers. This Circle embraces the problem of nutrition in all its ramifications.

Malnutrition of Nerve Centres. The delicate tissues of the nervous system would on *a priori* grounds be likely to suffer early from gastric disorder, and such is found to be the fact. Gastric disorders rapidly disturb the nerve centres, and ill-nourished nerve centres rapidly react on the gastric functions, stomach and brain reciprocally embarrassing each other. Worse still, if in consequence of retention and decomposition of food, poisons are brewed and the blood which should nourish the nerve tissues is itself tainted. Can one wonder that, under such conditions, interactions are set up which it is not easy to unravel ?

Neurasthenia. At other times it is difficult to say whether the trouble begins in the nervous system

¹ "What the soil is to the tree the stomach is to the animal."

or in the stomach. Thus in neurasthenia, whether of spontaneous or of traumatic origin, protracted repose may so derange the gastric functions and affect the general health that all inclination for mental and physical exertion vanishes. The patient becomes pre-occupied with his own sensations, and a Circle is soon established between the psychical condition and the digestive functions of the body. Gastric hyperæsthesia is frequently met with under these circumstances, as Mathieu points out :

“ The pain and general impairment of nutrition combined with anxiety as to health often give rise to a condition of neurasthenia. . . . This neurasthenia is a fresh source of gastric hyperæsthesia, of increased pain and of pyloric spasm. Dyspeptic disorders supply many illustrations of this Vicious Circle.”¹

In women especially are such correlations common. Thus Axenfeld referring to the neurotic dyspepsia of females says :

“ If the dyspepsia increases, the sufferer is involved in a veritable Vicious Circle. The neurasthenia causes dyspepsia and this causes anæmia. The anæmia in turn perpetuates that troublesome state of irritability of the nervous system from which so many persons suffer.”²

¹ *Traité des Maladies de l'Estomac et de l'Intestin*, p. 230.

² *Traité des Névroses*, 1883, p. 888.

Schofield also lays stress on these reciprocal conditions :

“ A Vicious Circle is often kept up in these cases which it is absolutely essential to break. They begin, it may be, with loss of appetite from some slight cause. This . . . leads to disordered thoughts, and the idea of disease is started. This, again, makes the appetite still more capricious ; the thoughts therefore get still worse, and so the body starves the brain, and the brain starves the body.”¹

Cardiac Disorder. Various consequential disorders are set up between the stomach and the heart, often causing much anxiety. An example is met with where worry or insomnia has led to dyspepsia and this to an irregular and weak cardiac action, which further interferes with digestion. If the heart is unsound, the disorder is still more readily produced, as Robin has described :

“ Gastric disorders are very apt to disturb the action of a healthy heart. All the more readily will they affect a diseased organ, even though the latter originally caused the dyspepsia.

This Vicious Circle, as a result of which the diseased heart gives rise to gastric disorders which in turn react on the heart, is exceedingly common, and many errors of diagnosis will be avoided if this fact is borne in mind.”²

¹ Nerves in Disorder, p. 162 ; Management of a Nerve Patient, p. 82.

² Les Maladies de l'Estomac, p. 966.

Deficient Aëration of Blood. Arbuthnot Lane points out the correlations that may be established between the stomach and the lungs :

“ The diminution in respiratory capacity which is brought about by indigestion in young people, is a matter of vital importance, and is a very material factor in lowering the activity of all the vital processes in the body. In the first instance deficient aëration and oxygenation result from serious alterations in the abdominal mechanics. Later a Vicious Circle is formed, the deficient aëration impairing digestion processes.”¹

Stretching of Mesentery. Mechanical correlations may arise by a stretching of the mesentery across the duodenum in cases of gastrectasis, as Barnard has described :

“ In some of the cases of acute paralytic dilatation of the stomach it would appear that the small intestines have been driven downwards and backwards into the pelvis by the enlarging organ, and that the mesentery has been drawn tightly across the duodenum. In such cases, in addition to the stomach, the duodenum is distended to the point at which it is crossed by the mesentery, and a Vicious Circle is thus established.”²

A curious complication³ may occur in such cases of obstruction owing to the fact that any water that is imbibed cannot reach the intestines, and consequently is neither absorbed nor quenches thirst. The result is that the unallayed thirst causes more water to be drunk, producing increased distention of the stomach, increased obstruction, and increased

¹ Operative Treatment of Chronic Constipation, p. 16.

² Allbutt and Rolleston, System of Medicine, Vol. III., p. 769.

³ Virchow, *Archiv*, Vol. CLVI., 1899, p. 306.

difficulty in satisfying thirst. We may thus have to deal with a paradoxical condition in which a person is tormented with thirst, although there are several pints of fluid in his stomach.

A number of drugs and food accessories create artificial Circles in connection with the stomach. For an account of them the reader is referred to Chapter XIV.

IV.—CIRCLES ASSOCIATED WITH THE INTESTINES

Similar Circles to those alluded to above occur *mutatis mutandis* in connection with the intestines. This applies, for example, to congestion of the stomach and a failing myocardium ; to defective peristalsis dependent upon stasis and decomposition of the ingesta ; to dyspepsia and enfeebled nutrition. These correlations need not be further alluded to.

The anatomical relations of the intestines, however, give rise to special Circles which will now be discussed.

Intestinal Obstruction. The great accumulation of gas in intestinal obstruction impairs the contractile powers of the muscular walls, and this impairment leads to further accumulation. The distention also perpetuates itself by diminishing the absorption of gases by the blood-vessels.

Thus Nothnagel writes :

“ As soon as the amount of gas present exceeds a certain limit, the intestine becomes distended, and this inhibits the absorption of gas by the blood-vessels of the intestinal wall. In addition the excessive distention impairs the contractile powers of the intestinal musculature. All three factors in their turn lead to the further accumulation of gas in the intestine. In this way a Vicious Circle which cannot be interrupted results, and causes the colossal meteorism occasionally seen in stenosis of the intestine.”¹

And again :

“ The sudden rise of intra-abdominal tension will interfere with the circulation, and the gases will no longer be absorbed from the intestinal lumen, and will rapidly increase the distension, thus establishing a Vicious Circle.”²

Another Circle arises when a coil of intestine is strangled, and its lumen becomes distended with blood and with gas. The tension causes more gut and mesentery to be drawn into the constricting ring and in their turn to be strangled and distended :

“ These coils draw their mesentery along with them within the constriction, which in this way becomes tighter and tighter in a Vicious Circle.”³

In the case of volvulus the distention interferes with the movements of the intestine, prevents it from untwisting and so perpetuates the condition.

Fæcal Stasis. Fæcal stasis is another complication of intestinal obstruction which sets up morbid

¹ Diseases of the Intestines and Peritoneum, pp. 140, 638.

² Barnard, Contributions to Abdominal Surgery, p. 5.

³ Barnard, l.c., p. 5.

correlations. For the stasis in course of time leads to paresis of the intestinal walls and this is followed by further stasis :

“ The muscular tissues within the intestinal wall become distended and stretched ; this, of course, interferes with their functional activity, for stretching of fatigued and degenerated muscular substance must necessarily be detrimental to its contractile power. In this way a Vicious Circle of events develops, each one of which acts harmfully on the other.”¹

Gant also refers to these correlations :

“ The important thing to remember is that when either of these two conditions is present and the other develops, the patient's condition is made more deplorable for the reason that each aggravates the other, thereby establishing a Vicious Circle.”²

Kinking of the Intestine. Chronic stasis is frequently associated with kinking of the intestine which in its turn promotes further stasis. A striking example is met with in connection with the transverse colon which may be so stretched as to form an M-shaped loop reaching down to the pelvis.

The longer the loop the greater the tendency to stasis, while the accumulated fæces favour further descent of the loop. In connection with this condition peritoneal adhesions are apt to form at the hepatic and splenic flexures causing permanent kinking of the gut and further aggravation of the stasis.³

¹ Nothnagel, Diseases of the Intestines and Peritoneum, pp. 375, 591.

² Constipation and Intestinal Obstruction, p. 132.

³ Arbuthnot Lane, Operative Treatment of Chronic Constipation, p. 16 ; *British Med. J.*, 1911, Vol. I., p. 912 ; *Practitioner*, 1910, Vol. I., p. 684.

The accumulation of flatus in the colon acts in the same direction :

“ When once any marked degree of meteorism has occurred, a Vicious Circle is established : the extreme dilatation of the colon tends to produce kinks and angles in the bowel, which causes obstruction to the lumen ; moreover, the stretching of the bowel wall further paralyzes the muscular walls in the same way that stretching the anal sphincter paralyzes that muscle. It is owing to the establishment of this Vicious Circle that the condition of meteorism, once well established, is extremely difficult to deal with successfully.”¹

Kinking of the Sigmoid Flexure. Still attributes some forms of constipation in infancy to a kinking of the sigmoid flexure, which is in turn intensified by the accumulated fæces :

“ It is probable that the sharp kinks which are so often present with the looping of the long sigmoid flexure in infancy may hinder the progress of the fæces, and the accumulation of fæces in turn aggravates the kink, so that a Vicious Circle is established which may account for the obstinate constipation which is not infrequent in infants.”²

Intussusception. Another Circle is met with in intussusception, where the intussusceptum excites active peristalsis in the intussuscipiens. The peristalsis in turn increases the length of the invaginated intussusceptum, cause and effect acting and reacting reciprocally on each other.

¹ Mummery, Diseases of the Colon, p. 35.

² Green, Encyclopædia and Dictionary of Medicine and Surgery, Vol. III., p. 418.

Hernia. In the case of hernia the ring tends to enlarge every time the gut descends, which enlargement facilitates a re-descent of the gut. A strangulated hernia frequently provokes vomiting and the vomiting increases the strangulation.

Peritonitis. Similar Circles to those present in intestinal obstruction are also present in peritonitis. Thus Nothnagel writes :

“ Paresis and paralysis of the bowel may appear very early in the course of peritonitis, especially in perforative peritonitis, where it is most probably due to reflex inhibition of the intestinal peristalsis. Paresis gives rise to meteorism, since gas continues to collect and accumulate in the bowel as it is not driven onward. As soon, however, as a considerable quantity of gas accumulates in the intestine, the Vicious Circle is completed, for gaseous distention of the intestine leads to further impairment of its muscular powers and eventually to over-distention and paresis, or to definite paralysis.”¹

Krehl has emphasised the important part played by meteorism :

“ It would appear that diminished muscular tonus and insufficient absorptive capacity are of much greater importance in the production of tympanites than is an excessive formation of gases. For this reason meteorism is especially marked in peritonitis and acute strangulation. If the intestines once yield to the pressure of the gases within them, a Vicious Circle is established, for this very distention embarrasses their circulation, and so diminishes their ability to absorb gas.”²

¹ Diseases of the Intestines and Peritoneum, p. 773.

² Clinical Pathology, tr. by Hewlett, p. 324.

Flatulence. Hertz points out that flatulence may be both cause and result of constipation. For the muscle of a distended intestine has to contract with unusual vigour in order to maintain the usual rate of progress, and as flatulence diminishes such contractile power, constipation results, or, if already present, is aggravated.¹

Colic. Ordinary colic, due to temporary arrest of irritating food, supplies a further illustration :

“All factors that directly or indirectly cause motor activity of the intestines can occasion colicky attacks, because every acceleration of peristalsis in the upper loops causes an accumulation of contents and increased pressure in the adjacent intestine. A *Circulus Vitiosus* results : the peristalsis increases the stasis above the obstacle and the stasis excites the peristalsis.”²

Irregularity of meals in children is enough to lead to this Circle. Especially common is it in breast-fed infants, owing to their being fed too often :

“The tendency to overfeeding in these cases is a natural one, because the taking of warm milk into the stomach . . . temporarily relieves the colic, and the mother, finding the child is relieved by suckling, tends to go on giving the breast too often, and so a Vicious Circle is set up ; and what you have to set yourself to do is to break that Vicious Circle by seeing that the child is fed regularly by the clock, and not at irregular intervals.”³

¹ Constipation and Allied Intestinal Disorders, pp. 56, 186.

² Nothnagel, Diseases of the Intestines and Peritoneum, p. 367.

³ Hutchison, Lectures on Diseases of Children, 1910, p. 59.

Sprue. Manson has drawn attention to a "Vicious pathological Circle" associated with sprue, especially as met with in the half-starved Eastern populations. Digestion and assimilation are early affected, leading to the destruction of the mucous membrane of the alimentary canal. Food increases the irritation and accelerates the end :

"As a result of this destruction . . . digestion and absorption cannot be effected ; thus, so far from proving a benefit to the starving, good food and plenty of it does but precipitate death, inducing by its mechanical and chemical effects further irritative changes in the starved and eroded bowel."¹

Ankylostomes may start a very similar "fatal pathological Circle of famine changes."²

Biliary Calculus. The growth of biliary calculi is associated with the operation of a Circle. In whatever way the nucleus may have been primarily formed, its presence tends to provoke irritation and catarrh of the mucous membrane of the gall-bladder, causing disintegration of the epithelial cells, amongst which cholesterin, bilirubin-calcium and micro-organisms are usually deposited.

These adhere to the nucleus and increase its size, as a result of which ingravescent irritation and

¹ Allbutt and Rolleston, System of Medicine, Vol. II. (ii.), pp. 550, 557.

² Do., pp. 901, 903.

catarrh are excited, and so the process continues. It has been well described by Rolleston :

“ Although gall-stones are due to inflammation, of a comparatively mild character, of the gall-bladder, their presence disposes to fresh infection of the gall-bladder and thus to cholecystitis and to a Vicious Circle.”¹

Cholecystitis or empyema of the gall-bladder may be associated with another Circle. For the inflammation of the mucosa may extend to the cystic duct and thus lead to retention and putrefaction of bile. These putrefactive changes cause further swelling and even complete retention.

Spasm of Duodenum. Mansell Moullin believes that muscular spasm and irritation of the mucous membrane of the duodenum act and react reciprocally on each other. At times a definite ulcer may be present :

“ All that the pain really indicates is that there is an irritable hyper-responsive condition of the mucous membrane so that a stimulus which in ordinary circumstances would produce only a normal result, calls into play a reaction which is not only excessive in amount, but which persists and continues so long as the condition is present. If this goes on, if the spasm and contraction are kept up, it ends in the establishment of a typical Vicious Circle, the increased responsiveness of the mucous membrane intensifying the muscular spasm, and the increased muscular spasm irritating the mucous membrane still more by crushing the tender surfaces together. It is the formation of this Vicious Circle that holds the secret not only of the symptoms that are present in what is commonly known as duodenal ulcer, but of the reason why they are relieved with such certainty and success by the operation of gastro-enterostomy when all else has failed.”²

¹ Diseases of the Liver, 1905, p. 746.

² *Lancet*, 1912, Vol. I., pp. 564, 566.

Appendicitis. Appendicitis is often complicated by morbid correlations. For example, inflammation may cause some obstruction of the duct and the secondary retention of secretions. Such retention in its turn aggravates congestion and obstruction of the duct. Progressive accumulation and congestion then result, until a completely closed cystic cavity is formed. The retained matters also excite inflammation of the muscular walls and diminish peristalsis, thus promoting further retention.

Similar correlations may be associated with chronic appendicitis leading to fibrosis. Thus Battle and Corner write :

“Fibrosis of the appendix interferes with the completeness of its peristaltic action, and as a result the tube will become incapable of emptying itself. By these means a Vicious Circle is established in that more pabulum remains within for the bacteria to flourish upon, and the more bacteria flourish, the more likely it is that chronic inflammation will progress, and the organ become still more incapable of performing its own evacuation. Such a condition may be called appendicular constipation. The inspissation of the contents will lead to the formation of an appendicular calculus or fæcal concretion, which may be likened to scybala elsewhere in the large intestine.”¹

Appendicular calculi are formed in much the same way as biliary, renal or other calculi. Some fæcal or other concretion supplies a nucleus which sets up irritation and ulceration of the mucosa. The resulting

¹ Surgery of the Diseases of the Vermiform Appendix, pp. 36, 41-2.

secretions adhere to, and lead to the progressive enlargement of, the concretion, which then sets up increased irritation.

Typhlitis. Another Circle may be associated with typhlitis, and is often due to the escape into the cæcum of toxic matters from the appendix :

“ The Vicious Circle results from the fact that the inflammatory condition will impair the contractile power of the cæcum, and so lead to further bacterial growth and further chronic inflammation. In this way a colitis may be established throughout the whole length of the large bowel.”¹

And again :

“ Owing to the ‘rest’ of the products of digestion in the cæcum, . . . the fermentative processes initiated in the appendix will proceed to further stages in the cæcum. As a result a secondary subacute or chronic typhlitis is started which leads to interference with the muscular action of the cæcum and further retention of the contained fermenting fæcal mass. In this way a Vicious Circle has been started, and the processes and their results may extend along the colon from segment to segment.”²

Colitis. The close connection between the intestines and the central nervous system is seen in membranous colitis with its frequent nervous complications. The local and the neurotic condition appear often to play into each other’s hands, as Mathieu points out :

“ In cases of muco-membranous colitis . . . a true Vicious Circle appears often to be present. The neurasthenia and the colitis react on and aggravate each other.”³

¹ The Surgery of the Diseases of the Appendix Vermiformis, p. 37.

² Do., p. 67.

³ Traité des Maladies de l’Estomac et de l’Intestin, pp. 288, 304 ; cf. also *British Med. J.*, 1906, Vol. I., p. 1333 ; 1911, Vol. I., p. 139.

And again :

“ The colitis, the pain and the nutritive disorders create and perpetuate the neurasthenia. The neurasthenia in its turn aggravates the colitis. A Vicious Circle is present.”

Paresis of Colon. When peristalsis is diminished owing to dilatation or sluggish action of the colon, a Circle is established through the dryness of the scybala. Thus fæcal stasis is both the cause and effect of fæcal stasis :

“ The longer fæcal material is delayed in its passage along the colon, the harder will it become, owing to the absorption of water by the bowel walls ; and the harder it becomes the less easily will it be driven on by peristalsis, so that a Vicious Circle is soon established.”¹

Ascites. Mention has already been made of the Circle associated with a failing heart and an impure blood-supply due to visceral congestion and stasis. If the stasis is so severe as to lead to ascites, the abnormal pressure conditions will aggravate the heart failure and thus cause grave peril to life. The ascitic effusion, by pressing on the renal veins, may also impede the excretion of urine ; the impeded excretion further increases the ascites.

¹ Mummery, Diseases of the Colon, p. 219.

V.—CIRCLES ASSOCIATED WITH THE RECTUM AND ANUS

Some Circles associated with constipation have already been alluded to in the previous Section. Others are specially associated with the rectum and anus.

Constipation. Constipation is often due to the habitual disregard of the call to defæcation, with the effect that the defæcation reflex becomes blunted, leading to atony and paresis of the rectal walls. In the worst cases considerable dilatation of the rectum is produced, followed by increased constipation.

If fæces remain long in the rectum, much of the contained liquid undergoes absorption, giving rise to dry and scanty scybala. In course of time these scybala may cause obstruction and further increase the constipation.

Dyschezia. Persons suffering from a prolapsed ovary, a tender retroverted uterus, anal fissure, or inflamed piles, sometimes voluntarily inhibit defæcation on account of the pain involved in the act. This leads to constipation and dyschezia which may increase the primary lesion.¹

¹ Trousseau, *Clinical Medicine* (N.S.S.), Vol. IV., pp. 187, 199, 201.

Dyschezia is sometimes associated with an S-shaped rectum, the loop of the S being pressed together and accompanied by lateral elongation. The condition is apt to be progressive, since the straining at stool increases the deformity and this the straining.¹

Neurasthenia. Strümpell draws attention to the occasional connexion between neurasthenia and constipation :

“ The nervous affection . . . is often probably the primary disease, which is followed by constipation, while in other cases the habitual constipation leads secondarily to the nervous depression. The two conditions usually form a Vicious Circle, since each of them is able to keep up and to increase the other.”²

General lassitude and constipation are closely related. The following are links in an unending chain : lassitude, insufficient exercise, inadequate perspiration, inadequate consumption of liquid, constipation, lassitude.

Dyspepsia. At other times dyspepsia and constipation form a Circle. Thus Hertz writes :

“ In many cases, in which dyspepsia is associated with constipation, there is a Vicious Circle at work. Owing to the anorexia produced by the constipation too little food is taken : this not only aggravates the constipation, but it also tends to produce atonic dyspepsia, both of which conditions react harmfully on each other.”³

¹ *Proc. Royal S. of Medicine*, 1911, Vol. V. (*Electro-Therapeutics*), p. 30.

² *Textbook of Medicine*, 1887, pp. 402-3.

³ *Constipation and Allied Intestinal Disorders*, p. 182. Some rarer correlations are mentioned on pp. 131, 167, 168, 177, 250.

Fissure of the Anus. The irritation and spasm associated with fissure of the anus often complicate each other :

“As a result of the constant motion and distention, and by lodgement of particles of fæces in the vent, continued irritation is set up, which in turn occasions spasm of the sphincter. The spasm once started, the irritation is increased and so a Vicious Circle is established, and the result is that the ulcer is never allowed to heal.”¹

Treves, although quoting this Circle, does not accept spasm as a causal factor. In his opinion the fissure originates in injury to the anal valves due to hard fæces, the sore being reopened and possibly extended by subsequent motions.

Prolapsus Ani. Two Circles may complicate prolapsus recti. Prolapse causes tenesmus : result of the tenesmus—increased prolapse. Prolapse also causes relaxation of the sphincter : result of the relaxation—increased prolapse :

“The more the bowel comes down, the more is the sphincter stretched and relaxed, and the increasing atony favours the repetition of the prolapse.”²

Strangulation of Piles. At other times a different sequence is observed. Prolapsed piles may

¹ Treves, System of Surgery, Vol. II., p. 754.

² Edwards, Diseases of the Rectum, Anus and Sigmoid Colon, p. 367.

become strangulated and cause so much irritation as to induce spasm of the sphincter. The spasm increases the strangulation. Thus Mathieu writes :

“Hæmorrhoids are common in persons who suffer from constipation and in their turn provoke further constipation.”¹

Oxyurides. An infective Circle occurs in persons whose rectum is infested with oxyurides. The itching and scratching at the anus lead to the helminths or their ova being caught under the nails, conveyed to the mouth, and swallowed by the host. From the stomach the ova reach the intestines and rapidly attain maturity. Thus the irritation ensures by auto-infection successive generations of the parasite. Fertile ova are readily found under the finger-nails of the oxyuris host, and Cabot believes that fresh infection takes place almost every day or even every night.² Possibly there may be infection by an ascending current during the act of vomiting.³

Pruritus Ani. This forms a very troublesome neurosis especially in predisposed persons. The pruritus leads to scratching and the scratching intensifies the itching. As Treves says :

“The itching is so intense that it is impossible to avoid scratching, which, instead of giving relief, only adds to the trouble.”⁴

¹ Maladies de l'Estomac et de l'Intestin, p. 182.

² Modern Clinical Medicine, p. 551.

³ Debove, Achard and Castaigne, Maladies du Tube Digestif, Vol. II., pp. 306, 327.

⁴ System of Surgery, Vol. II., p. 793.

Rectocele. Another Circle is established during the progressive development of a rectocele such as is common in women. As the fæces collect in the sac formed by the bulging anterior rectal wall, great straining at stool is required to expel the fæces. This straining increases the size of the pouch, leading to further lodgment and increased straining.

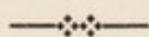
Enough has been said to indicate the frequency of Circles in disorders of the digestive system. The list, however, is far from exhausted; for disorders of digestion are so closely and reciprocally associated with other disorders of the body that disturbance of the equilibrium existing between them radiates far and wide, cause and effect reacting continuously on each other.

The study of these correlations throws fresh light on the famous aphorism of Hippocrates :

*Συμπαθία πάντα· κατὰ μὲν οὐλομελίην πάντα,
κάτα μέρος δὲ τὰ ἐν ἐκάστῳ μέρει μέρεα πρὸς
τὸ ἔργον.*¹

¹ "The whole body sympathises with every member, and every member with the whole, throughout its structure."
Περὶ τροφῆς, § 23.

Chapter Six



Circles associated with the Urinary System



THE Circles associated with the urinary system are of much interest owing to their number and variety (Fig. V.). Illustrations of the organic, mechanical, neurotic and chemical forms may be found in abundance, many of them possessing great clinical importance.

We shall deal in order with :

- I. Circles associated with the Kidneys.
- II. Circles associated with the Ureters.
- III. Circles associated with the Bladder and Prostate.
- IV. Circles associated with the Urethra.

I.—CIRCLES ASSOCIATED WITH THE KIDNEYS

The reciprocal correlations existing between the kidneys and their fellow-organs are so intimate that Circles are readily established by disease.

Nephritis. For example, when the blood is unduly charged with toxic matters it impairs the nutrition and efficiency of the renal epithelium. Impaired nutrition and efficiency in turn keep the blood impure and complete the Circle, which is indeed frequently a cause of death, in spite of all the resources of medicine.

Adami thus describes the condition :

“ Functional inadequacy of the kidneys is not without its effect upon the composition of the blood. The quantity of water eliminated may deviate considerably from the normal, and waste products may be retained instead of excreted. The quality of the blood is thus depreciated, and, being laden with toxic substances, it in turn exerts an irritating and deteriorating effect upon the kidneys. In this way a Vicious Circle is set up, as a result of which the condition of the patient goes rapidly from bad to worse.”¹

In some case of nephritis there is reason for thinking that destructive changes in the renal epithelium cause an excess of an internal secretion from the kidneys (renin) to be cast into the circulation and in turn to damage the renal tissues. Chauffard and Læderich write as follows :

“ There can be no doubt that certain alterations in the renal cells may give rise to toxic matters, which in their turn perpetuate these alterations and create a true Vicious Circle, the effect of which is a more or less indefinite continuance of the nephritis.”²

¹ Principles of Pathology, Vol. II., p. 735.

² Brouardel et Gilbert, *Maladies des Reins*, p. 166.

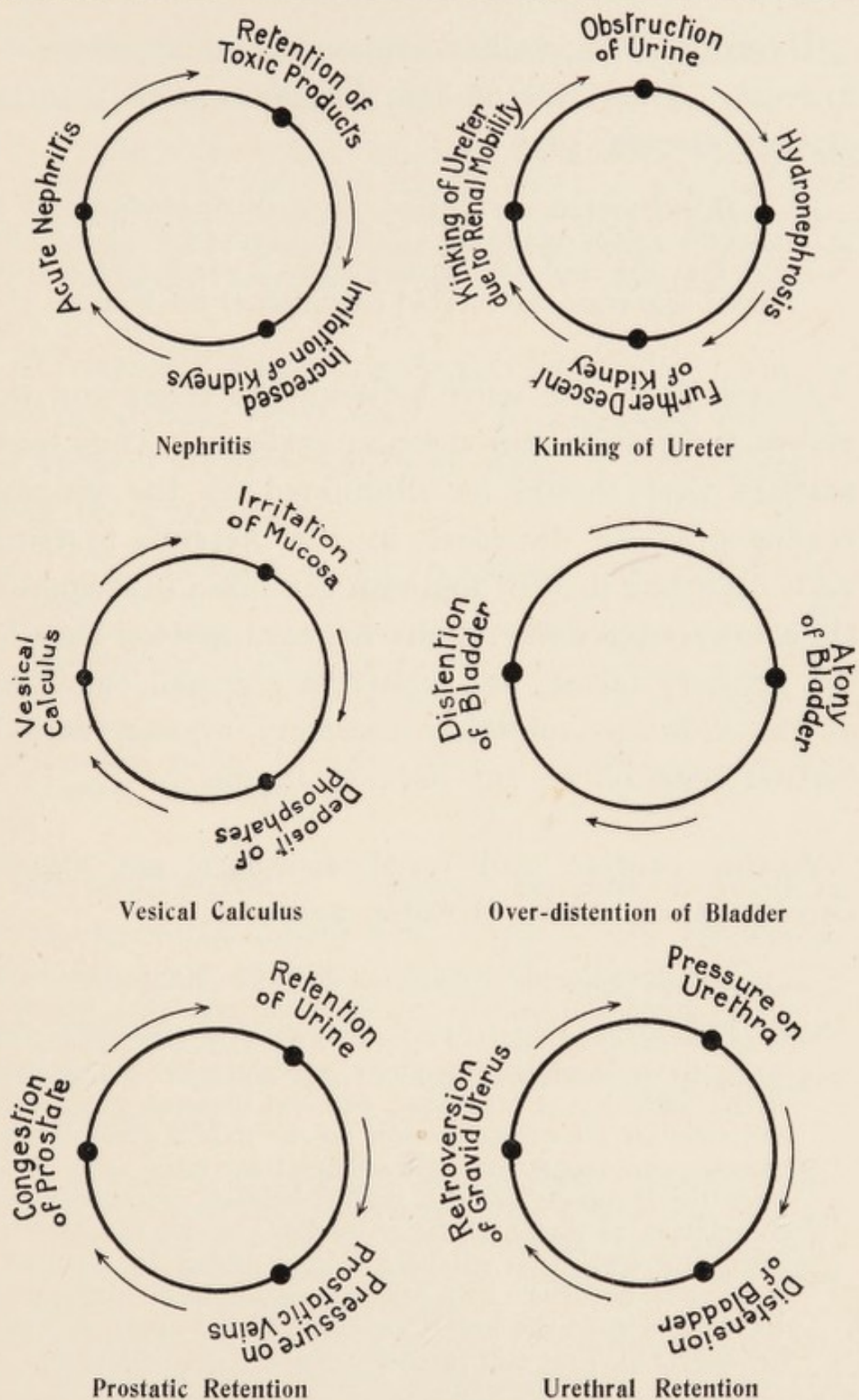


Fig. V.—Circles associated with the Urinary System

Uræmia. A similar explanation may apply to uræmia. Thus Garrod, in discussing the theories of that disease, says :

“ It has been suggested that the tendency to chronicity in renal diseases is due to the establishment of a Vicious Circle, and that the nephrolysins formed as a result of the renal lesions aggravate the morbid condition of the kidneys.”¹

Correlations also exist between the renal and the nervous, digestive and vascular systems. Thus toxic matters that should be eliminated by the kidneys readily provoke disorders in the nervous system ; such disorders in turn increase the renal inadequacy. Or a lowered activity of the nervous system may be the primary factor, and induce a sluggish condition of the kidneys and other excretory organs, with a further reaction on the nervous tissues.

Again, cardiac and renal disorders are closely correlated, as Lauder Brunton points out :

“ The disordered circulation disturbs the functions of other organs, and these in turn make the circulation worse. . . The disordered circulation interferes with the functions of the lungs, liver, stomach, intestines and kidneys. On account of the difficulty of breathing, exercise becomes impossible, and thus all the accessory aids to circulation given by the muscles and fasciæ during movement are done away with. Appetite becomes lessened and flatulence increases ; the elimination of waste products by the kidneys is interfered with, and distention of the abdomen either by flatulence alone or by flatulence with ascites, presses the diaphragm up, encroaches upon the breathing space in the lungs, and tilts the heart up, thus still further increasing its difficulties.”²

¹ Osler and Macrae, System of Medicine, Vol. VI., p. 90.

² Therapeutics of the Circulation, p. 129.

Especially interdependent are the liver and the kidneys, both in health and disease :

“ The kidneys and the liver, the principal eliminating organs of the body, are closely related by a physiological synergy and a pathological solidarity. Hepatic insufficiency can determine renal changes ; experiment shows that renal insufficiency may induce reactions and lesions in the liver.”¹

Cirrhosis. Hare attributes the thirst that is associated with renal cirrhosis to increased diuresis, “ a distinctly appreciable and highly Vicious Circle ” being in operation :

“ The Circle comprises continuous vaso-constriction : deficiency of water in the tissues : thirst : increased ingestion of water ; and increased diuresis. The water drunk does not adequately relieve the thirst, since it fails, on account of the peripheral vaso-constriction, to flush adequately the tissues and thus to remove the essential cause of the thirst : in other words, the water drunk is largely short-circuited through the kidneys.”²

Hydronephrosis. Shattock describes a Circle in which hydronephrosis and polyuria are associated with idiopathic dilatation of the bladder, the obstruction arising not from organic changes but from disordered innervation. After discussing alternative theories he says :

“ Far more probably the polyuria results from the hydronephrosis, and there being a persistent obstruction a Vicious Circle arises, in which the hydronephrosis brings about polyuria and the resulting polyuria brings about a further increase in the hydronephrosis.”³

¹ Osler and Macrae, System of Medicine, Vol. VI., pp. 169, 325, 327.

² Food Factor in Disease, Vol. II., p. 332.

³ Proc. Roy. S. of Medicine, 1909, Part III. (Pathology), p. 97.

Movable Kidney. In neurasthenic women chronic ill-health may be associated with a movable kidney. The over-sensitive nervous system renders the sufferer unduly conscious of the abnormal mobility, while the persistent ache renders the nervous system more and more sensitive. Osler thus expresses the idea : " It is well never to tell a patient that a kidney is movable ; the symptoms may date from a knowledge of the existence of the condition." ¹

Renal Calculus. Reciprocal conditions may be established in connection with renal calculi, which originate with the deposition in the urinary passages of some colloid or albuminous matter such as mucus, blood or pus. Within the meshes of this organic framework uric acid (or other substance) is entangled and agglutinated into a nucleus, with consequent irritation of the lining membranes. The irritation leads to further exudation of the colloid substance, and this in turn attracts fresh deposits and causes fresh irritation. And so the process continues, while the stone gradually increases in size. Secondary renal calculi, on the other hand, result from an infective process in the kidney, generally associated with stagnation of the urine. Under such conditions phosphates are readily precipitated, the resulting concretion forming the nucleus of a calculus. This nucleus in turn causes irritation of the mucous membrane and the exudation of muco-pus, and thus readily gathers about itself fresh phosphates.

¹ Principles and Practice of Medicine, 1905, p. 530.

Increased Diuresis. An accumulation of urine in the bladder, if at all considerable, may affect the renal secretion, as a result partly of reflex action, partly of mechanical tension. The accumulation of urine increases the renal secretion, which increase in turn aggravates the accumulation.¹

Diminished Diuresis. In severe cases of ascites a mechanical Circle is sometimes formed. For the secretion of urine may be interfered with by pressure on the renal veins or on the ureters.² Such interference in turn increases the ascites and completes the Circle. Thus Romberg writes :

“Ascites may obstruct the escape of blood through the renal veins, and by thus retarding the circulation through the kidneys may diminish diuresis. An important Circulus Vitiosus may be established in this way, unless the œdema and transudations can be got rid of.”³

Again, ascites excites thirst, the gratification of which may increase the dropsy. In the words of Horace : “*Crescit indulgens sibi dirus hydrops.*”⁴

¹ Guyon, Leçons Cliniques sur les Maladies des Voies Urinaires, Vol. I., pp. 86, 94 ; Desnos and Minet, Maladies des Voies Urinaires, p. 854.

² Brunton, Therapeutics of the Circulation, p. 149 ; Figs. 178, 179.

³ Krankheiten des Herzens und der Blutgefässe, p. 282.

⁴ Odes, II., 2.

II.—CIRCLES ASSOCIATED WITH THE URETERS

Kinking of Ureter. In hydronephrosis and in pyonephrosis the ureter may be involved in the reciprocally progressive lesions. An example occurs where undue mobility of the kidney is accompanied by twisting or kinking of the ureter, causing some obstruction to the escape of urine. As the renal pelvis and calyces become distended, the whole kidney increases in size and weight, and descends further in the abdomen, thereby aggravating the kink or twist.

Abnormal Insertion. The insertion of the ureter into the hilum may be so high as to leave a pouch lying below the point of insertion and always full of urine. Cases are on record in which a pouch of this kind compressed the ureter, causing further distention and further compression. Valvular folds and other abnormalities may also at times lead to reciprocal reactions. Or the opening of the ureter into the bladder may be abnormally small, impeding the flow of urine, and giving rise to a sacciform dilatation. This dilatation may in turn further diminish the opening, and thus complete the Circle.

Calculus in Ureter. A renal calculus in its progress towards the bladder may block the ureter, and set up inflammation of the mucous lining. This

may aggravate the obstruction, and, owing to stagnation of urine, cause an increase in the size of the stone.

If retained for a length of time the calculus gives rise to a diverticulum of the ureter in which stagnant urine accumulates. This also leads to growth of the calculus and in time to enlargement of the diverticulum.¹

Dilatation of Ureter. Matthews Duncan draws attention to a curious condition in which obstruction of the ureters due to polyuria provokes frequent micturition, this in its turn intensifying the obstruction :

“ In cases of diabetes insipidus the ureters are often found dilated, as also the kidneys. This curious circumstance seems to be explained by some recent observations which almost prove that the disease known as wetting of the bed in children is the cause in some cases of dilatation of the ureter and of the kidney, and of danger and even death. This wetting of the bed or frequent urination in children is far from being a complaint to be considered as altogether of trifling importance. In these cases retention in the ureter may occur, and it is explained by supposing that contraction of the bladder leads to the frequent urination, and also to closure of the vesical orifices of the ureters, produces dilatation of them, dilatation of the kidneys and danger of death. This theory will also apply to diabetes insipidus ; and if it is so, you have another example of the Vicious Circle. There is a large quantity of urine, which leads to frequent urination : frequent urination leads to obstruction of the ureters at their vesical orifices, and partial obstruction of the ureters leads to excessive secretion ; the excessive secretion requires frequent emptying ; the frequent emptying produces obstruction of the ureters ; and the obstruction of the ureters leads to excessive secretion, and so on.”²

¹ *British Med. J.*, 1912, Vol. I., p. 5.

² *Clinical Lectures on the Diseases of Women*, p. 82.

III.—CIRCLES ASSOCIATED WITH THE BLADDER AND PROSTATE

Prostatic Retention. A striking example is presented by retention of urine caused by prostatic hypertrophy. The venous plexuses surrounding the prostate are always of ample size and undergo further dilatation in elderly men. This explains how it is that when an enlarged prostate becomes congested, a considerable increase in the size of the gland results, sufficient in many cases to cause complete retention. The pressure of the accumulated urine in turn aggravates the venous engorgement, these two factors acting reciprocally on each other.

J. L. Joyce has observed a marked diminution in the size of the prostate as soon as the bladder had been evacuated by catheterisation.

Desnos and Minet thus describe the mechanism of prostatic retention :

“ The mechanism of the retention is clear. The rapid increase in size of the lateral lobes brings them into contact, the whole gland being compressed by the periprostatic plexuses. Above all the congested and œdematous mucosa forms a plug which obstructs the neck of the bladder. . . . Meanwhile urine is accumulating behind the plug and distending the bladder. The pressure of the liquid in this reservoir further aggravates the venous congestion, until the obstruction at the neck of the bladder becomes insuperable.”¹

¹ *Maladies des Voies Urinaires*, 1909, p. 411 ; cf. also Guyon, *Leçons Cliniques sur les Maladies des Voies Urinaires*, Vol. II., p. 397 *et seq.*

In some forms of prostatic hypertrophy the enlarged lobe falls over and closes the urethral orifice like a ball-valve, as soon as the bladder contracts. The more vigorous the contraction, the more tightly is the orifice closed ; the tighter the closure the greater the contraction.

Cystitis. There are various conditions, such as residual urine, that cause congestion and irritability of the neck of the bladder associated with increased frequency of micturition. This in turn aggravates the congestion, as Mansell Moullin points out :

“The tissues become more and more swollen. The epithelium becomes abraded, or perhaps a small fissure is formed ; the neck of the bladder becomes the seat of an intense burning pain, which is made infinitely worse by the spasmodic contraction of the muscles around it, and a Vicious Circle is established. The irritation at the neck of the bladder causes increased frequency ; and the increased frequency makes the irritability worse, until at last the patient is reduced to a condition of the utmost misery.”¹

The decomposition of the urine so common in cystitis is an aggravating factor, owing to the carbonate of ammonia which is formed and which increases the cystitis :

“In cases of phosphatic gravel, the urine is ammoniacal, irritating and caustic to the mucous membrane of the bladder, the inflammation of which, by generating muco-pus, becomes in its turn a cause of alkalinity and of catarrh, forming thus a truly Vicious Circle in pathology, from which there is no exit without first altogether changing the composition of the urine.”²

¹ Enlargement of the Prostate, 1911, p. 125.

² Leroy d'Etiolles, *Traité de la Gravelle*, 1866, p. 510.

Sir Henry Thompson draws attention to a Circle that is frequently present when catheterism, although imperatively demanded by an incapable and inflamed bladder, intensifies the inflammation :

“ The cystitis on the one hand, and the catheterism on the other, exercise mutually inimical influences, and the patient becomes the victim of a Vicious Circle of actions, in which an absolutely indispensable remedy, the catheter, aggravates the inflammation of the bladder, which therefore, in its turn, demands the instrument with increasing frequency.”¹

Post-Prostatic Pouch. In cases of retention the wall of the trigone is apt to yield under the continual pressure, giving rise to a thin-walled post-prostatic pouch. When once formed, this pouch leads to further retention of urine, to increased effort during micturition, and this in turn to further bulging. Occasionally the pouch has assumed dimensions equal to those of the bladder itself.

Atony of Bladder. Where retention has led to atony of the bladder, we meet with another example of forces moving contrariwise :

“ Prolonged or repeated retention, with overstretching of the organ, from any cause whatever, results in weakening of the detrusor muscles, reducing their contractibility and producing the condition called atony ; while, on the other hand, atony itself contributes to further retention by reason of the inability of the weakened muscles to expel the urine. Thus is established a Vicious Circle that forms the intimate relation between the two conditions.”²

¹ Clinical Lectures on Diseases of the Urinary Organs, p. 147.

² Keen, Surgery, Vol. IV., p. 299.

At other times debility of the detrusor muscle may be the primary factor :

“ Retention of urine may arise from debility in the detrusor muscle of the bladder, which will be further enfeebled by the distension occasioned by an accumulation of urine.”¹

Lithotrity. Guyon draws attention to complications that were common in former days when lithotrity was prolonged over several sittings. Cystitis necessitated lithotrity, while the resulting fragments of crushed stone increased the cystitis :

“ In former days when lithotrity was performed at short and numerous *séances* without chloroform, the fragments of crushed stone were left in the bladder. These more or less jagged fragments were often of considerable size and increased the irritation caused by the manipulations, which were done without any attempt at anæsthesia. Indeed the fragments caused far more irritation than did the original calculus. Attacks of cystitis followed, which were difficult either to avoid or to deal with, since they were directly due to curative treatment, and since their treatment always required a more or less considerable number of *séances*. There was no possible escape from this Vicious Circle.”²

Prostatitis. A Circle may be present in acute prostatitis, when the abdominal straining to pass water increases the pressure on the urinary tract, and thus leads to a greater obstruction and straining :

“ The violent contractions of the abdominal muscles provoked by the dysuria exert an injurious pressure on the inflamed gland, which in its turn further compresses the urethra, and thereby adds to the sufferings due to the dysuria. As a result of this *Circulus Vitiosus* the patient may be brought into a state almost of despair.”³

¹ Abernethy, Surgical and Physiological Works, 1830, Vol. III., p. 307.

² La Vessie et la Prostate, p. 699.

³ Fürbringer, Die Krankheiten der Harn-und Geschlechtsorgane, p. 313.

Vesical Calculus. Some interesting reciprocal relations are established during the growth of a vesical calculus, whether such calculus has descended from the kidney or was primarily formed in the bladder. If a small nucleus slips into a healthy bladder, just enough irritation may be provoked to cause the calculus to be surrounded with an envelope of mucus in which successive layers of crystals are deposited. The growth of the stone then proceeds in an acid medium, the film of colloid being ever ready to attract fresh crystals of uric acid (or other substance) from the urine by molecular coalescence, while the enlarging stone keeps up the irritation and causes more and more mucus to be secreted.

Sooner or later, however, bacterial infection generally ensues, leading to cystitis and the precipitation of phosphates. The film of mucus then becomes a nidus for the deposit of phosphatic accretions, and the growth of the calculus proceeds in an alkaline medium. The growing calculus increases the irritation, while the irritation leads to further deposits of phosphates, thus adding to the size of the concretion. A very similar Vicious Circle of events is present when the concretion is *ab origine* a vesical one, resulting from the deposition of phosphates.

Where bacterial infection supervenes in connexion with a calculus a further Circle is established, since the micro-organisms provoke ammoniacal fermentation and increased cystitis. Fresh pabulum is thus supplied to the invaders, adding to their powers of multiplication. Moreover the alkaline salts formed

during cystitis constitute a further source of irritation, as Skene points out :

“ The irritant effect of these salts, really deposits of foreign bodies, on the inflamed mucous membrane completes the Vicious Circle, the effect now aiding the original cause.”¹

Irritable Bladder. A neurotic Circle is occasionally met with in which impaired tone results from and also produces an irritable bladder. Reginald Harrison speaks of persons who, in view of an imaginary inconvenience they may be temporarily exposed to during a long railway journey, go on for days previously micturating every few minutes. They thus acquire a habit which may be permanent.²

A somewhat similar neurosis due to exaggerated reflex irritability is met with in nocturnal enuresis. Some temporary derangement may start the habit, and this, if frequently repeated, may so act on the impressionable nervous system of a child as to persist after the removal of the exciting cause. Many such habit Circles are met with.

IV.—CIRCLES ASSOCIATED WITH THE URETHRA

Retention of Urine. The obstetrician meets with a Circle caused by a retroverted gravid uterus pressing on the urethra, and thus leading to retention of urine and increased retroversion. At other times the retention of urine is the primary and the retro-

¹ Pepper and Starr, System of Practical Medicine, Vol. IV., p. 341.

² Lectures on the Surgical Disorders of the Urinary Organs, p. 191.

version the secondary factor. Pouliot thus describes the condition :

“ The retroversion, when once complete, causes such retention of urine as in most cases to establish a Vicious Circle. The distended bladder pushes the uterus further back. The uterus, being tilted into Douglas's pouch, prevents micturition, and the Circle can only be broken by an artificial evacuation of the bladder.”¹

Congestion of Urethra. In acute gonorrhœa the urethral mucous membrane may be so inflamed as to lead to retention of urine. Such retention in turn aggravates the congestion of the lower urinary tract and increases the urethral obstruction. The more prolonged the retention the greater the swelling of the mucous membrane, and *vice versa*. The severe straining associated with tight strictures and with retention sets up a similar hyperæmic condition of the urethra and aggravates the stricture.

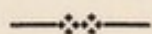
Urethrocele. With congenital or other strictures of the urethra it is not uncommon to find extensive retro-strictural dilatations. These dilatations contain decomposing urine, and sometimes a calculus, and may be so situated as to press further on the strictured urethra, or to provoke dysuria. Thus the dysuria is both cause and result of the dilatation.

Urethroceles may also arise from catarrh of the urethra through relaxation of the walls and the gradual separation of muscular fibres. Little by little the urine pushes aside the weakened tissues and forms a sac in which urine accumulates. Decomposition soon follows, and helps to increase the urethritis.²

¹ *Annales des Maladies Génito-Urinaires*, 1909, p. 5.

² Thomas, *Diseases of Women*, p. 238.

Chapter Seven



Circles associated with the Sexual System



THE intimate relations that exist between different portions of the sexual system, as well as between the sexual and the other great systems of the body, would on *a priori* grounds lead us to expect the presence of numerous Circles when disease attacks the sexual organs. Such in fact is the case (Fig. VI.).

The two sexes will be dealt with separately.

I.—CIRCLES ASSOCIATED WITH DISORDERS IN THE MALE

Masturbation. A common example is presented by neurasthenia associated with sexual malpractices. Oppenheim writes thus :

“ In many cases we have a Vicious Circle ; the tendency to masturbation is in itself a symptom of neuropathic diathesis, and the masturbation again gives rise to a crowd of nervous disorders.”¹

¹ Textbook of Nervous Diseases, tr. by Bruce, 1911, Vol. II., pp. 1125-6.

Müller also describes the morbid process :

“ In neurasthenic persons of both sexes, especially if unmarried, there is a tendency to satisfy the sexual instinct by means of masturbation. Indeed it is often difficult to decide whether the masturbation should be regarded as a result or as a cause of the sexual neurasthenia, since a *Circulus Vitiosus* has generally been established.”¹

Spermocystitis. A somewhat similar condition is associated with sexual vice, which begets a craving for excessive indulgence. Spermocystitis and chronic prostatitis frequently result from such sexual excess, which is in its turn perpetuated.²

Posterior Urethritis. Fürbringer draws attention to the close connection between *congressus interruptus* and posterior urethritis, with which *spermatorrhœa* is often associated, the two aggravating each other :

“ A condition of *spermatorrhœa* or of too facile pollution is almost invariably provoked ; moreover in addition to the sexual neurasthenia a chronic state of irritability of the posterior urethra is brought on, which gives rise to a *Circulus Vitiosus*.”³

¹ *Neurasthenie*, p. 181.

² *Twentieth Century Practice*, Vol. VII., p. 626 ; *Bangs and Hardaway, Genito-Urinary Diseases*, Vol. II., p. 608.

³ *Störungen der Geschlechtsfunctionen des Mannes*, p. 41.

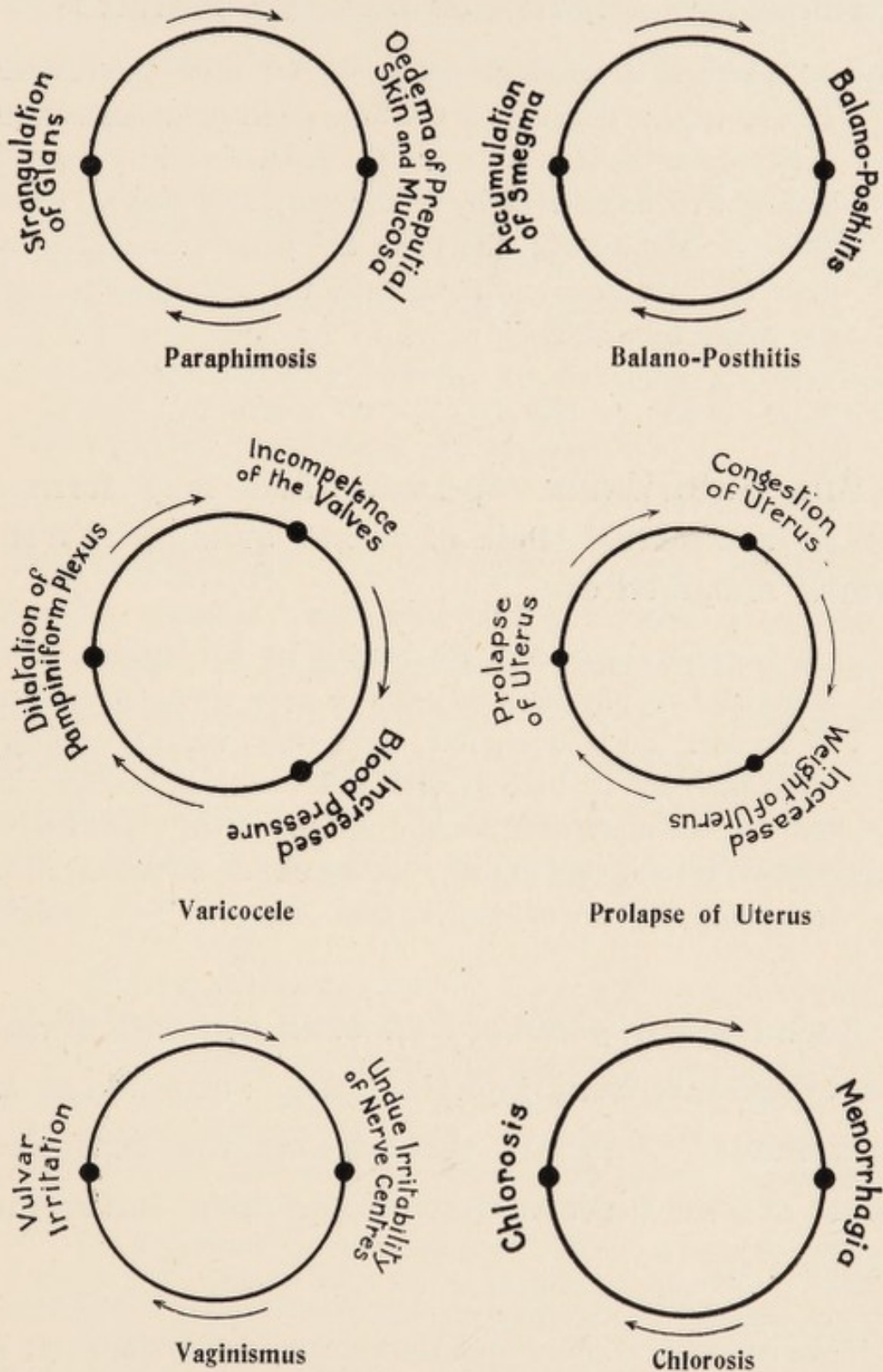


Fig. VI.—Circles associated with the Sexual System

Sturgis lays emphasis on the same disorder :

“ There is a constant hankering for more intercourse. This inordinate desire gives rise to more frequent copulation, until hyperæsthesia is set up in the prostatic urethra, which is sought to be relieved by more coitus, and thus a Vicious Circle is established ; the more the patient copulates the more the irritation, and the greater the irritation the more the desire for coition.”¹

Spermatorrhœa. Spermatorrhœa may form a factor in a morbid chain of events, quite apart from sexual malpractices :

“ Occasional seminal discharges in the healthy and unmarried are physiological—that is, they are not symptoms of disease. Such involuntary discharges, when excessively frequent, may be both results and causes of disease, indicating an abnormal, usually an exhausted state of the nervous system, and in turn reacting on the nervous system, increasing the very exhaustion that caused it.”²

Such frequent pollutions are often met with during convalescence from typhoid, acute rheumatism or pneumonia. They are then due to the exhausted state of the nervous system and help further to exhaust it.³

¹ Prostatorrhœa Simplex and Urethrorrhœa ex Libidine, *J. of Cut. and Genito-Urinary Diseases*, New York, 1898, Vol. XVI., p. 270.

² Beard, *Nervous Exhaustion*, p. 70.

³ Löwenfeld, *Neurasthenie und Hysterie*, p. 79.

Occasionally spermatorrhœa is associated with insomnia, debility and neurasthenia, which react on each other :

“ The emissions are most usually associated with, and probably result from, erotic dreams and images, which often disturb sleep ; and as the patient’s mind may be at the same time worried by the emissions which he fears, and of which he is ashamed, a definite insomnia may result. And as insomnia naturally depresses his energies and lowers his resistance, a Vicious Circle is established, which can easily produce the intensest form of neurasthenia.”¹

Hyperæsthesia of Urethra. Any irritation along the genital tract, whether gonorrhœal or not, may establish reciprocal relations between that tract and the erection and ejaculation centres. Peripheral irritation renders the sexual centres unduly sensitive, while these latter in turn increase the hyperæsthesia of the urethra, especially of its prostatic and bulbous sections :

“ It must always be borne in mind that any peripheral irritation in the sexual tract of the male, whatever the cause, . . . reacts on the ejaculation centre and induces a chronic state of increased irritability. This condition of irritability also spreads to the erection centre which is, both anatomically and functionally, so closely connected with the ejaculation centre. A Circulus Vitiosus is thus established, since the abnormal stimulation of the erection centre gives rise in its turn to peripheral hyperæmia and irritation, sometimes even to ejaculation, which again reacts injuriously on the centres.”²

¹ Holmes, *Practitioner*, 1911, Vol. I., p. 53.

² Nothnagel, *Specielle Pathologie und Therapie. Nervosität und Neurasthenische Zustände*, by Krafft-Ebing, p. 191.

Impotence. Impotence is often associated with a Circle, as pointed out by Morris :

“Some slight physical imperfection or want of general tone may give rise to a feeling or fear of impotence or of mistrust of self, or an exaggerated idea of the effects of past masturbation, or the memory of an unsatisfactory coitus may take possession of the mind, and an imaginary or false impotence will be the result. The mere thought that a sexual intercourse will be impossible or unsatisfactory is quite sufficient cause to make it so.”¹

Gonorrhœa. The hyperæmia and swelling of the urethral mucous membrane in gonorrhœa may be complicated by retention of urine. The swelling may at first merely render micturition difficult. But as soon as retention has occurred, the accumulated urine causes increased venous congestion of the urinary tract, and thus by aggravating the swelling completes the Circle.

Paraphimosis. A mechanical Circle may complicate paraphimosis, when the constricting preputial skin and mucous membrane lead to engorgement of the glans, and this engorgement causes the ring to grow tighter and tighter. In other words the strangulation leads to congestion, and this in turn aggravates the strangulation.

¹ Injuries and Diseases of the Genital and Urinary Organs, p. 43 ; Ziemssen, Cyclopædia of the Practice of Medicine, Vol. VIII., p. 891.

Balano-Posthitis. Corner points out a Circle that is established when the smegma under the prepuce is allowed to collect and decompose. Especially is this likely to happen where the preputial orifice is narrow :

“ The secretion decomposes and irritates both the glans penis and the prepuce, producing a chronic superficial balano-posthitis and a deeper chronic inflammation in the prepuce, causing its fibrosis and subsequent contraction on the glans penis. The meatus in it also becomes contracted so that it can no longer be withdrawn over the glans, and the secretions under it collect and ferment, producing further irritation. The greater the irritation of the glands by decomposing secretion, the greater the amount of secretion they produce. In this way a Vicious Circle is established.”¹

The phimosis causes retention of the smegma ; the retention sets up balano-posthitis and aggravates the phimosis.

Varicocele. In varicocele the tortuous and dependent veins of the pampiniform plexus are enlarged, while the valves become incompetent and their walls thinned, thus giving rise to a self-perpetuating condition. The larger the veins the greater the tension on their walls ; the greater the tension the more do the walls yield. Incompetence of the valves may supply a further aggravating factor.

Hydrocele. Hydrocele is another disorder in which morbid correlations may occur. Its main cause lies in a disturbance of the equilibrium between

¹ Male Diseases in General Practice, p. 398.

the fluid secreted into, and absorbed from, the tunica vaginalis. When the quantity of fluid secreted is increased, such increase may compress the effluent lymphatics and so lead to a further accumulation, much as occurs with a pleuritic effusion.

Or again the spermatic artery may, owing to arterio-sclerosis, be unequal to the task of driving the blood through the veins. Hence may result a venous congestion of the testicle and from time to time a hydrocele, leading in turn to further congestion.

II.—CIRCLES ASSOCIATED WITH DISORDERS IN THE FEMALE

Ill-Health. Owing to the greater sensitiveness of the nervous system in women, correlations between sexual disorders and the general health are more frequent than in the male. Thus Thomas writes :

“ It should not be forgotten by the gynæcologist that chronic local disease is often caused by a general depreciation of the system. . . . When such a result takes place the two states continue to react one upon the other. The depraved system increases the local disorder to which it has given rise, and the irritation, kept up by the latter, aggravates the degree of the former.”¹

Amand Routh refers to the same condition :

“ We have frequently to deal with a Vicious Circle, with local and constitutional states so interacting, that no real improvement is possible until both the general and local states receive their due share of attention.”²

¹ Diseases of Women, p. 56.

² Allbutt, Playfair and Eden, Gynæcology, p. 737.

Neurasthenia. Neurasthenia is a common form of ill-health associated with the sexual organs, as has been described by Faure and Siredey :

“ Women suffering from some disease of the sexual organs frequently shew signs of physical and moral depression which is closely allied to neurasthenia. Worn out by their sufferings, often anæmic through loss of blood or through prolonged confinement to the house, either in bed or on the sofa, these unfortunate women grow thin and feeble, and give way more and more to discouragement. They are now entrapped in a Vicious Circle, from which escape is difficult. Their neurasthenia induces dyspeptic disorders, and their malnutrition tends to aggravate their neurasthenia.”¹

Ovarian Hyperæsthesia. Ovarian pain is a common local complication, as Herman has described :

“ In chronic pelvic pain with neurasthenia effects follow one another in a Vicious Circle. The patient feels more severely the pelvic pain because her nervous system is too sensitive. The persistent pelvic pain keeps her nervous system weak and sensitive and further weakens it.”²

The menstrual nismus often increases the disorder :

“ Even when uncomplicated, prolonged hyperæmia may result in acute oophoritis or more often in chronic disease of the ovaries, which completes the Vicious Circle by increasing in its turn the periodical congestion which originally led to it.”³

¹ *Traité de Gynécologie Médico-Chirurgicale*, p. 396.

² *Diseases of Women* (1907), p. 86 ; *British Med. J.*, 1910, Vol. I., p. 183.

³ Mann, *System of Gynæcology*, Vol. II., p. 857.

Ovarian pain is also common after childbirth, especially in a woman who has borne children quickly :

“ These symptoms are those of nervous exhaustion produced by the strain on the nervous energy of pregnancy, labour and suckling, together with the worry and disturbed rest which the care of a young family involves. The morbid states form a Vicious Circle. Want of sleep exhausts the nervous system, and nervous exhaustion prevents sound sleep. Weakness of digestion due to nervous exhaustion impairs nutrition, and the discomfort after food helps to prevent sleep. The nervous exhaustion causes the pain, and the pain, in its turn, aggravates the nervous exhaustion, partly by the direct effect of the pain, partly because it suggests to the patient fear of worse evils to come.”¹

Uterine Disorders. Similar disturbance may be caused by uterine or vaginal disorders such as metritis, leucorrhœa and dysmenorrhœa, all of which may produce a state of ill-health which in turn reacts on the local disorder :

“ The gastric disorders often shew themselves at the same time as those of the uterus. The two affections progress side by side and react on one another. A Vicious Circle is established, and it is useless merely to curette the uterus or to treat the metritis in all sorts of ways. If your treatment stops here, you will fail or only obtain a temporary success.”²

In other cases the nervous or psychical condition suffers. For in the female even more than in the male do the mind and the body react on each other.

Chlorosis. Chlorosis, although usually a cause

¹ Herman, Diseases of Women, p. 79.

² Robin and Dalché, Traitement Médical des Maladies des Femmes, 1900, p. 27.

of scanty menstruation, at times leads to menorrhagia and metrorrhagia, which in turn aggravate the chlorosis. Matthews Duncan thus writes :

“ When a woman is chlorotic she fortunately has generally amenorrhœa, but if not, she will be very likely to have menorrhagia. And you have here an illustration of a Vicious pathological Circle. The menorrhagia increases the chlorosis, and, *vice versa*, the chlorosis aggravates the menorrhagia.”¹

Croom writes in the same strain :

“ These cases are amongst the most difficult to treat, because they interact in such a way as to produce a Vicious pathological Circle—the drain on the system by the hæmorrhage tending to aggravate the very systemic condition which, in its turn, leads to the menorrhagia.”²

It is difficult to account for the menorrhagia when the body can so ill spare the loss of blood. Possibly the explanation lies in the low specific gravity or coagulability of the blood or in a faulty nutrition of the capillaries.

Pruritus Vulvæ. A troublesome Circle may be set up by pruritus vulvæ. The irritation may be purely nervous, but it is more often due to some local disease.

¹ Lectures on the Diseases of Women, p. 124.

² Allbutt, Playfair and Eden, Gynæcology, p. 85.

In either case the severe itching leads to scratching, and the scratching abrades the skin and accentuates the itching :

“ Scratching produces temporary relief, and with it those changes in the tissues which themselves lead to scratching, so that a Vicious Circle is established. The scratching eases the itching for a time, but the very relief which is brought about is at the cost of minute changes in the tissues which cause further scratching.”¹

At times the irritation induces sleepless nights which aggravate the neurosis. Vulvitis associated with vaginal discharges may be complicated in much the same way, the consequent irritation and rubbing reciprocally provoking each other. The disorder is specially common in young girls :

“ The child experiences a more or less acute sense of burning and itching which compels it to scratch itself. The scratching merely serves to augment the inflammation.”²

Accumulation of Smegma. Correlations similar to those described in connection with balano-posthitis may occur in the female. If the smegma secreted by the vulvar glands is allowed to accumulate, decomposition, inflammation and excoriation of the mucous surfaces may result, leading to increased secretion and accumulation.

¹ Gibbons, *British Med. J.*, 1912, Vol. I., p. 471.

² Brocq, *Dermatologie Pratique*, Vol. I., p. 348.

Ulcers of the Vulva. Chronic ulcers of the vulva sometimes prove very rebellious owing to associated lymph stasis and hyperplasia of the tissues:

“As the inflammatory products from the ulcer reach the lymphatic glands, these glands may be more or less completely blocked. . . . The associated lymph stasis will in turn favour hyperplasia of the tissues while it delays or even prevents the healing of the ulcer. A form of Vicious Circle may be established in this way.”¹

Hypertrophy of Clitoris. Dudley draws attention to a Circle present in persons in whom the clitoris is enlarged and surrounded by redundant preputial skin. The hypertrophied skin exposes the clitoris and prepuce to friction, and thus gives rise to irritation, scratching and masturbation. This, in turn, leads to congestion and further enlargement of the clitoris and prepuce.²

Vaginismus. Vaginismus seems to depend on abnormal nervous excitability of the woman combined with irritability of the external sexual organs. The general and local conditions aid and abet each other, as Robin and Dalché point out:

“It matters little whether the general state of health is the cause or the effect of the local condition, for the two react on, and aggravate, each other in a Vicious Circle. Treatment must be directed to the nervous system, to the dyspepsia, to any visceral ptosis, to the anæmia, in fact to the entire organism which is out of order. Only when this is done will the local treatment of the vulvar irritation prove efficacious and permanent.”³

¹ Koch, *Archiv f. Dermatologie und Syph.*, Vol. XXXIV., p. 228.

² Gynæcology, p. 526.

³ *Traitement Médical des Maladies des Femmes*, 1900, p. 284.

Displacement of Uterus. Several Circles may be established when the uterus is congested and displaced, as A. R. Simpson describes :

“ These inflammations are sometimes the cause, sometimes the consequence of the displacement ; in either case the displacement and inflammation tend to perpetuate and to aggravate each other.”¹

The trouble is often due to a woman having been compelled to carry heavy weights. The primary prolapse leads to congestion and this causes increased prolapse :

“ The prolapse remains the sole cause for a short time only. Very soon increased weight of the uterus from congestion, enfeeblement of uterine supports from prolonged tension, and traction by falling of the hypertrophied vagina and prolapsed bladder complete the Vicious Circle.”²

Procidentia is even more injurious, since the veins of the broad ligaments are so compressed that the return of blood is impeded, resulting in œdema of the uterus.³ Procidentia is both cause and result of the congestion.

Goodell draws attention to reciprocal relations that may be established between the uterus, vagina and bladder, especially in connection with hyper-

¹ Allbutt, Playfair and Eden, Gynæcology, p. 197.

² Thomas, Diseases of Women, p. 383.

³ Sir J. Y. Simpson, Clinical Lectures on the Diseases of Women, pp. 753, 755.

trophic elongation of the supra-vaginal portion of the cervix :

“ It is a Vicious Circle throughout ; the prolapsing organ—say the vagina—tugs at the bladder, which yields, and in turn lends its weight towards the further descent of the former by alternately coercing and being coerced ; their united action at last begets the circular hypertrophy of the cervix ; the latter returns the favour by edging and nudging on the vagina, which responds by still more increasing the prolapse of the bladder and the hypertrophy of the cervix, and by aiding them in drawing out the supra-glandular portion of the cervix. Thus the reciprocation is kept up until the constantly elongating and growing cervix has attained length and weight enough to act aggressively.”¹

In some cases of hypertrophy of the vaginal cervix all the symptoms of a foreign body in the vagina may be present. Like a polypus the cervix keeps up vaginal irritation and induces expulsive efforts which in turn increase the descent and hypertrophy.²

Another Circle occurs where the elongated and protruding cervix is so strangulated by the vulvar orifice that the return of blood is obstructed. The strangulation leads to œdema of the cervix and this aggravates the strangulation.

Uterine displacements frequently give rise to back-

¹ Lessons in Gynæcology, p. 227.

² Barnes, Diseases of Women, p. 623.

ache and tempt a woman to spend many hours on the sofa. Such prolonged recumbency tends to enfeeble her muscular system and may perpetuate the displacement :

“ The unfortunate thing is that if the patients can lie down, they are continually lying down and thus we come into one of those Vicious Circles. For the lying down results in feebler muscles, and the more they lie down, the more they are subject to back-ache when they are on their feet.”¹

Dysuria. Prolapse of the uterus is often associated with displacement of the bladder, and with difficulty in micturition. This leads to straining and thus increases the prolapse, these two factors aiding and abetting each other :

“ The dislocation of the bladder makes micturition difficult, and the more the patient strains, if the uterus is not pushed up into the pelvis, the more the escape of urine will be hindered.”²

Salpingitis. When mucus or pus collect in the Fallopian tube, congestion and obstruction of the ostium uterinum are liable to follow, giving rise to

¹ *Medical Press and Circular*, 1911, Vol. I., p. 566.

² Sir J. Y. Simpson, *Clinical Lectures on the Diseases of Women*, p. 753.

hydrosalpinx or pyosalpinx. As the retained secretions undergo decomposition, further irritation is set up which aggravates the obstruction.

Occasionally a kink of the Fallopian tube is the primary cause of retention, followed by increased weight. The greater weight increases the kink, and so the process continues, while the lumen gets steadily less and the accumulation of secretion more abundant.

Constipation. Reciprocal relations between the uterus and the rectum are common, as Robin and Dalché point out :

“ A uterine displacement, a peri-uterine phlegmasia, a hæmatocele, a salpingitis, a fibroid etc., may act mechanically and give rise to constipation, which is followed by quite a number of dyspeptic symptoms. On the other hand constipation may itself do harm to a healthy uterus and by means of a Vicious Circle may aggravate the uterine disorders to which it was primarily due.”¹

Where the uterus or the ovary is tender, considerable pain may be excited by the efforts of defæcation. Hence the woman is tempted to postpone the act, with the result of increased constipation.

Displacement of Kidney. Morbid correlations

¹ Traitement Médical des Maladies des Femmes, 1900, p. 18.

may be caused by displacements of the uterus and of the kidney. Sometimes the renal disorder is primary and sometimes the uterine. The first provokes the second and the second aggravates the first. Visceroptosis and uterine displacements may be similarly correlated :

“ We are face to face with a Vicious Circle. . . . The two organs act and react simultaneously on one another.”¹

Heart Disease. Landau has studied the disorders induced in the vascular system by the growth of uterine myomata. The following is his description :

“ The formation of varices, the occurrence of thrombosis and, finally, the onset of degeneration of the myocardium are very common. Should the last-named process result, then, by a Vicious Circle, the uterine hæmorrhages become continually more profuse, in consequence of increasing passive hyperæmia dependent upon diminishing power of the cardiac pump. . . . In the great majority of cases, the myoma and the uterine hæmorrhages that result from its growth are the primary cause of the morbus cordis.”²

Abortion. Several Circles are met with in obstetrical practice. Abortion, for example, may be started by any condition of congestion which leads

¹ Robin and Dalché, l.c., pp. 34, 35.

² Kisch, *The Sexual Life of Woman*, tr. by Paul, p. 240.

to hæmorrhage. Such hæmorrhage injures the decidua and thereby increases the hæmorrhage. This correlation accounts for the abortion so common in retroversion of the gravid uterus, as Küstner has pointed out :

“ The broad ligaments are twisted, . . . the thin-walled veins are compressed and their lumen diminished, resulting in congestion of the uterus. This congestion is probably the usual cause of the interruption of the pregnancy that so often takes place and of the abortion that so often follows spontaneously. The congestion leads to hæmorrhages in the decidua. These, although slight at the outset, lead to further damage to tissues, and this in turn to further hæmorrhage, until the Vicious Circle of a commencing abortion is established.”¹

Inversion of Uterus. In cases of inversion of the uterus, the fundus may at first be merely indented so as to project into the uterine cavity like a polypus. This inverted portion then provokes contractions which increase the inversion, the remainder of the process being completed by the uterus itself, which, so to speak, swallows the indented portion.

Retroversion of Gravid Uterus. A mechanical Circle is established when a retroverted gravid uterus is so impacted in the pelvis as to press on the urethra

¹ Veit, Handbuch der Gynäkologie, Vol. I., p. 248.

and cause retention of urine. The distended bladder increases the retroversion ; the retroversion increases the retention.

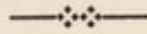
Thus Matthews Duncan writes :

“ You will not understand the retroversion of the gravid uterus if you do not keep in mind that the retention of urine is both cause and effect—that there is, in this disease, what is sometimes called a Vicious Circle. . . . The replete bladder increases the retroversion and makes it, for the time at least, incurable, and it was the retroversion that made the retention of urine by pressure on the urethra. So the first is the cause of the second, and the second is, inversely, the cause of the first, both combining to form a Vicious Circle. In this kind of retention there is frequently, and probably always, a kind of insipid diabetes present.”¹



¹ Clinical Lectures on the Diseases of Women, p. 78.

Chapter Eight



Circles associated with the Eyes and Eye-lids



ISEASES of the eyes are frequently complicated by Circles. In some cases different portions of the visual apparatus are involved in the pathological sequences ; in other cases the visual apparatus and the general health (Fig. VII.).

The following Classification will be found convenient, although it cannot always be strictly adhered to :

- I. Circles associated with the Eyes.
- II. Circles associated with the Eye-lids.
- III. Circles associated with Disorders of Refraction.

I.—CIRCLES ASSOCIATED WITH THE EYES

Glaucoma. A striking example is presented by glaucoma, a disease which, in the words of Priestley Smith, “perpetuates and intensifies itself in a Vicious Circle.”¹

¹ Norris and Oliver, System of Diseases of the Eye, Vol. III., p. 648.

In the healthy eye the intra-ocular fluid, after being secreted by the ciliary glands, passes into the posterior, and then into the anterior, chamber, filters through the ligamentum pectinatum and spaces of Fontana, and escapes into the canal of Schlemm and thence into the anterior ciliary veins, a state of equilibrium being maintained by a self-regulating mechanism.

In glaucoma this equilibrium is disturbed, with the result that the intra-ocular pressure rises. The exact sequence of events is, however, not fully understood.

According to the popular "retention theory," the root of the iris is under certain predisposing conditions approximated to the root of the cornea, thus diminishing the filtration angle and hindering the escape of the intra-ocular fluid. An excess of this fluid is then liable to accumulate in the vitreous and push forward the lens and iris, thus further blocking the filtration angle and checking excretion.¹

¹ It is well to remember that correlations that appear to us injurious may with the progress of knowledge come to bear another explanation. Thus in 1867 Wecker suggested a different Vicious Circle as the cause of glaucoma: "The diminished elasticity of the sclerotic plays a highly important *rôle*. It establishes a Vicious Circle in respect of the ciliary nerves, which are more and more compressed." *Maladies des Yeux*, Vol. I., p. 502.

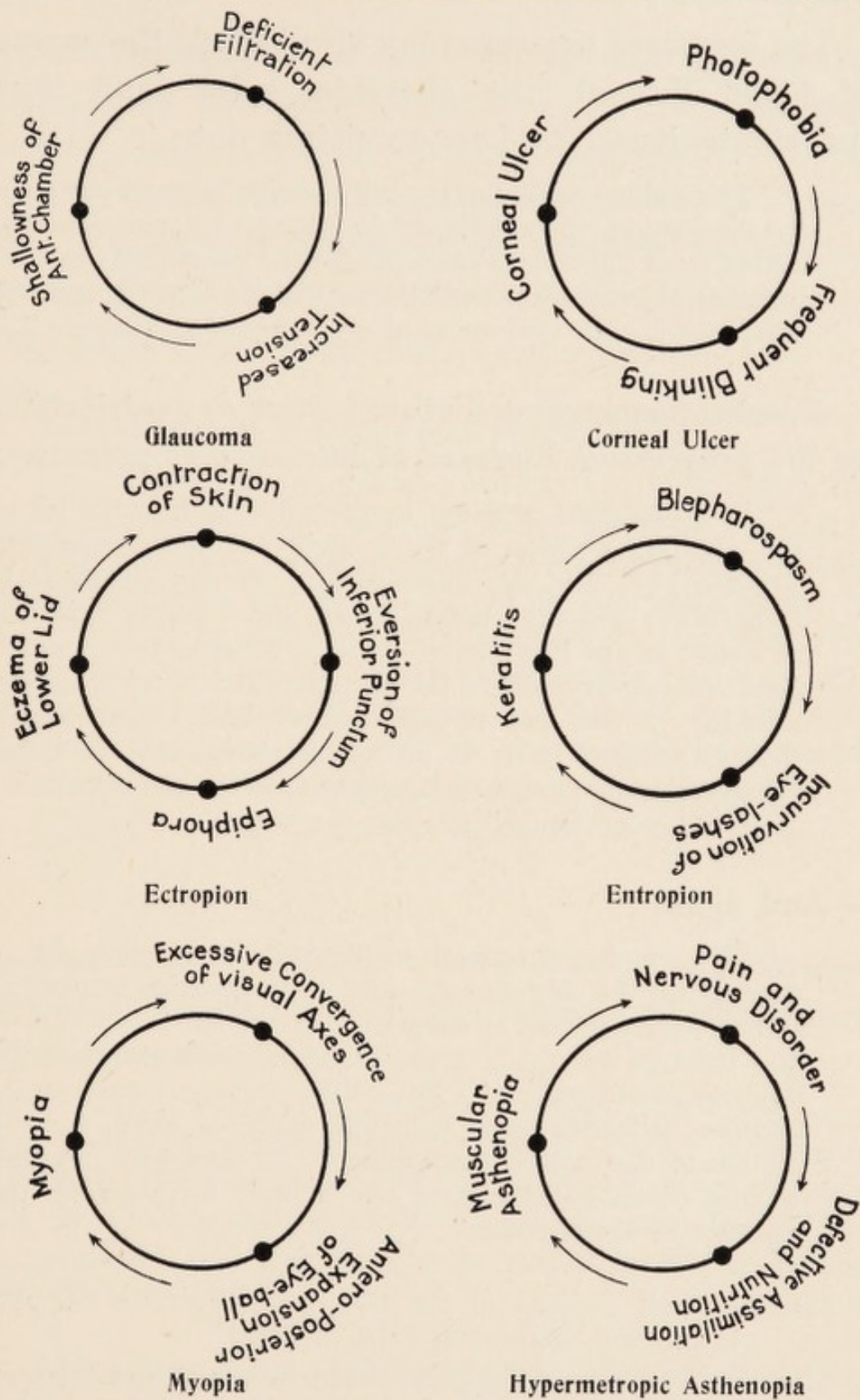


Fig. VII.—Circles associated with the Eyes and Eye-lids

The increased pressure may also impede the escape of blood through the choroidal veins, and thus perpetuate itself, as Lawson points out :

“ The sudden raising of the intra-ocular pressure increases the congestion, to be followed in its turn by a serous exudation from the venous channels, with a consequent further increase of pressure ; and thus a Vicious Circle is quickly established, with symptoms of ever-increasing violence.”¹

Kuschel has suggested other factors as contributing to the progressive increase of intra-ocular pressure :

“ The increased pressure in the vitreous humour forces the coronary division of the hyaloid membrane (vorderer Grenzsicht) into the intervals between the ciliary folds (Ciliartäler) and thus blocks them. As a result fluid can no longer escape from the vitreous, in consequence of which a further rise in pressure takes place, followed by a further blocking of the inter-ciliary spaces. The Vicious Circle thus established leads to an enormous increase of intra-vitreous pressure and to a complete arrest of the circulation of intra-ocular fluids.”²

And again :

“ The increased tension in the vitreous exerts severe pressure on the choroid especially on its anterior section. . . Hence results partial or complete obstruction to the venous flow through the ciliary processes, whose veins open into the anterior venæ vorticosæ. The ciliary processes consequently become distended and encroach upon or even entirely obliterate the interciliary spaces. In this way another Vicious Circle is established which must further raise the pressure in the vitreous.”

¹ Diseases and Injuries of the Eye, 1903, p. 236 ; cf. also Henderson, Glaucoma, 1910, p. 131.

² Der Intra-Okulare Flüssigkeitsstrom in seinen Beziehungen zum biomechanischen Aufbau des Auges unter gesunden Verhältnissen, beim Glaukom und bei der Kurzsichtigkeit, 1910, pp. 120, 129.

Secondary Glaucoma. Reciprocal relations also complicate secondary glaucoma, as, for example, where staphyloma results from perforation of the cornea associated with cicatrisation of the prolapsed iris. There is then more or less complete obliteration of the filtration angle, followed by increased tension and increased staphyloma.

The sequence is thus described by Fick :

“ Staphyloma corneæ is a corneal scar which, with the adherent iris, bulges outward. . . . The adhesion of the iris to the cicatrizing cornea produces traction on the ciliary body, that vascular and nervous part of the inner tunic of the eye by which the aqueous humour is secreted. Irritation of the ciliary body—so it is assumed—increases secretion ; the internal pressure of the eye is thereby raised. This heightened tension pushes the scar forward with greater force ; the ciliary body is thereby still more dragged upon, with the consequence of shutting up the Circulus Vitiosus.”¹

Keratitis. Keratitis is sometimes a very chronic disorder owing to the associated trichiasis and blepharospasm :

“ The corneal inflammation causes great pain with photophobia and lachrymation, owing to which the patient keeps his eyes convulsively closed (blepharospasm), and by so doing causes a still greater approximation of the incurved lashes to the cornea, and establishes a Vicious Circle.”²

Unless some efficient treatment is adopted which

¹ Diseases of the Eye and Ophthalmoscopy, tr. by Hale, p. 257.

² Lawson, Diseases and Injuries of the Eye, 1903, p. 459.

interrupts the morbid process, matters go from bad to worse : the cornea becomes opaque, and sight may be completely destroyed.

Corneal Ulcer. Another troublesome condition is ulcer of the cornea which may be kept up by the constant blinking of the upper lid :

“ The movement of the upper lid, by rubbing against and irritating the ulcerated surface, increases the pain and photophobia, and in this way keeps up a Vicious Circle, which is arrested by a light bandage.”¹

Foreign Body. The presence of a foreign body in the cornea may set up reciprocal relations owing to the secondary photophobia and blepharospasm. The prolonged exclusion of light renders the retina more and more sensitive, thus provoking a condition which perpetuates the blepharospasm.

Kerectasia. In some forms of kerectasia resulting from inflammation, apart from perforation, the corneal tissues are so softened and thinned, as to be unable to resist the intra-ocular pressure. The consequent progressive bulging may cause further attenuation and further bulging. A similar sequence of events is sometimes associated with scleral ectasia and with keratoconus.

¹ Lawson, l.c., p. 145.

Phlyctenular Conjunctivitis. Phlyctenular conjunctivitis, so largely dependent on malnutrition and struma, is one among many disorders in which local disease reacts on the general health and *vice versa*. As a result of the extreme photophobia the affected person, usually a child, shrinks from light for weeks or months, burying the face in cushions or wherever light can best be excluded. The seclusion from light, air and exercise lowers the already depressed nutrition and aggravates the disease.

A second Circle is frequently established when the blepharospasm keeps the lids in close contact and thus leads to retention of unhealthy discharges. Cause and effect act and react on each other.

Gonorrhœal Ophthalmia. Similar reciprocal relations are associated with gonorrhœal ophthalmia or ophthalmia neonatorum. The photophobia and blepharospasm cause the purulent and irritant discharges to be pent up, and these discharges in their turn intensify the ophthalmia.

Muscæ Volitantes. Landolt has drawn attention to a Circle which complicates retinal hyperæsthesia,

especially when a myopic person is worried by *muscæ volitantes* :

“The myope sees these phenomena with greater ease, because he is seldom adapted to the source of light. Moreover, when the myopia is pernicious, the sensitiveness of the retina undergoes, from the beginning, a pathological exaggeration. Later on, to these almost physiological corpuscles are added others which are due to the retinal and choroidal exudation. The latter are now more numerous, larger and more troublesome and disquieting to the patient. He ascribes to them all kinds of shapes, and never wearies of their description, which he willingly accompanies with a faithful sketch. This is a proof of the torments to which they subject him and of the anxiety with which he observes them. This observation itself places him in a Vicious Circle of action and reaction, for the more he pursues these phantoms, the more he is harassed by them, nothing being more fatiguing than the observation of such entoptic phenomena. Thus it is that they become a cause, both direct and indirect, of the weakening of the eyesight.”¹

Retinal Hyperæmia. In neuropaths suffering from hyperæmia of the disc, exaggerated fears of serious eye lesion are sometimes conjured up by auto-suggestion, or by injudicious professional advice, the effect of which is to increase the neurosis :

“These cases are very frequently met with in practice, and the patient’s statements are so misleading that inexperience may lead to a wrong diagnosis or to a hasty expression of opinion, with the result that the existing manifestations are merely aggravated.”²

Wholesome advice, coupled with correction of any

¹ Refraction and Accommodation of the Eye, p. 457.

² Schöbl, in Norris and Oliver, System of Diseases of the Eye, Vol. III., p. 581.

minor ailment, may quickly cure the patient. As Clifford Allbutt says :

“ In neurasthenics a local ill, acting and reacting thus, establishes a short circuit and a Vicious Circle ; and the local error must be at once readjusted.”¹

Tinted Lenses. Frequently in these and other forms of retinal hyperæsthesia the victim resorts to tinted lenses and darkened rooms, which but serve to increase the trouble :

“ Since photophobia is kept up or even aggravated by darkened rooms, or by the use of smoked glasses, well-lit rooms must be ordered and the use of dark glasses prohibited.”²

Even apart from hyperæsthesia some persons make use of tinted glasses, of what Donders terms “ conservative spectacles,” on account of their agreeable and soothing effect. Such glasses are however objectionable since they withdraw the healthy stimulus of white light, intensify the retinal sensitiveness, and thus create a permanent necessity for their employment. Such abnormal sensitiveness may even predispose to disease.³

Papillœdema. The development of “ choked disc” or papillœdema may be dependent on a reciprocity of

¹ Allbutt and Rolleston, System of Medicine, Vol. VIII., p. 755.

² Graefe-Saemisch, Gesamnte Augenheilkunde, 1908, Vol. II., (v.), p. 368.

³ Donders, Accommodation and Refraction of the Eye (N.S.S.), p. 219.

action. The primary cause is usually to be found in an increase of intra-cranial pressure due to hydrocephalus or a new growth, which forces the subarachnoid fluid into the sheaths of the optic nerve. Hence result engorgement of the central vein of the retina, œdema of the optic nerve, and swelling of the papilla. The nerve becomes incarcerated at the point where it fits tightly in the foramen scleræ, and this causes strangulation of the papilla and thus further obstruction in the vein. In the words of Victor Horsley, "the resistance of the scleral ring causes strangulation and thereby sets up a Vicious Circle of pressures."

Dacryo-Cystitis. An important Circle is sometimes met with in cases of dacryo-cystitis associated with stricture of the lachrymal duct. The trouble begins with congestion of the lachrymal sac, causing some obstruction of the duct, which is in turn followed by retention and decomposition of the secretions. The consequent irritation produces further narrowing, often ending in complete obstruction.

Moreover as a result of the constant distention of the lachrymal sac by the fluid, its walls gradually lose their elasticity. When this condition, called atony of the lachrymal sac, has occurred, the tears no longer pass down into the nose even when the

duct again becomes patent. As a result the sac may grow larger and larger until a conspicuous fluctuating tumour is produced.¹

Exophthalmic Goitre. For the sake of completeness allusion may be made here to the Circle that complicates exophthalmic goitre (cf. p. 52).

II.—CIRCLES ASSOCIATED WITH THE EYE-LIDS

The eye-lids have already been alluded to more than once as forming one of the factors concerned in the establishment of Circles. But it will be convenient to group some additional illustrations under a separate heading.

Ectropion. Ectropion is a common disorder that frequently perpetuates itself in a Circle, since it both results from, and provokes further, lachrymation.

Any attack of epiphora that produces a macerated and contracted state of the skin of the lower lid may start the process. For the contraction of the skin draws down the margin of the lid and leads to eversion of the punctum, this being followed by increased epiphora. In the words of Panas :

“ The skin, incessantly irritated by the tears flowing over it, contracts more and more, thus establishing a Vicious Circle which ends in ectropion.”²

¹ Fuchs, Textbook of Ophthalmology, tr. by Duane, 1911, p. 668.

² Maladies des Yeux, Vol. II., p. 333.

Chronic catarrhal conjunctivitis as seen in elderly people supplies an example of the condition, which Fuchs thus describes :

“As a consequence of the wetting with the tears, the skin of the lower lid is attacked with eczema or becomes rigid and contracted, so that the free edge of the lid is no longer in perfect apposition with the eye-ball. As a result of this the punctum lacrimale no longer dips into the lacus lacrimalis, so that the transportation of the tears into the lachrymal sac is impeded, the epiphora increased, and thus again a still further injurious reaction upon the character of the skin is produced. In this way there is formed a Vicious Circle which leads to a constantly increasing depression of the lower lid (ectropion).”¹

The patient is apt to stroke his face from above downwards in order to wipe away the tears. The ectropion and epiphora are thus perpetuated.

A similar condition is readily set up in children with phlyctenular ophthalmia, especially if there is a tendency to eczema :

“The lachrymation in phlyctenular ophthalmia increases the eczema, which then, by causing contraction of the skin of the lower lid, produces eversion of the inferior punctum lacrymale, and this, in its turn, causes increased lachrymation, and thus a Vicious Circle is set up.”²

Prolonged lachrymation is apt to give rise to blepharitis, which in turn leads to ectropion and thus perpetuates the lachrymation. For the cicatricial

¹ Textbook of Ophthalmology, tr. by Duane, p. 135 ; cf. also Berry, Diseases of the Eye, p. 58.

² Swanzy, Diseases of the Eye and their Treatment, p. 193. In the latest edition, Swanzy and Werner, Diseases of the Eye, 1912, p. 535, the same reciprocal condition is described, although the term Vicious Circle is not used.

tissue resulting from the blepharitis causes the conjunctiva to be drawn forwards over the lid, thus altering its edge and preventing its close application to the eye-ball. Tears now run down over the lid and intensify the blepharitis.¹

Chemosis of Eye-lids. In chemosis of the eye-lids a Circle may be established when the bulging conjunctiva stretches the ciliary portion of the orbicularis, the contraction of which causes eversion of the lid. The everted lid and contracting orbicularis then act like a ligature, and aggravate the chemosis by strangulating the conjunctival veins. A similar form of spastic ectropion not infrequently follows an attempt to open the palpebral fissure in a child with swollen lids and blepharospasm.

Entropion. Entropion also presents some examples of a Circle, as when the lid margins are incurved by spasmodic contraction of the ciliary fibres of the orbicularis. Relaxation of the skin and a disappearance of the subcutaneous fat act as predisposing factors, the exciting cause being some conjunctival or corneal irritation and photophobia, which cause reflex contraction of the orbi-

¹ Fuchs, Textbook of Ophthalmology, tr. by Duane, pp. 630-1.

cularis. The complication is common after cataract extraction in old people. When once induced, the entropion is maintained and intensified by the irritation that it produces.

The severe form of entropion which is associated with trichiasis, keratitis and blepharospasm has already been alluded to on p. 139.

Blepharophimosis. Where cicatrical entropion is associated with contraction of the conjunctiva and cartilage, the commissure is frequently narrowed, producing what is known as blepharophimosis and further increasing the tendency to inversion. Muscular spasm and trichiasis are frequently present as aggravating factors.

Trachoma. Burnett draws attention to reciprocal conditions that are present in trachoma :

“As we seldom see these cases until the inflammatory symptoms send the patient to the surgeon, there has always been a question as to whether the deposit is the cause or the result of the inflammation. From the fact, however, that they have been found in eyes which have not been inflamed, it would appear more likely that the inflammation is not the first step in the process, though undoubtedly the inflammation when it is once set up, facilitates its progress and encourages new deposits, and thus a Vicious Circle is completed.”¹

This Circle is especially injurious when, owing to the photophobia and the sticking together of the

¹ Norris and Oliver, System of Diseases of the Eye, Vol. III., p. 209.

lids, the secretions are pent up and aggravate the conjunctival and corneal trouble.

Fissure of Canthus. In cases of fissure of the canthus cause and effect sometimes act reciprocally on each other. Where corneal and conjunctival irritation are accompanied by photophobia and spasm, a superficial ulceration is frequently caused by the continuous folding of the skin at the outer canthus, and by the conjunctival discharges. This ulceration by reflex irritation increases the orbicular spasm, and acts as an important factor in maintaining the irritable condition of the eye.

Eczema. The itching that accompanies eczema of the eye-lids may perpetuate the disorder by the scratching which it provokes. Axenfeld thus describes the process :

“ The intense itching causes the patient, generally a child, to keep on scratching. By this means the secretions are smeared over the face and aggravate the mischief.”¹

III.—CIRCLES ASSOCIATED WITH ERRORS OF REFRACTION

Every error of refraction may at times be complicated by the operation of a Circle.

Myopia. In myopia reciprocal relations may

¹ Lehrbuch der Augenheilkunde, p. 229.

be established between accommodation and convergence, on the one hand, and posterior staphyloma, on the other, especially in the case of children whose eyes possess no great resisting power.

Landolt thus describes the factors :

“ The influence of near work may manifest itself in different ways. It will be noticed even that the three principal modes of production of myopia that we have mentioned, are so intimately related to each other that one of them necessarily suggests the others. Exaggeration of convergence leads to that of accommodation. The latter, of itself alone, and also by the excessive nearness of the object, which it necessitates, and the position which gives rise to cephalic hyperæmia, favours the production of choroiditis. The affection of the membranes of the *fundus oculi* entails a diminution of the acuteness of vision, which, in its turn, makes the gradual approach of the object and exaggeration of convergence obligatory.

“ Sometimes this Vicious Circle will be opened, on the contrary, by diminution of the acuteness of vision, and, at other times, by a spasm of accommodation. But at whatever point this wheel of misfortune takes up the victim, he must go round with it, and will have to inexorably pass through the series of injurious influences, which reinforce each other to aggravate the evil.

“ When we take into consideration this linking together of harmful causes, we are no longer surprised at the rapid and constant progress made by myopia in an eye which it has once attacked, especially when the latter has been, from birth, disposed to it, or is deprived of the ability to resist it.”¹

¹ Refraction and Accommodation of the Eye, p. 454.

Noyes lays stress on the weakness of the muscular apparatus :

“ Want of proper balance among the muscles, as they combine in their action, provokes unnatural strain and leads to undue pressure on the globe. The difficulty of steady fixation induces close approximation of the work to the eye, and thus cause and effect are set going in a Vicious Circle.”¹

But myopia has injurious effects extending far beyond the eyes. Thus Lawson, referring to myopia in relation to general health, writes :

“ The general health in young children often suffers greatly from the aching and general discomfort they experience, and in this way a Vicious Circle may be established which favours the rapid advance of the disease.”²

Myopia and spinal curvature also stand in reciprocal relation, if R. Liebreich's views may be accepted :

“ Spinal curvature and short-sightedness seem to form a *Circulus Vitiosus*, in so far as short-sightedness produces curvature, and curvature favours short-sightedness ; while evidently the same bad arrangements are at the foundation of both these anomalies.”³

Hypermetropia. The progressive increase of hypermetropic asthenopia is closely dependent on a Circle. The over-strained accommodation causes the removal

¹ Diseases of the Eye, p. 64. Cf. also *Trans. of the Ophthalmological Society of the U.K.* (1907), Vol. XXVII., p. 12.

² Diseases and Injuries of the Eye, 1903, p. 67.

³ School Life in its Influence on Sight and Figure, p. 16.

of an object to a greater distance and thus leads to diminished acuity of vision. This latter again induces the sufferer to attempt closer work, involving increased effort of accommodation. And so the two factors of over-strained accommodation and indistinct vision act and react on each other.

Presbyopia. A similar complication comes into operation with the advent of presbyopia as a result of the effort to obtain distinct vision by accommodation. Owing to the great distance at which the presbyope reads, the retinal image becomes small and indistinct, and this tempts him to bring his work closer to his eyes. At the nearer distance, however, he overtaxes his accommodation, and this in return renders his work indistinct and again compels its removal.

Anisometropia. R. W. Doyne has recently drawn attention to a Circle that is frequently present in anisometropia, disturbance of the fusion centre and exhaustion of the muscles of accommodation being *participes criminis* :

“ The trouble arises from a Vicious Circle. The fusion centre demands clear images and makes demands on the lower centres which control the muscles of the eyes ; the muscles become exhausted, the images become indistinct and the fusion centre becomes more imperious, as its task becomes more difficult. Moreover, all these details are mainly subconscious and independent of the will.”¹

¹ *British Med. J.*, 1910, Vol. II., p. 363.

Heterophoria. Frequently heterophoria complicates ametropia and aggravates its pernicious effect :

“ Just as it is true that ametropia and heterophoria can and do produce impaired health, so conversely will impairment of health give rise to heterophoria and exposure of ametropia.”¹

Asthenopia. It will thus be seen in how many ways ametropic asthenopia may establish

“ the Vicious Circle of cause and effect : eye-strain, with its pain and nervous disturbances, producing interference with assimilation and nutrition, which in its turn so reduces the general physical condition as to induce an increase in the asthenopia.”²

Insomnia is at times an aggravating factor :

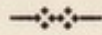
“ Insomnia is a very prominent symptom of eye-strain and so a Vicious Circle is started ; eye-strain producing among other troubles insomnia, and insomnia in its turn aggravating the patient's condition, because the all-important restorative is wanting.”³

¹ Norris and Oliver, System of Diseases of the Eye, Vol. IV., p. 420.

² Norris and Oliver, l.c., Vol. IV., p. 405 ; Gould, *British Med. J.*, 1903, Vol. II., p. 663.

³ *Practitioner*, 1911, Vol. I., p. 26.

Chapter Nine



Circles associated with the Nose



THE rebellious character of many diseases of the nose is due to the presence of a Circle, with its ceaselessly acting and reacting forces (Fig. VIII.).

Variations in the size of the nasal passages, both in the direction of excess or deficiency, play a part of great importance and will be dealt with first.

Stenosis. Stenosis commonly originates in a neglected cold or a series of colds which keep the mucosa congested until the erectile tissue has to some extent lost its contractility. As the disease advances, the susceptibility to catarrh increases, and the engorged mucosa gradually undergoes hypertrophy and to a great extent occludes the nostrils. The negative inspiratory pressure behind the obstruction keeps up the hyperæmia and thus favours further hypertrophy.

As Gradle points out :

“ Hypertrophic processes accompanied by inflammation thus tend to perpetuation, by reason of the Vicious Circle to which they give rise.”¹

When once established, the stenosis may seriously interfere with the removal of secretions and thus lead to an accumulation which increases the obstruction. The pathological sequences are well described by Ashhurst :

“ Obstruction, by preventing or interfering with the expulsive forces of the expiratory current, prevents the removal of the usually abnormal amount of secretion, either by blowing the nose or otherwise ; its accumulation is in its turn an efficient factor in producing obstruction, and a Vicious Circle is thus established.”²

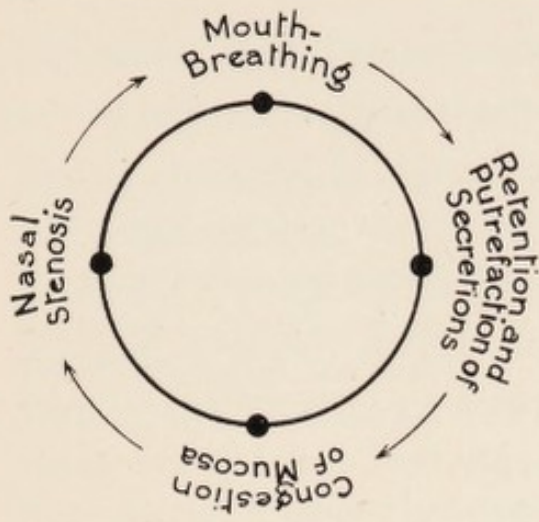
Watson Williams has pointed out that deflection of the septum and nasal obstruction react on each other. The deflection causes stenosis on the side of the convexity, leading to diminished pressure behind the obstruction, which diminution tends to increase the deflection :

“ As a consequence of the partial nasal obstruction from deflected septum, inspiration causes a rarefaction of the air behind the obstruction : as a consequence over-filling of the vessels, and constant hyperæmia with chronic rhinitis and further increase of the nasal stenosis may result.”³

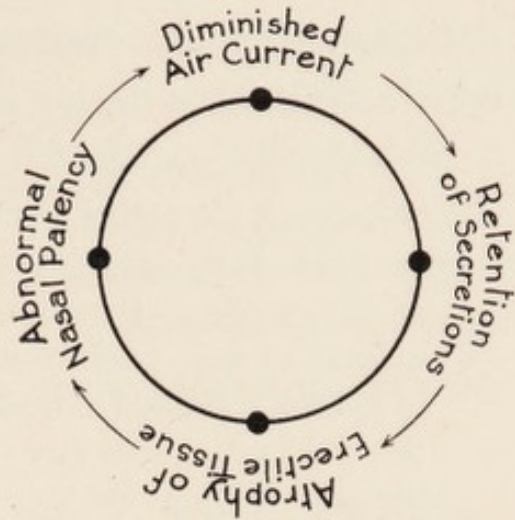
¹ Diseases of the Nose, Pharynx and Ear, p. 46.

² Cyclopedia of Surgery, Vol. V., p. 404.

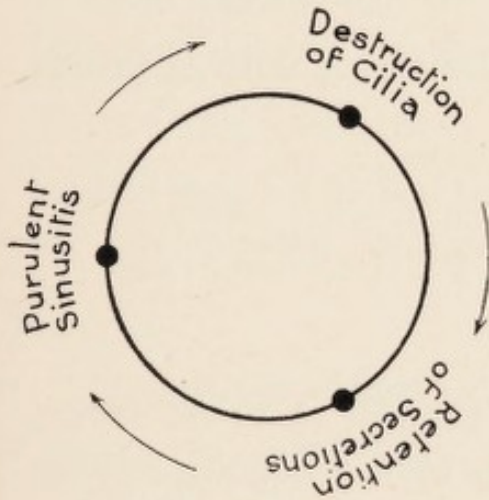
³ Diseases of the Upper Respiratory Tract, p. 337.



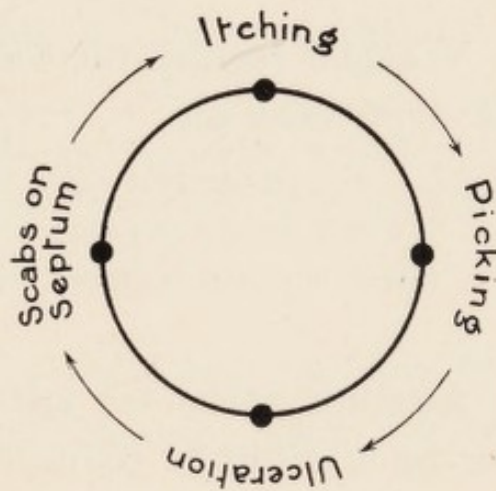
Nasal Stenosis



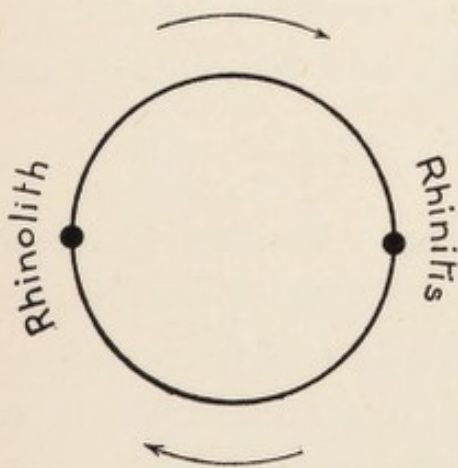
Abnormal Nasal Patency



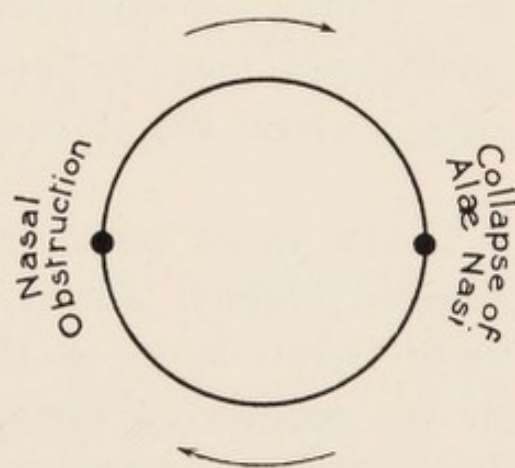
Sinusitis



Ulcer of Septum



Rhinolith



Collapse of Alæ Nasi

Fig. VIII.—Circles associated with the Nose

Obstruction is frequently caused by adenoids, which tend to enlarge as the result of a Circle :

“ The steps in the production of the disease are simple. Whenever an infant or young child “ catches cold,” the swelling of the adenoid tissue is a necessary accompaniment of the swelling of the nasal mucous membrane. Repeated attacks of this description . . . leave the lymphatic tissue in a state of chronic inflammation. A Vicious Circle is set up, the child takes cold more readily than ever, and eventually the adenoid growths may become of sufficient size to cause the characteristic symptoms of obstruction.”¹

Waggett regards the Circle associated with adenoids as dependent on

“ the permanent catarrhal condition of the nose induced by the actual presence of obstructing adenoids and the infected clefts between their folds.”²

Another cause for adenoid growth is to be found in the diminished barometric pressure accompanying the act of inspiration in cases of nasal obstruction. Every such act diminishes the pressure behind the obstruction, leads to hyperæmia and hyperplasia and so aggravates the obstruction.

Risley draws attention to the “ Vicious Circle of events,”³ which occurs when, owing to deformities of the scroll bones of the nostrils and to deviations of the septum or vomer, the nasal chamber is so

¹ Crowley, *The Hygiene of School Life*, p. 38.

² *Diseases of the Nose*, p. 85.

³ *British Med. J.*, 1906, Vol. II., p. 1869.

narrowed that the opposing sides come into contact, or approach so nearly that any congestion of the lining mucosa brings them together. Here, too, a self-aggravating factor comes into play, since the opposing pressures perpetuate the congestion. Congestion breeds congestion. The nose becomes stopped by the turgid soft tissues and drainage is checked.

When nasal stenosis gives rise to mouth-breathing, a fresh factor is introduced, which tends to increase the stenosis.¹ In the words of Mayo Collier :

“ Mouth-breathing introduces a further aggravating factor. A Vicious Circle is set up ; mouth-breathing tends to obstruct the nose, and this very obstruction maintains and continues the mouth-breathing.”²

Mouth-breathing again is not only a common result of adenoids but also favours their further enlargement :

“ As a result of this abnormal growth (i.e. adenoids) the posterior nares are partially blocked and nasal breathing is difficult. This difficulty breeds habit. The adenoids continue to grow ; and, as a result, a Vicious Circle is established.”³

¹ Stoerk long ago pointed out that the nasal mucosa can only remain healthy so long as it is exposed to the respiratory currents of air. When deprived of these it may undergo all degrees of disorder from catarrh to total destruction. Cf. *Erkrankungen der Nase, des Rachens, und des Kehlkopfes*. Nothnagel, *Pathologie und Therapie*, p. 34.

² Mouth-breathing, p. 12.

³ Hogarth, *Medical Inspection of Schools*, p. 285.

Much the same may be said of enlarged tonsils, when these interfere with nasal, and thus conduce to oral, respiration. For in mouth-breathers the hypertrophied tonsils are readily inoculated by any air-borne contagion, and then undergo further enlargement. Bloch thus describes the condition :

“ Enlarged tonsils frequently interfere with nasal respiration, and thus cause mouth-breathing, which in its turn acts injuriously on the tonsils that lie directly in the air-current. In fact these organs form the first important obstruction to the otherwise almost unimpeded current of air. They thus serve as the most convenient site for the deposition of the grosser impurities in the inspired air, and give rise to a true *Circulus Vitiosus*.”¹

According to some writers an arched palate causes nasal obstruction which again favours further deformity of the upper jaw :

“ The patient acquires the habit of mouth-breathing, adenoids develop in the stagnating cavity, and the tonsils enlarge. A Vicious Circle is thus established, for persistent mouth-breathing leads to further deformity of the upper jaw in the direction of inefficient expansion.”²

Collapse of the *alæ nasi* at times gives rise to a Circle. The nostrils may collapse instead of expanding on inspiration, and thus convert the anterior nares into mere slits. In severe cases the *alæ* may actually fall against the septum :

“ Although itself the consequence of some intranasal anomaly causing stenosis, it (i.e. the collapse of the sides of the nose) intensifies the latter. With every inspiration the sides of the external nose sink in, thereby slightly narrowing the vestibule.”³

¹ Die Pathologie und Therapie der Mundatmung, p. 73.

² Pickerill, Stomatology, p. 28.

³ Gradle, Diseases of the Nose, Pharynx and Ear, p. 196.

Abnormal Patency. It is interesting to observe that abnormal patency also gives rise to Circles. Thus the progress of atrophic rhinitis or ozæna depends to a great extent on the enlarged interval between the spongy bones and the septum. For as the velocity of a stream grows less with a wider channel so does the air passing through the enlarged nasal passages lose the velocity and force required to expel the tenacious nasal secretions. Hence result stagnation, putrefaction, fœtor. In course of time the inspissated secretions contract like a film of collodion, leading to anæmia and atrophy of the mucosa, to shrinking of the turbinals, and to yet greater patency of the meatuses. Thus the morbid condition is perpetuated.

MacDonald has observed a similar sequence after the removal of a polypus :

“After the removal of nasal polypi in cases where the inferior turbinals had previously presented a normal appearance, there is sometimes induced a muco-purulent discharge, which, partly from its tenacity, and partly on account of the unnaturally widened fossæ the patient is unable to extrude. It putrefies and produces an ozænic smell ; it dries and contracts the venous sinuses of the erectile tissue. A Vicious Circle is instituted, which, if neglected, might presumably result in true atrophy.”¹

Dr. U. Ribary has drawn attention to some cor-

¹ Allbutt and Rolleston, System of Medicine, Vol. IV. (ii)., p. 21 ; Diseases of the Nose, p. 152.

relations which are associated with the formation and removal of crusts in rhinitis sicca :

“ The erosions which are associated with anterior rhinitis sicca and which frequently provoke epistaxis, may either heal or give rise to polypoid excrescences (bleeding polypus of the septum), or they may extend to the deeper parts and lead to ulceration by means of infective processes. Where healing has taken place, white, tendonlike, glistening, tongue-shaped processes of epidermis may be observed to extend from the edge of the skin on the septum into the normal mucosa, a condition very similar to that which Bezold and Habermann have noticed in the case of the ear, and where the epidermis of the auditory meatus invaded the mucosa of the middle ear. In fact as a result of the morbid process the mucous epithelium has perished, and been replaced by epidermis. The new epidermis however appears to have less resisting power than has normal cutis, since a sense of tension persists and results in renewed nose-picking and in further injury to the mucosa with its sequelæ. In this way a *Circulus Vitiosus* forms which perpetuates the disorder and generally lasts for the remainder of life.”¹

The same process often leads to a perforating ulcer, as Grünwald points out :

“ I have observed several cases of this kind of perforation, and the Vicious Circle was always the same : crust formation on the septum ; picking off the crust and so causing bleeding, which led to the formation of a larger and more firmly adherent crust ; and so on, the whole process being started by some inflammatory condition, such as suppuration in the vestibule or in the interior of the nose.”²

On the other hand the putrefaction associated

¹ *Archiv f. Laryngologie und Rhinologie*, 1896, Vol. IV., p. 314.

² *Nasal Suppuration*, tr. by Lamb, p. 180.

with crusts that have remained long *in situ* is a source of further irritation :

“ The retention and putrefaction of the crusts cause fresh irritation of the nasal mucosa and a continuance of the discharge and thus of the disease.”¹

Sinusitis. Reciprocal relations are frequently established in connexion with sinusitis. Owing to the narrowness of the ducts draining the sinuses, congestion readily leads to partial obstruction, followed by retention and putrefaction of the secretions. The consequent irritation provokes further swelling and finally complete obstruction.

Kuhnt thus describes the condition as met with in the frontal sinus secondary to a rhinitis :

“ Under such circumstances it is quite possible for an independent disorder to be set up in the frontal sinus, which may last long after the rhinitis has subsided. The mucous, muco-purulent or purulent secretions are then either unable to escape or only do so imperfectly. They are apt to decompose, and then in their turn accentuate the irritation of the mucosa.

Even anatomical changes frequently result, especially in the naso-frontal duct, close the Vicious Circle, and thus prevent any probability, or even possibility, of a natural recovery.”²

Another Circle is often associated with purulent sinusitis owing to the destruction of the ciliated epithelium. The aggregate effect of myriads of cilia in removing the secretions, especially when they have to act in opposition to gravity, must be of great importance. Acute inflammation, however, and

¹ C. A. Parker, Diseases of the Nose and Throat, p. 309.

² Heymann, Handbuch der Laryngologie und Rhinologie, Vol. III., p. 361.

especially the retention of pus, rapidly destroy ciliated epithelium, and thus neutralise Nature's scavenging provisions. Retention leads to further retention.

Polypus. According to some authors the growth of a nasal polypus is complicated by the presence of a Circle, as Heymann points out :

"The polypus irritates the adjacent structures, and thus excites, as well as maintains, a condition of inflammation. In saying this we are adopting the view that a polypus may owe its origin to a condition of inflammation, so that a form of *Circulus Vitiosus* is established. . . . In many, probably most, cases suppuration has started and led to the formation of the polypus ; at the same time the irritation of the polypus may cause or at least keep up the suppuration. It is scarcely necessary to add that the continual bathing of the mucosa in pus may in turn give rise to fresh polypi."¹

Similar views are held by Stoerk :

"Some observers regard the copious secretions that are associated with the growth of a polypus as a cause, others as a result. But in any case when once a polypus has formed it keeps up the catarrh, which in turn serves as a stimulus for the development of other polypi."²

The increase in size of a polypus, when once formed, has been attributed by some writers to the effect of gravitation, to the kinking of the blood-vessels,³ to the traction caused by blowing the nose, and to its to-and-from movement due to respiration. It seems at any rate possible, as Watson Williams suggests, that these factors may accelerate growth, and the larger the growth, the more effectual will these factors be.

¹ Handbuch der Laryngologie und Rhinologie, Vol. III., p. 824.

² Erkrankungen der Nase, des Rachens und des Kehlkopfes (Nothnagel's Pathologie und Therapie), p. 188.

³ Hajek, Nebenhöhlen der Nase, p. 255.

Thus Watson Williams writes :

“Once the polypus is originated it tends to increase in size, and perhaps its dependent position by mechanical action co-operates with the vascular changes in determining its subsequent development.”¹

Epistaxis. A. Cartaz draws attention to a Circle met with in cases of recurrent epistaxis associated with excoriations of the septum :

“I refer to those attacks of recurring epistaxis which originate from the anterior portion of the septum and which are frequently due to the bad habit of scratching the nose with the finger. The nail leads to excoriations of the mucosa, and to small ulcers which in course of time are covered by scabs. The itching and the desire to get rid of the scabs causes the sufferer to blow his nose vigorously, or to detach the scabs with his finger. The consequence is a return of the hæmorrhage ; or else the hæmorrhage recurs from some other trivial cause, . . . and unless care is taken a Vicious Circle forms which may lead to more serious consequences.”²

Rhinolith. The development of the various forms of calculi occurring in the body is dependent on reciprocal reactions between the primary nucleus and the subjacent mucosa, and the same principle applies to the rhinoliths occasionally met with. The nucleus, whether consisting of a foreign body, of blood or of mucus, becomes encrusted with calcareous matter derived from the nasal secretions, and becomes in turn a source of irritation to the mucosa.

Rhinitis. Some attacks of nasal catarrh, even after recovery, greatly diminish the resistance of the nasal mucosa and so interfere with the vaso-motor

¹ Diseases of the Upper Respiratory Tract, p. 326.

² Cartaz, Castez and Barbier, *Maladies du Nez et du Larynx*, p. 34.

mechanism. An increased liability to catarrh is developed and each attack leaves the mucosa more predisposed, a *locus minoris resistentiæ*. Especially is the Circle a troublesome one, if there is constitutional debility. A similar condition is associated with the various nasal neuroses, and depends on the principle that a reflex disturbance once produced is more easily renewed. Every attack appears to diminish the control of the nerve centres and to induce an attack on less and less provocation.

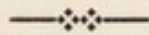
An artificial Circle is sometimes created by the injudicious use of cocaine in the treatment of rhinitis. The immediate effect of this drug is to produce shrinking of the congested mucosa and thus to clear the nasal passages. The constriction of the vessels, however, is very temporary and is followed by prolonged paralysis. If relief is desired stronger and stronger applications are necessary. The cocaine becomes an *agent provocateur* of disease, and a fatally progressive habit is readily acquired. Similar precautions are needed when cocaine is used in the treatment of nasal asthma and paroxysmal sneezing. The condition is liable to be aggravated when the transient effects of the drug have passed off.

Hasslauer thus describes the Circle :

“ The popular pencilling of the nasal mucosa with solutions of cocaine cannot be recommended. The immediate action of the cocaine is no doubt to give relief ; but as soon as the effect of the drug has subsided, the nasal mucosa and the spongy bones swell up more than ever, and the patient is in a worse plight than before.”¹

¹ Ohrenheilkunde, 1911, p. 141.

Chapter Ten



Circles associated with the Throat



ISEASES of the throat may be complicated by some Circles of great clinical importance (Fig. IX.).

Oedema of Aryteno-Epiglottidean Folds.
In cases of congestion of the aryteno-epiglottidean folds the two œdematous masses may be seen lying like valves above the glottis. There is then a risk that they may be sucked together during inspiration and provoke acute dyspnœa. The greater the dyspnœa the greater the inspiratory efforts and the more closely do the œdematous folds approximate, suffocation being an occasional termination.

Tongue-Swallowing. Death may also result from tongue-swallowing, a rare accident in children whose frænum is too long or has been divided. The danger arises from the tongue being so retracted into the pharynx during deglutition as to hinder

inspiration. The consequent dyspnœa is apt to lead to further retraction ; the tongue may even come to be fixed in the gullet like a wedge, obstructing the larynx so completely that no air can reach the lungs. Several cases of asphyxia are on record.

Neoplasms. Schrötter has called attention to a Circle that may be present where a new growth is associated with laryngeal catarrh :

“Chronic catarrh is very frequently associated with new growths in the larynx, a Vicious Circle being obviously present. The catarrh leads to the formation of the neoplasm and this, especially if pedunculated, keeps up the catarrh.”¹

Sometimes a neoplasm has been sucked into the glottis so as to provoke urgent dyspnœa, followed by increased impaction and death.

Paralysis of the Abductors. A deadly vortex may be set up in connection with paralysis of the abductors, *i.e.* the posterior crico-arytenoid muscles. In normal respiration the glottis dilates with every inspiration, and the deeper the inspiration the wider the glottis. Where, however, the abductors are paralysed, inspiration is no longer assisted by dilation of the glottis, but, on the contrary, is impeded by increased approximation of the cords, which are separated by a mere chink. The narrowing

¹ Vorlesungen über die Krankheiten des Kehlkopfes, p. 66.

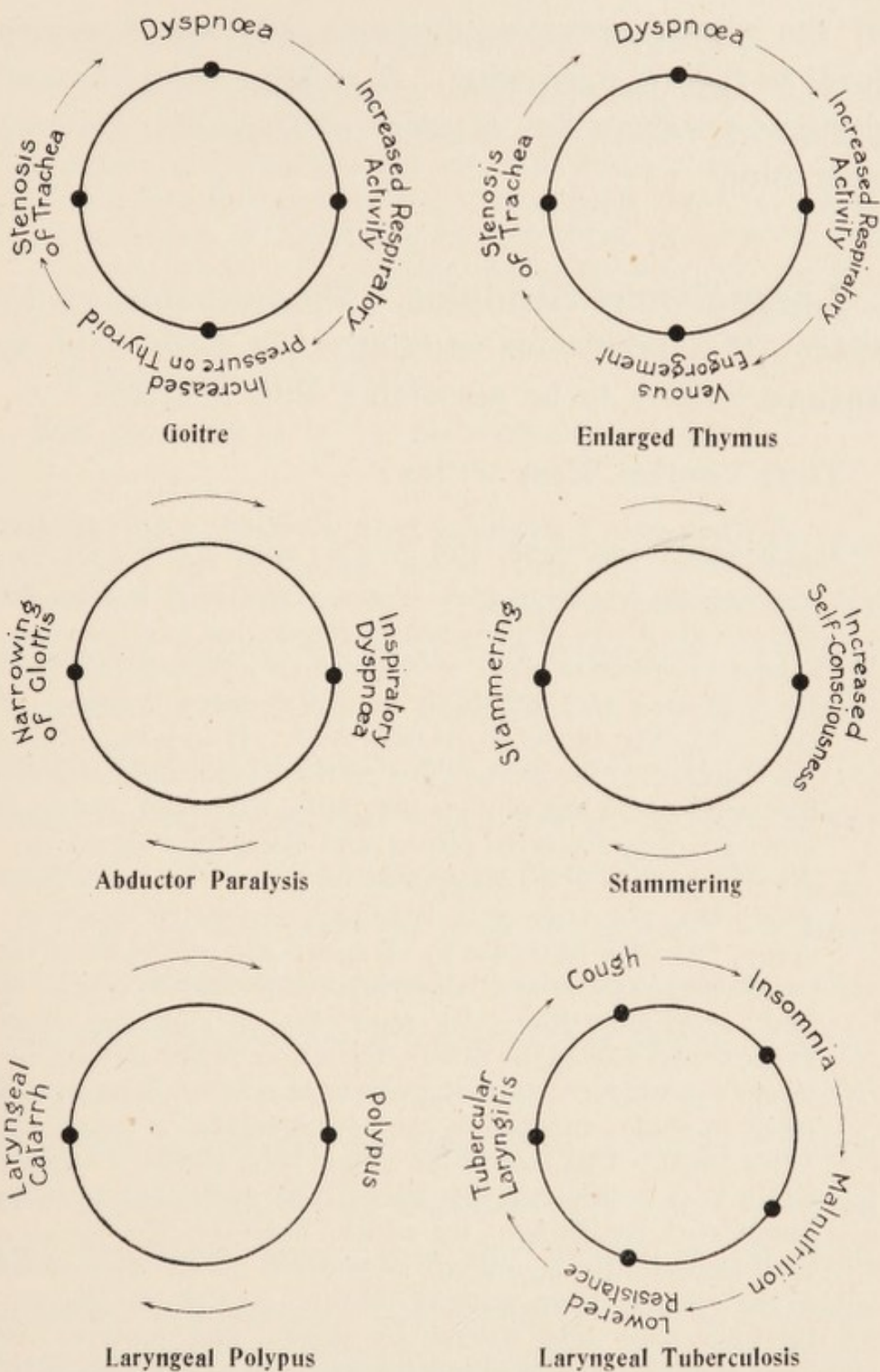


Fig. IX.—Circles associated with the Throat

of the glottis provokes dyspnoea and the dyspnoea leads to further narrowing. A sufferer from bilateral posticus paralysis has a sword of Damocles hanging over him.

Laryngismus Stridulus. The respiratory glottic spasm of laryngismus stridulus has been held by various writers to be associated with a Circle.

Thus Charles West writes :

“When once convulsions have occurred, a new element soon comes into play, which aggravates the danger and increases the frequency of an attack. The blood, imperfectly depurated, if the disturbance of respiration has been considerable, seems in itself to exercise an injurious influence, by increasing the irritability of the nervous system, and thus promoting the return of the attack. If once convulsions have occurred, the probability of their recurrence is much increased ; and the oftener they have happened, the more often are they likely to return, and the graver is the prognosis which you are compelled to form. This rule holds good, too, not only with reference merely to spasmodic croup, but with reference to all spasmodic affections of the respiratory organs, and whooping cough affords one of its best exemplifications. In some fit of coughing more violent than any of the others, the spasm of the larynx is of longer continuance, the face grows livid, a fruitless expiratory effort is made, and before the spasm relaxes a convulsion takes place. This convulsion is but very seldom a solitary one. You notice that for hours it is succeeded by very accelerated breathing ; by which, however, the blood is very imperfectly depurated, as you see by the lips, which never resume their natural colour. At length the disturbance once more reaches its climax, and another, and then another convulsion occurs, with a gradually-diminishing interval, until death takes place.”¹

¹ *Medical Times*, Vol. XIX., p. 522.

Hughlings Jackson held similar views :

“ Great venosity of the blood will much over-stimulate the ‘ naturally very excitable ’ respiratory centres in infants, and thus produce respiratory convulsion.”

“ When there has been first set up any degree of spasm of any part of the respiratory apparatus, the venosity will become greater still, and thus there will be a rapid multiplication of effects.” In other words “ a Vicious Circle is established. Super-venosity initiates the paroxysm, which increases the super-venosity.”¹

But this theory is not universally accepted.

Tuberculosis. Some correlations are called into operation in tubercular laryngitis owing to the associated cough, vomiting and dysphagia. In consequence of the irritable condition of the larynx the cough may be incessant, and rob the sufferer of the sleep and laryngeal rest which are so essential if the progress of the disease is to be checked. The cough may also be accompanied by such frequent vomiting that an insufficient amount of food is retained. The resulting malnutrition diminishes the power of resistance and accelerates the disease. Again, when the epiglottis is invaded by tubercular deposits there is often agonising pain on deglutition, and the suffering and dysphagia may cause the refusal of all food, however appetising. The victim is in as grievous a predicament as Tantalus of old ; emaciation and aggravation inevitably result.

¹ *Brain*, Vol. IX., pp. 14, 15 ; Vol. XII., p. 491.

Laryngitis. In some attacks of laryngitis the congestion and erosion set up severe paroxysms of coughing. The inflamed surfaces are brought into violent contact, and this in turn aggravates the mischief. The accumulation of adhesive secretions is another source of irritation, which is accentuated by the constant efforts of the sufferer to clear the throat. Further, the secretions interfere with the repair of a diseased mucosa or of an ulcer, a reciprocation of action being maintained in all these ways. Even hoarseness gives rise to a Circle by the increased effort to speak or sing which it involves. The greater the effort the more does the laryngeal congestion increase.

Again, in cases of exaggerated reflex irritability of the nervous system, excessive cough may so irritate and exhaust the medullary centre as to pervert the reflex mechanism. The cough becomes uncontrollable and persists even though all local irritation has subsided.

Chronic laryngitis presents an illustration of that form of Circle in which primary disease leaves behind it a diminished resistance to fresh attack, a liability to recrudescence on the slightest exposure. There is no permanent *restitutio ad integrum*, and each attack ends in an increase of mischief.

Stammering. Exaggerated self-consciousness and stammering are frequently correlated. Many persons stammer but slightly when perfectly at ease. But mental perturbation at once aggravates their disability, and this in turn intensifies their perturbation. "The stutterer stutters most when he is trying hardest to avoid stuttering."

Another neurotic Circle is at times established by the globus hystericus, the sensation of a lump that rises in the throat and is probably due to pharyngeal spasm. The disorder is one that occurs in sensitive introspective persons and may be intensified by undue attention.

Tracheal Stenosis. A dangerous Circle may be met with in cases of enlarged thyroid, where this gland compresses the trachea and reduces the lumen to a slit; for acute attacks of dyspnœa are liable to come on quite unexpectedly. Started, perhaps, by some casual effort, the dyspnœa calls the supplementary respiratory muscles (especially the sterno-hyoids and -thyroids) into action. These in contracting press the hypertrophied thyroid against the trachea, further diminish the lumen and increase the dyspnœa. Thus the victim is caught in a dangerous vortex, and,

unless skilled help is promptly given, dies miserably from self-strangulation. Fränkel thus describes the condition :

“ The sufferer gets into the clutches of a Vicious Circle. The greater the want of oxygen, the more vigorous and prolonged the muscular contractions ; the more vigorous the latter, the greater the compression of the trachea and the less room for the admission of air.”¹

Again, where tracheal stenosis is due to a goitre, the heightened blood-pressure produced during expiration raises the pressure in the extensive plexus of veins that encircle the thyroid gland. In this way increased swelling of the goitre is brought about and the stenosis is aggravated.² Venous hæmorrhage into adenomatous cysts may also set up morbid correlations. The increased pressure on the trachea leads to dyspnœa, to over-filling of the right heart, and to congestion of the veins of the neck. This congestion in turn aggravates the hæmorrhage.

Similar complications occasionally follow when, instead of the trachea being compressed from without, there is endotracheal stenosis, due to syphilis or a new growth. The stenosis brings on dyspnœa and a remedial activity of the respiratory muscles. This

¹ Lungenkrankheiten, p. 8 ; Jacobson and Rowlands, Operations of Surgery, Vol. I., p. 677.

² Heymann, Handbuch der Laryngologie und Rhinologie, Vol. I., p. 563.

causes an overfilling of the right side of the heart during inspiration owing to the increased suction action. During expiration, on the other hand, the high intra-thoracic pressure exerted on the lungs hinders the entry of the blood into the lungs, the effect of which further increases the respiratory activity and dyspnœa.

As Frænkel points out :

“ Any condition which accelerates the venous flow on the right side of the heart must under such circumstances aggravate the state of the patient. This applies especially to increased muscular activity, and to the increased dyspnœa necessarily associated with it. A *Circulus Vitiosus* is thus established as a result of the increased respiratory activity.”¹

Enlarged Thymus. Death is occasionally associated with thymic enlargement, either as an independent condition, or as part of a general status lymphaticus.² Owing to the narrowness of the interval (about 2 cm.) which separates the manubrium

¹ Lungenkrankheiten, p. 29.

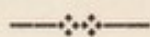
² An excellent summary of the present knowledge of this subject is given by Lubarsch and Ostertag, *Allgemeine Pathologie*, 1911, Vol. XV. (ii.), pp. 672 sq.

from the spinal column in infancy, even a moderate hyperplasia of the thymus may produce tracheal stenosis and consequent thymic dyspnoea. This dyspnoea may in turn lead to venous engorgement and to further enlargement of the thymus, thus setting up a "Vicious Circle that may quickly lead to suffocation."¹



¹ Osler and Macrae, System of Medicine, Vol. IV., p. 799.

Chapter Eleven



Circles associated with the Ears



FOR the purpose of description the ear is divided into three parts: external, middle and internal. The aural Circles may be arranged in the same divisions (Fig. X.).

I.—CIRCLES ASSOCIATED WITH THE EXTERNAL EAR

Eczema. Eczema frequently gives rise to morbid correlations owing to its association with pruritus, as has been frequently pointed out:

“Eczema of the meatus is always associated with very severe itching, which obliges the sufferer to scratch. The resulting abrasions perpetuate the inflammation of the epidermis and thus prevent recovery.”¹

Otitis Externa. When inflammatory secretions are allowed to stagnate in the meatus they set up irritation and congestion, which lead to further secretion and accumulation. Especially is this complication likely to occur if the canal is narrowed and the tendency to retention thus increased.

¹ Guisez, *La Pratique Oto-Rhino-Laryngologique*, Vol. III., p. 83.

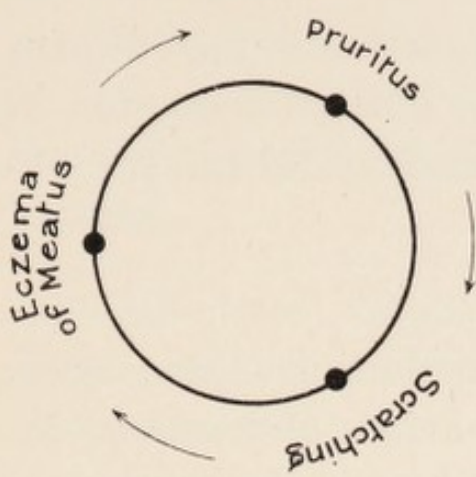
Excess of Cerumen. Excessive secretion of the ceruminous glands due to hyperæmia of the lining membrane may also act in a Circle. For such secretion, especially if its escape is impeded, leads to the formation of a plug of wax which excites further irritation and hyperæmia, and stimulates the glands to abnormal activity.

Otomycosis. Otomycosis is sometimes met with where inflammatory secretions supply a nidus for the nourishment and growth of the parasite, which penetrates beneath the epidermis and excites further inflammation. Indeed the disease largely depends on the fact that the fungus increases the discharge and thus promotes its own growth, the disorder being therefore self-perpetuating.

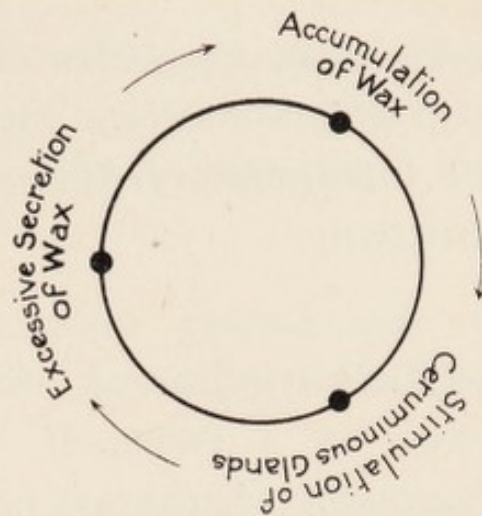
Furunculosis. The skin of the meatus as of other parts of the body may be the seat of an infective Circle, when one or more hair-follicles are invaded by staphylococci. The attack is generally heralded by itching, which leads to scratching, abrasion and fresh inoculation. The succession of boils is usually due to auto-inoculation as a result of scratching.

II.—CIRCLES ASSOCIATED WITH THE MIDDLE EAR

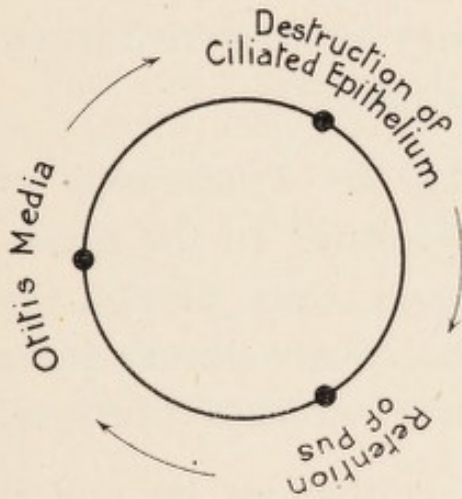
Eustachian Obstruction. A common example is associated with Eustachian obstruction due to vascular engorgement. This obstruction leads to



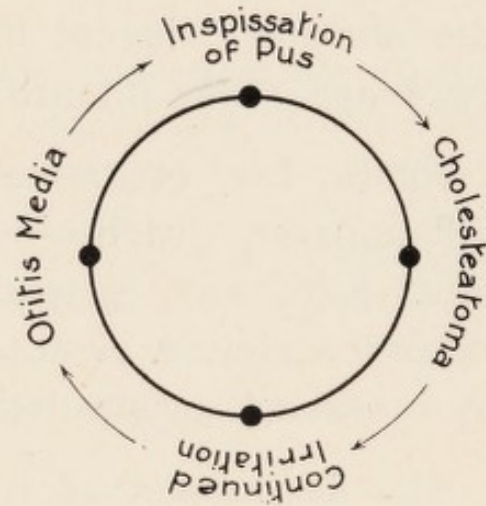
Eczema



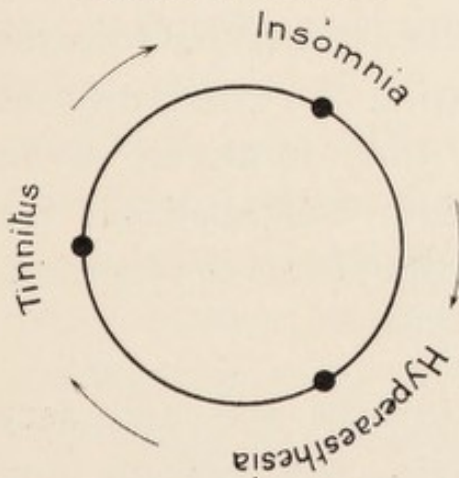
Excessive Secretion of Wax



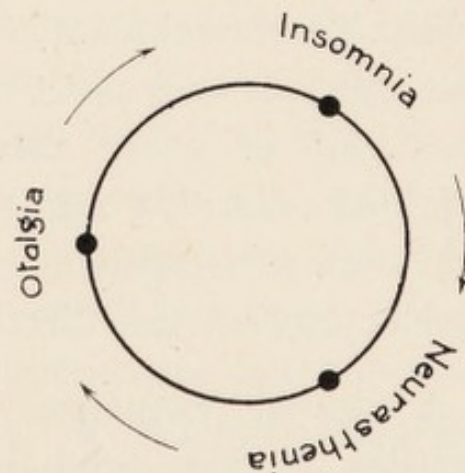
Purulent Otitis Media



Cholesteatoma



Persistent Tinnitus



Otalgia

Fig. X.—Circles associated with the Ears

rarefaction, congestion and exudation in the tympanum, which interfere with the normal resolution of the inflammatory process and thus favour the obstruction.

Otitis media. A more serious condition arises when, as a result of Eustachian obstruction, inflammatory discharges are retained in the tympanum and undergo putrefaction. Such discharges irritate the mucous lining of the cavity and excite further discharge which intensifies the mischief.

Again, the accumulation in the tympanum of inflammatory products exerts pressure on the superficial veins and lymphatics, and thus blocks the natural channels of absorption. Such closure leads to increased accumulation and increased pressure.

The destruction of ciliated epithelium by pus is another source of injurious correlations. During health the movements of the cilia are directed towards the pharynx and assist in clearing the tympanum of epithelial or other detritus. Pus, however, when retained, destroys this epithelium and abolishes the scavenging mechanism. Retention leads to retention, and completes the Circle.

A similar sequence may involve the accessory cavities of the tympanum, viz. the antrum and mastoid cells. Indeed the conformation of the temporal bone, with its warm and moist cavities and the awkwardly situated efferent ducts, is such as

greatly to favour the imprisonment and putrefaction of inflammatory and other *débris*, the narrow communicating channels being readily obstructed and blocked.

Dench thus describes another complication of chronic catarrhal otitis media associated with tubal obstruction :

“ A gradual stretching of the drum membrane takes place from the continued pressure from without, until finally further displacement is prevented by contact with the internal tympanic wall. The pressure against this resisting barrier increases the local inflammatory process. The movement of the drum membrane inward and its persistence in this position is favoured by the action of the tensor tympani muscle, which by contraction draws the membrane inward against the wall of the middle ear. From disuse the tendon becomes shortened, this change being aided by the inflammatory process.”¹

Cholesteatoma. An occasional consequence of purulent otitis media is the formation of a cholesteatoma, consisting of inspissated pus mixed with exfoliated epithelial cells. The constant friction of this mass irritates the enclosing walls and provokes a continual proliferation and desquamation of cells, which in turn become adherent to the mass and so add layer to layer. The cholesteatoma thus increases very much as does a vesical or a biliary calculus, irritation leading to growth and growth to increased irritation.

¹ Diseases of the Ear, pp. 310, 360.

Polypus. According to some aurists, the presence of a polypus is associated with similar morbid correlations to those observed in connection with the nose. In some cases at any rate an aural polypus appears to result from, as well as to perpetuate, suppuration. As Gradle writes :

“ Well-ascertained histories often teach that polypi are started by prior suppurative disease, which their presence then serves to perpetuate.”¹

Abuse of Inflation. An artificial Circle is sometimes established by the habit of inflating the tympanum, when relaxation of the membrane and associated disorders of the ossicles have interfered with good hearing. The sufferer attempts to get rid of the discomfort either by the Valsalvan method of inflation, or by blowing the nose in order to force air into the Eustachian tube. Although there may be a temporary improvement, the constant repetition of the manœuvre leads to further over-stretching of the membrane, the loose folds of which come to lie upon the ossicles and further impair their functions.

As Politzer says :

“ The oftener the Valsalvan method is used, the less the increase in the hearing distance and the shorter the duration of the improvement will be, until finally, after its continual misuse, a high degree of deafness results.”²

¹ Diseases of the Nose, Pharynx and Ear, p. 1910. This quotation applies to the ear as much as to the nose.

² Diseases of the Ear, tr. by Ballin and Heller, pp. 142, 198, 342.

Deafness. Deafness may itself tend to further deafness by preventing the accurate adjustment of the tensor tympani to the vibrations of sound that reach the ear. This imperfect accommodation in turn aggravates the disorder. Hence it is that a deaf person is often inattentive and apparently absent-minded.

Diminished Resistance. Mitchell Bruce has drawn attention to a form of Circle which is met with when a disease is associated with imperfect repair. The incompleteness of recovery is shown by a disposition to relapse, by a diminished resistance to fresh disease, and with every attack the permanent lesion increases until the cumulative mischief may be very extensive. Catarrh of the middle ear is an illustration of such a condition, as Hartmann has pointed out :

“ Even after a complete cure the ear remains a *locus minoris resistentiæ*, and the disease recurs readily.”¹

Another Circle of the same kind is sometimes established when serious and debilitating illness has greatly lowered the resistance of the organism to pathogenic influences. During health a great variety of micro-organisms are present in the normal mucosa of the tympanum without causing any symptoms. If, however, prolonged pyrexia or other noxious influence lowers the resistance and renders the tissues more vulnerable, the pathogenic

¹ Diseases of the Ear, p. 131.

microbes may become active and virulent. Acute aural mischief is set up and further depreciates the general condition.

III.—CIRCLES ASSOCIATED WITH THE INTERNAL EAR

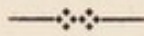
Neuroses. In neuropaths severe tinnitus may give rise to a Circle, similar in its character to that met with where *muscæ volitantes* aggravate neurasthenia. Acute torment may be caused, and the more the mind is concentrated on the disorder the more is the sufferer harassed. Even men of strong nervous temperament have been so grievously obsessed by noises in the head, as occasionally to commit suicide. A somewhat similar condition arises when the severe otalgia that complicates some forms of aural disease induces hyperæsthesia and neurasthenia, especially if insomnia is superadded.

Even apart from tinnitus and otalgia, any impairment of hearing power is likely to react unfavourably on neurasthenia, as Dench points out :

“ After being subjected to the fatigue consequent on the day's activity, the hearing power becomes much diminished, and any effort on the part of the patient to disguise the symptom simply magnifies it. The local impairment, in turn, reacts upon the general condition of the patient to a considerable degree, frequently causing him to become hypochondriac, and in some cases leading to acute melancholia.”¹

¹ Diseases of the Ear, p. 663.

Chapter Twelve



Circles associated with the Skin



THE following classification will be found convenient (Fig. XI.) :

- I. Circles associated with Inflammatory Disorders.
- II. Circles associated with Parasitic Disorders.
- III. Circles associated with Neuroses.
- IV. Circles associated with Appendages of the Skin—Hair, Nails, Sweat and Sebaceous Glands.

I.—CIRCLES ASSOCIATED WITH INFLAMMATORY DISORDERS

Eczema. Various Circles are met with in so common a disease as eczema, which will serve as a type of pruriginous disorders. The itching and associated scratching aggravate, and may

indefinitely prolong, the lesion that produced them. Thus McCall Anderson, speaking of acute eczema, says :

“Scratching always aggravates the disease and tends to bring out fresh crops of eruption. . . . Often, in mild cases, where there is not much infiltration, the disease is kept up by the scratching alone.”¹

Similar correlations occur in chronic eczema, as Kaposi points out :

“The attendant itching is generally very severe and induces violent scratching. This acts as a cutaneous irritant and may excite a fresh eczema.”²

Malcolm Morris, too, emphasises these correlations which complicate pruriginous eczema :

“The itching provokes scratching, the scratching sets up lichenification which irritates the nerve endings and provokes further itching ; and the main object of treatment is to break this Vicious Circle by reducing the lichenification and restoring the damaged tissues to the normal state.”³

Varicose Ulcers. Kaposi has called attention to the “endless *Circulus Vitiosus*” associated with varicose veins of the leg. These veins give rise to itching and scratching, as a result of which papules, excoriations, hæmorrhages and crusts are

¹ Diseases of the Skin, p. 103.

² Diseases of the Skin (tr. by Johnston), p. 345.

³ *British Med. J.*, 1912, Vol. I., p. 1472.

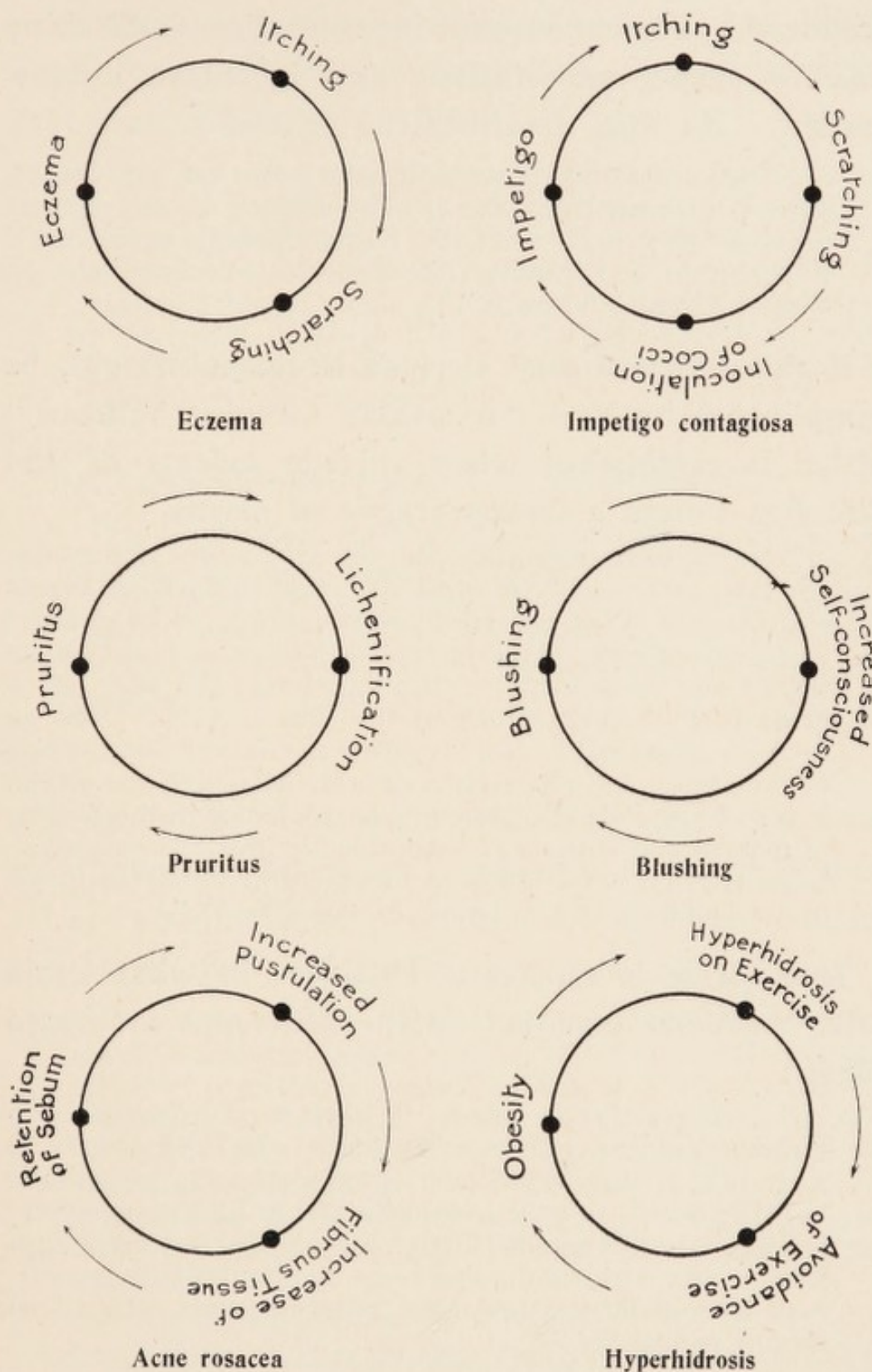


Fig. XI.—Circles associated with the Skin

produced. The consequent inflammation and itching lead to deeper excoriations and increased inflammation. He thus describes the process :

“ Such a condition of the skin predisposes in a high degree, *per se*, to renewed attacks of inflammation on the slightest provocation ; and, since the inflammation again tends to maintain and increase the ulceration, we have here an endless *Circulus Vitiosus*.”¹

Varicose ulcers may also, as Unna points out, be complicated by that “ incurable *Circulus Vitiosus* ” which is established when chronic œdema of the skin has caused a disappearance of elastin :

“ Owing to the loss of elastin, the œdematous skin gradually loses more and more elasticity ; that is, the spontaneous elastic recoil of the collagenous tissue, displaced by pressure or by movements of the body, takes place more and more slowly and incompletely ; the muscles of the skin lose a great part of their action on the skin texture. Thus we have an additional factor, favouring the œdematous swelling of the cutis. By the œdema directly attacking the elastin it interferes with the most important factor in the healing of œdema and induces an incurable *Circulus Vitiosus*, which terminates in complete loss of resistance of the skin, rupture of the epidermis, and lymphorrhœa externa.”²

This Circle is especially obstinate in what Unna calls “ callous eczema ” with thick and indurated edges :

“ This variety of eczema is always complicated by a *Circulus Vitiosus*. The eczema itches ; the itching leads to scratching ; the scratching produces and perpetuates hyperkeratosis, and the hyperkeratosis in turn keeps up the itching. By this noxious Circle very trivial attacks of eczema such as the erythemato-squamous or pityriasiform variety, may be transformed into hard callous eczema, which lasts for the rest of life.”³

¹ Hebra, *Diseases of the Skin* (N.S.S.), Vol. V., p. 25.

² *Histopathology of Diseases of the Skin*, tr. by Walker, p. 40.

³ Mracek, *Handbuch der Hautkrankheiten*, Vol. II., p. 300.

Somewhat similar correlations may complicate other forms of chronic ulceration, as, for instance, that met with in the vulva :

“ As the inflammatory products from the ulcer reach the lymphatic glands a more or less complete blockage (Aus-schaltung) of the gland may result (the functional activity has probably been already affected by sclerosis). The associated lymph stasis will, in its turn, favour hyperplasia of the tissues, while it delays or even prevents the healing of the ulcerating surfaces. In this way a kind of *Circulus Vitiosus* may be established.”¹

Esthiomène is complicated in much the same way :

“ The ulceration, with or without attacks of acute lymphangitis, with or without lymphatic obstruction, by degrees induces a chronic state of hypertrophic lymphangitis, a true vulvar elephantiasis. This lymphangitis, in its turn, reacts on the ulceration, which it aggravates, perpetuates, and renders almost incurable.”²

Intertrigo. Morbid correlations may also complicate eczema intertrigo, a disorder which sometimes arises when opposing surfaces of the skin remain long in contact and chafe each other :

“ In these localities the disorder, beginning as an erythema traumaticum, proceeds by its irritative effects to stimulate the secretion of sweat, which is freely poured out between the adjacent folds of skin, and may there temporarily be imprisoned. The surface, heated and reddened, is also somewhat macerated by the effused perspiration, and the latter, when chemically altered, as it is frequently under these circumstances, adds still further to the original disorder.”³

¹ Koch, *Archiv f. Dermatologie und Syphilis*, Vol. XXXIV., p. 228.

² Dubreuilh, *Pratique Dermatologique*, Vol. II., p. 613.

³ Hyde, *Diseases of the Skin*, p. 143.

Crusts. The crusts that are so frequently present in eczema sometimes serve a useful purpose by protecting the delicate epidermis. At other times they prolong the morbid action by forming a reservoir in which pus collects. This pus, in its efforts to escape, further erodes the subjacent tissues and prolongs the malady, acting very much like an irritant foreign body.

Eczema of Eye-Lid. Skin that has been attacked by eczema is apt to undergo contraction, and may thus establish morbid correlations. For example, eczema of the lower eye-lid often leads to eversion of the punctum lachrymale and to constant lacrymation, which in turn perpetuates the original lesion :

“ When the position of the lid has thus been altered, the tears flow over the cheek, causing eczema, with thickening and excoriation of the skin, so that a Vicious Circle is set up, which tends always further and further to increase the deformity.”¹

Recurrent Eczema. An attack of eczema diminishes the power of resistance to a fresh attack, and thus paves the way for recurrence. Thus Hyde writes :

“ Recovery, even when complete, leaves the patient, it should never be forgotten, with a skin sensitive to irritation and more prone to a fresh attack of the disease than one long virgin of an inflammatory process.”²

¹ Berry, Diseases of the Eye, p. 58.

² Diseases of the Skin, p. 188.

Ill-Health. But the Circles associated with eczema may extend far beyond the skin and involve other great systems of the body. Both acute and chronic neuroses may be established and increase local disturbance. Thus Kaposi writes concerning eczema :

“ The patient may suffer from constant insomnia, from neurasthenia caused by incessant pruritus, and from great loss of serum. General anæmia follows ; the skin, too, is anæmic and unduly sensitive. Under these conditions any gastric disorder, or nervous or physical excitement may provoke eczema, while at other times such sources of irritation would do no harm.”¹

Apart from neuroses, many illustrations will be met with of that “ Vicious Circle that arises between the cause and effect of eczema.” Thus a primary focus may provoke secondary outbreaks in remote parts of the body :

“ In this way the whole organism may become ‘eczematous,’ and the general health suffers. The condition of the blood is altered, and a Vicious Circle is established, wherein ill health conduces to outbreaks of eczema, and the eczema aggravates the ill health.”²

The digestive system is specially liable to be affected, as Malcolm Morris has pointed out :

“ The irritation of the skin may . . . set up reflex irritation in the intestine, preventing the proper digestion of food. The irregularity of the bowels reacts in turn on the skin, and thus a Vicious Circle is established.”³

¹ *Annales de Dermatologie et de Syph.*, 1900, Vol. I., p. 921.

² Kaposi, l.c., pp. 918-922 (quoted in *British J. of Dermatology*, 1901, Vol. XIII., p. 37.

³ *Diseases of the Skin*, p. 276.

Urticaria. Urticaria is another disorder which is perpetuated by scratching :

“ The wheals are accompanied by intense itching, which causes the sufferer to scratch himself. This scratching gives rise to a further crop of wheals.”¹

Lichen Ruber. Lichen ruber planus frequently gives rise to severe itching which goads the sufferer to scratch himself, and so to intensify the disease :

“ In the majority of cases itching is present ; at times it is intense, and interferes with sleep. . . . The patient scratches himself, and the usual effects of scratching show themselves. The itching is usually more severe the greater the nervous irritability. The scratching leads to an extension of the eruption, and rows of papules will be found along the linear marks due to the finger-nails.”²

Clavus. An inflamed corn or clavus owes its persistence and growth to a different Circle. For the more its conical apex (that is the hard core projecting into the cutis) irritates the papillæ and nerve filaments, the more do these (on the subsidence of the pressure) become congested. Hence result increased proliferation of epidermal cells and accelerated growth of the corn.

II.—CIRCLES ASSOCIATED WITH PARASITES

(a)—ANIMAL PARASITES

Oxyurides. A familiar illustration of reciprocal correlations due to an animal parasite is met with in the case of oxyurides. The irritation at the anus

¹ Gaucher, *Maladies de la Peau*, p. 60.

² Gaucher, *l.c.*, p. 133.

and the consequent scratching lead to portions of the helminths or to their eggs being caught under the finger-nails, conveyed to the mouth, and swallowed. From the stomach the ova pass into the intestines and rapidly attain sexual maturity. In this way the irritation ensures, by auto-infection, successive generations of the parasite.

Scabies. Scabies also creates a Circle through the itching and scratching excited by the acari. The parasite may lodge under the finger-nails, and thus be transferred from one part of the body to another. Such transference contributes greatly to the extension of the disorder.

Acarophobia is at times complicated by troublesome correlations :

“There are some persons who have recovered from scabies, but who in consequence of the attack and of the treatment adopted are still suffering from a more or less extensive eczema. They will not believe themselves cured, and worry their doctor to order them more and more active treatment. This only aggravates the eruption and the itching, so that the poor sufferer cannot escape from the Vicious Circle in which he is caught.”¹

Pediculosis. Several Circles are associated with pediculi capitis. The crawling and sucking of the parasites cause itching, and the itching provokes scratching of the infected area. The finger-nails then produce excoriations and effusions, and thus supply further food material for the lice, accelerating

¹ Pratique Dermatologique, Vol. II., p. 739.

their propagation. The louse itself promotes the same result, for when it has satisfied its appetite and withdrawn its haustellum, a drop of blood wells up to the surface, thus supplying further nutriment.

Again, the inflammation and tenderness of the affected skin prevent the proper use of the comb. The diseased spot and the colony infesting it are left undisturbed and the lice can multiply at their leisure. Moreover the cutaneous secretions readily form crusts and glue the hairs together, thus affording a hiding-place for the increase of the parasites. Especially is this the case in those countries where the *plica polonica* is still in fashion. No wonder that, in Hebra's words, "the lice swarm as if one had disturbed a nest of ants." Lastly, lice may be conveyed from one part of the body to another by means of the nails, as in the case of scabies.

(b)—VEGETABLE PARASITES

These may be subdivided into :

- I. Fungi.
- II. Bacterial Micro-organisms.

(i.)—Fungi.

Ringworm. Some important Circles are established when ringworm invades the hairy or the glabrous regions of the skin. For example, if an endothrix member of the trichophytons insinuates itself between the cuticle cells of the hair, it rapidly

proliferates, so that in course of time the shaft becomes stuffed with spores. The hair is thus rendered brittle, and readily breaks off. The detached portion with its spores is then free to spread infection far and wide ; in fact the continual breaking off of the hair is the means by which the spores of the parasite are diffused. In Malcolm Morris's words :

“As the fungus grows the hair breaks, and infected fragments are carried to other parts, there to set up secondary foci of disease.”¹

Another Circle arises when the itching which so often accompanies ringworm leads to scratching and to the auto-inoculation of fresh foci. The parasite may lodge under the nails and be transferred to another portion of the scalp. Or the nail itself may be invaded by onychomycosis, which facilitates the inoculation of fresh areas. The ordinary combing and cleansing of the hair is another means of diffusing infection, and thus leads to further cleansing. Especially is this the case when the hair is washed, since water is a necessity for the nourishment of the fungus. As Sabouraud says :

“Any attempt to cleanse the diseased scalp disperses the infective agent and creates fresh points of inoculation. In girls, for instance, the linear tracks left by the use of the comb are indicated by rows of diseased hairs.”²

When the fungus takes root in the non-hairy skin, it causes dissociation of the epidermic cells, and the *débris* supplies the parasite with the sustenance

¹ Ringworm, p. 62.

² Pratique Dermatologique, Vol. IV., p. 480.

necessary for its further growth. The irritation also provokes inflammation and exudation, both of which are favourable to rapid increase.

Similar correlations are established in the case of favus and tinea versicolor. The fungus is liable to provoke inflammatory reactions, as shown by discomfort, burning or itching. The consequent rubbing or scratching may then inoculate the fungus into fresh areas, there to reproduce a similar reaction.

Otomycosis. Otomycosis, an occasional cause of otitis externa, represents another type. The inflammatory secretions excited by the fungus supply a nidus for its further nourishment and growth, resulting in a perpetuation of the mischief.

(ii.)—Bacterial Micro-organisms.

Impetigo. Impetigo contagiosa or parasitica may be taken as an example. The eruption gives rise to discomfort and itching; the finger-nails get infected by the sero-pus containing the streptococci, which then are readily inoculated into any excoriations produced by the scratching. Indeed repeated auto-inoculations may cause the disease to persist indefinitely. In the words of Sequeira :

“ The eruption itches, and auto-inoculation is exceedingly common. By scratching and simple contact fresh spots form with great rapidity, and large areas may be involved.”¹

Similar correlations are associated with ecthyma, furunculosis and sycosis.

¹ Diseases of the Skin, p. 149.

III.—CIRCLES ASSOCIATED WITH NEUROSES

All dermatoses are complicated by a neurotic element. But it will be convenient to group under a separate heading some conditions where the neurosis is predominant.

Pruritus. A familiar example is presented by pruritus, a disorder which may be independent of local irritation or of pathological changes in the skin. Thus Kaposi speaks of persons in whom the fear of pruritus coming on in a theatre, where there would be no opportunity of privacy, sufficed to excite an attack. Leloir writes thus :

“Whether the affection proceeds rapidly or slowly, it almost always culminates in an itching of great intensity. The patient is irresistibly compelled to scratch. . . . In many cases the scratching aggravates the pruritus, makes it more intense, more persistent, and more extensive, by increasing the reflex irritation.”¹

Hyperkeratosis. In obstinate cases the itching may culminate in what Unna² calls the “*Circulus Vitiosus* of scratching and hyperkeratosis,” a correlation which has been strongly upheld by Brocq and Jacquet, although other dermatologists believe that a slight eczema or other lesion may start the process. If the scratching has been indulged in for

¹ Twentieth Century Practice of Medicine, Vol. V., p. 766.

² Mracek, Handbuch der Hautkrankheiten, Vol. II., p. 306.

long, a permanent change known as lichenification is apt to follow. This again perpetuates the pruritus, as Macleod has described :

“ When lichenification is established, a Vicious Circle is set up, for the thickening of the skin irritates the nerve-endings and so keeps up the pruritus, whilst the rubbing which is indulged in to relieve the pruritus increases the lichenification.”¹

In other cases of long-continued pruritus innervation may be so disturbed as to produce an exaggerated activity of the reflex mechanism of scratching. The habit may persist after all peripheral lesion has disappeared. The condition resembles that occasionally met with in other muscular mechanisms such as blepharospasm, cough, vomiting.

Pruritus ani and pruritus vulvæ have been dealt with in Chapters V. and VII.

Prurigo. In prurigo also the neurotic element plays an important part. There has been much dispute as to whether the scratching gives rise to the papules or the papules to the scratching ; but whatever the sequence, a Circle is established. Thus Sir Jonathan Hutchinson writes :

“ Prurigo, from whatever cause it may have begun, tends to perpetuate or even to aggravate itself. It causes itching, and the itching causes scratching, and the scratching extends the prurigo, and thus the patient goes on from bad to worse.”²

¹ Allbutt and Rolleston, System of Medicine, Vol. IX., p. 298.

² Lectures on Clinical Surgery, Vol. I. (i.), p. 30.

Blushing. Another Circle is associated with blushing—a vaso-motor disorder provoked by emotional disturbance and showing itself by dilatation of the blood-vessels of the skin. It is especially common in nervous, self-conscious women. The more self-conscious, the more they blush. The harder they try to avoid blushing the worse they suffer.

IV.—CIRCLES ASSOCIATED WITH HAIR, NAILS, SEBACEOUS AND SWEAT GLANDS

(a)—THE HAIR

Several Circles involving the hair (*e.g.* pediculosis, ringworm) have been already alluded to under parasitic disorders and need not be further dealt with.

Trichiasis. Abnormal arrangement of the eyelashes, known as trichiasis, may sometimes create correlations owing to secondary keratitis and blepharospasm :

“The corneal inflammation causes great pain with photophobia and lacrymation, owing to which the patient keeps his eyes convulsively closed (blepharospasm), and by so doing causes a still greater approximation of the incurved lashes to the cornea, and establishes a Vicious Circle.”¹

Baldness. According to some writers baldness may be dependent upon reciprocally acting factors. Owing to the fashion of keeping the head covered, and of thus depriving the hair of sun, air and nourish-

¹ Lawson, Diseases and Injuries of the Eye, p. 459.

ment (especially if a hard-rimmed hat is worn), the hair in the regions most frequently covered tends to atrophy and falls out. Thus Brocq writes :

“ Persons who keep their heads constantly covered with a heavy and tightly-fitting hat lose their hair much more rapidly than those who keep their head uncovered.”¹

The result is more or less extensive baldness, which in its turn provokes increased use of the head gear.

Hirsuties. Hirsuties may lead to an artificial Circle owing to the practice of epilation or to the use of depilatories. Neither epilation nor depilatories are of any permanent value ; they merely make new hair grow more luxuriantly than before, owing to the increased local circulation and to hypertrophy of the papillæ. Thus the hypertrichosis leads to epilation, and this to further hypertrichosis.

(b)—THE NAILS

The nails have more than once been mentioned as sharing in the formation of Circles. At times when used to relieve pruritus, they become the carriers of infection, as in the case of oxyurides or impetigo, and thus serve to spread the disease.

At other times they aggravate the pruriginous disorders they are intended to relieve, as in the case of urticaria and eczema.

¹ Pratique Dermatologique, Vol. I., pp. 318, 375.

Onychogryphosis. But the nails themselves may sometimes be diseased. Thus Heller has drawn attention to a Circle that is established in onychogryphosis, owing to a keratoma in the nail-bed :

“ This cushion-like growth, caused by the inflammatory irritation in the matrix, raises up the nail-plate and disturbs its natural growth. This raising of the nail also increases the angle between the matrix and the nail-plate, as this latter emerges from the posterior fold. A Circulus Vitiosus is now established, since the space between the plate and the matrix (owing to the plate being obliquely raised) again becomes filled by the horny growth.”¹

Ingrowing Toe-Nail. Other correlations may be associated with onychia, where inflammation leads to accelerated nail growth, and this in turn intensifies the inflammation. An illustration is afforded by ingrowing toe-nail, as Sir Jonathan Hutchinson points out :

“ As soon as any degree of inflammation has been set up, the conditions aggravate each other ; the inflamed nail expands and grows laterally against the raw surface, now unable to tolerate any pressure. No doubt, also, as in onychia maligna, the secretion produced is in itself a source of irritation.”²

(c)—THE SEBACEOUS GLANDS

Sebaceous Cysts. Many Circles depend on obstruction to efferent ducts and the consequent accumulation of retained secretions. For example,

¹ Mracek, Handbuch der Hautkrankheiten, Vol. IV. (ii.), p. 569.

² Lectures on Clinical Surgery, Vol. I. (i.), p. 144.

hyperkeratosis of the outer third or funnel of a pilo-sebaceous follicle may give rise to a comedo plug, whose presence acts as an irritant and promotes further hyperkeratosis. Sebaceous cysts often arise by a similar process, the accumulation of sebaceous matter causing hyperactivity of the follicular walls and increased accumulation. The same may be said of acne vulgaris, where inflammation of the walls of the follicles is probably associated with microbic infection. The increased secretion leads to increased irritation and *vice versa*.

Acne Rosacea. Some interesting correlations may be present in acne rosacea, and account for the chronic nature of the disorder. The disease begins with temporary but recurrent angio-neurotic flushing of the skin over the central portion of the face. In course of time these flushes give rise to a network of vascular dilatations associated with telangiectases and acne-like papules, resulting eventually in inflammation of the sebaceous glands. The relations between the telangiectases and the pustules are thus described by Brocq :

“ A form of Vicious Circle is established. The inflamed acne favours the afflux of blood to the face, and aggravates the dilatation of the blood-vessels ; while, on the other hand, the chronic congestion of the skin favours the production of acne and the induration round the basis of the pustules.”¹

¹ Dermatologie Pratique, Vol. I., p. 831 ; Pratique Dermatologique, Vol. I., p. 227.

The later stage of the disease is characterized by an enormous development of sebaceous glands and fibrous tissue—changes which reciprocally aggravate one another. The process is similar to that met with in rhinophyma and acne cheloid, and is thus described by Wilfred Fox :

“The fibrous tissue obstructs further the sebaceous ducts, renders the outflow more difficult, and by stagnation favours additional pustulation, which in its turn produces fresh fibrous tissue, and so a Vicious Circle is set up.”¹

Seborrhœa. Facial seborrhœa in neurotic persons may at times establish a Circle in the following way :

“In some chloranæmic and neurasthenic individuals, men and women, facial seborrhœa appears in the form of oily, sweaty drops upon the nose and forehead, not alone after overheating, but also suddenly, as the result of nervous excitement. This Vicious Circle may lead to considerable mental depression, inasmuch as the patients devote their entire attention to this condition, imagine themselves scrutinized by every one, and dread intercourse with others.”²

Large accumulations of fat and epidermis, due to seborrhœa, are sometimes observed in the retracted depression of the umbilicus. In course of time this mass may become rancid and irritating, thus provoking increased secretion and accumulation. Seborrhœa genitalium is another example, which arises when, through want of cleanliness, smegma is allowed to collect and decompose. Especially is this likely to

¹ Allbutt and Rolleston, System of Medicine, Vol. IX., p. 697.

² Kaposi, Diseases of the Skin, tr. by Johnston, p. 123.

happen with a phimotic prepuce. The phimosis causes retention ; the retention sets up balanoposthitis and aggravates the phimosis. Thus Corner writes :

“ The greater the irritation of the glands by decomposing secretion, the greater the amount of secretion they produce. In this way a Vicious Circle is established.”¹

In females a similar condition results if the smegma about the clitoris and vulvar folds is not frequently removed. Decomposition, vulvitis or balanitis clitoridis lead to increased secretion and accumulation.

(d)—THE SWEAT GLANDS

Hyperhidrosis. General hyperhidrosis, when associated with the prostration of serious disease, is frequently the result of debility as well as the cause of its aggravation :

“ The colliquative sweats of convalescence are nothing more than the expression of a state of profound weakness. . . . The convalescent perspires because he is weak, and this perspiration aggravates his weakness. This is a Vicious Circle from which he must escape without delay.”²

Some stout persons, in whom the thick layer of fat diminishes the amount of heat given off by radiation and conduction, are much troubled by abundant perspirations. These make the sufferer lazy, and thus tend to increased obesity and perspiration.³ Hyperhidrosis of the axillary regions frequently causes women to wear impervious shields,

¹ Male Diseases in General Practice, p. 398.

² Bouveret, *Les Sueurs Morbides*, p. 121.

³ Krehl, *Clinical Pathology*, tr. by Hewlett, p. 342.

in order to protect their dress from unsightly stains. The shields, however, encourage the retention and decomposition of the secretions, and thus provoke irritation of the skin and further hyperhidrosis.

Anhidrosis. In persons who take too little exercise an inadequate amount of perspiration may also establish morbid correlations. For the want of exercise causes anhidrosis, insufficient consumption of liquid, constipation, lassitude and a further disinclination for exercise.

Dyshidrosis. Many dermatologists have attributed pompholyx or dyshidrosis to disorder of the sweat apparatus, although the matter is still *sub judice*. But in any case the associated itching and scratching are both cause and effect of the disorder. As Brocq says :

“The patient complains of intense itching and burning. The more he scratches himself the more numerous and the larger do the vesicles become. They seem almost to develop under the fingers at the itching spots as these are being rubbed.”¹

Retention cysts of the sweat glands may be due to a Circle, much as happens in the case of other glands. Owing to its narrow lumen some obstruction or kinking of the sweat duct is readily brought about, leading to accumulation of sweat and cystic dilatation. This may in turn cause further obstruction and further accumulation, until the cyst reaches a considerable size.

¹ Dermatologie Pratique, Vol. II., p. 133.

Iodide Eruptions. A grievous artificial Circle has at times been established when potassium iodide has been prescribed for the cure of various forms of dermatitis, and is perhaps best dealt with here, since iodide eruptions are caused by irritation of the sweat and sebaceous glands.

When the drug has provoked an eruption which is attributed to the original disorder, increased doses of iodide may be ordered in ignorance of the real cause of the aggravation, and in the hope of curing the very lesions the drug has produced! There can be no doubt that death has sometimes resulted from such a lamentable error. Thus Thibierge writes :

“The various lesions provoked by iodide of potassium are often mistaken for manifestations of syphilis. This error of diagnosis leads to further use of the remedy, or even to increased doses. Hence result a persistence and aggravation of the eruption.”¹

Again, Brocq speaking of iodide eruptions, says :

“When the true nature of the eruption is not recognized, and the physician consequently persists in the administration of the iodide, the cutaneous lesions rapidly increase in number and severity, invade the mucous membranes, and become hæmorrhagic. Albuminuria, diarrhœa, and marasmus gradually supervene, and the patient may succumb.”²

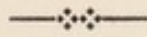
The danger is perhaps all the greater from the fact that *accoutumance* does not occur. One attack of a drug eruption seems to intensify the susceptibility to subsequent attacks.³

¹ Pratique Dermatologique, Vol. II., p. 487.

² Dermatologie Pratique, Vol. I., p. 412.

³ Morrow, Monographs on Dermatology (N.S.S.), 1893, pp. 367, 500.

Chapter Thirteen



The Circle as a Cause of Death



THE importance of the Circle as a factor which aggravates disease has been abundantly demonstrated in the previous pages. But it may be useful, under a special heading, to emphasise the frequency with which death results from this complication. The *Circulus Vitiosus* becomes the *Circulus Necator* (Fig. XII.).

Many years ago Bichat sought to distinguish between death by the heart, death by the lungs, and death by the brain.¹ Such a classification can no longer be accepted in the light of modern pathology, since we know that, by whichever gate-way danger first approaches, actual death results from the arrest of all the vital functions. Nevertheless, as a matter of convenience, we may associate deaths with the same triumvirate of vital organs, and describe:

- I. Deaths associated with the Vascular System.
- II. Deaths associated with the Respiratory System.
- III. Deaths associated with the Nervous System.

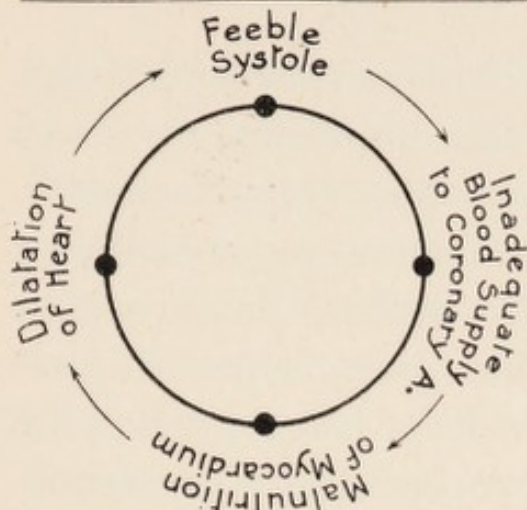
¹ Recherches sur la Vie et la Mort.

I.—DEATHS ASSOCIATED WITH THE VASCULAR SYSTEM

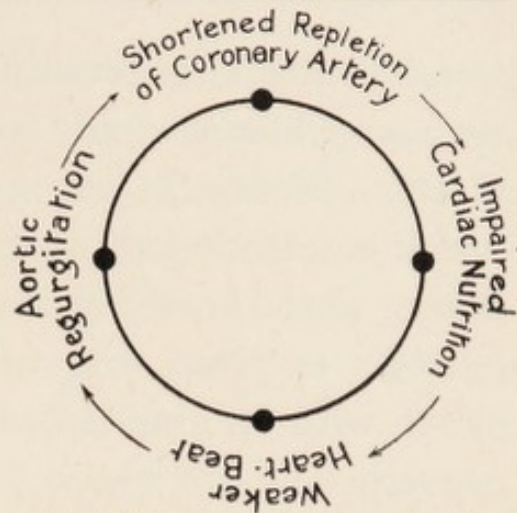
Syncope. Syncope due to heart failure ranks as one of the commonest modes of death, and occurs under a variety of circumstances.

Cardiac Dilatation. For example, acute cardiac dilatation may weaken the coronary circulation to such a degree that insufficient blood reaches the myocardium to allow of its continued activity. The less the blood supplied to the myocardium, the feebler the systole, and *vice versa*. This Circle probably caused the death of the soldier who raced to Athens with the news of Marathon, and dropped dead on arrival. The prolonged strain led to cardiac dilatation, to inadequate coronary circulation, to inadequate nutrition of the myocardium, to further dilatation and to syncope.

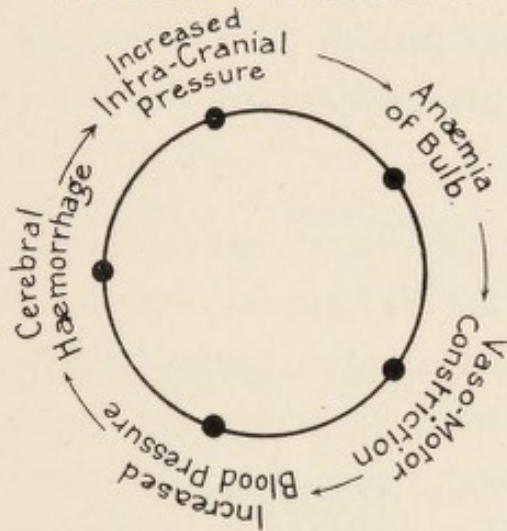
Arterial Sclerosis Death frequently results from arterial sclerosis producing coronary obstruction, a condition which accounts for the demise of many elderly persons, to whom death comes like a "bolt from the blue." The morbid process has probably been in progress for years, until a stage is reached when the lumen of one or both coronary arteries is almost obliterated by degenerative processes. The exaggerated *vis a fronte* requires an increased *vis a*



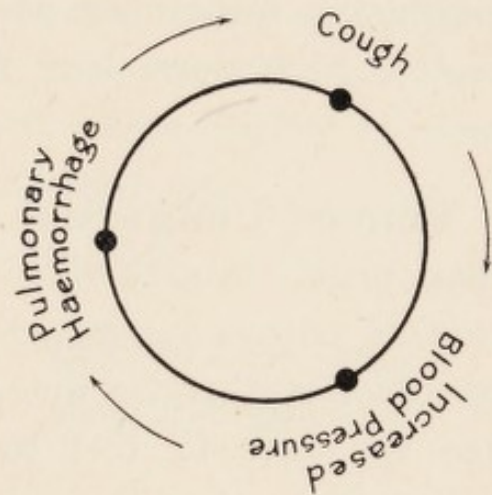
Death from Cardiac Dilatation



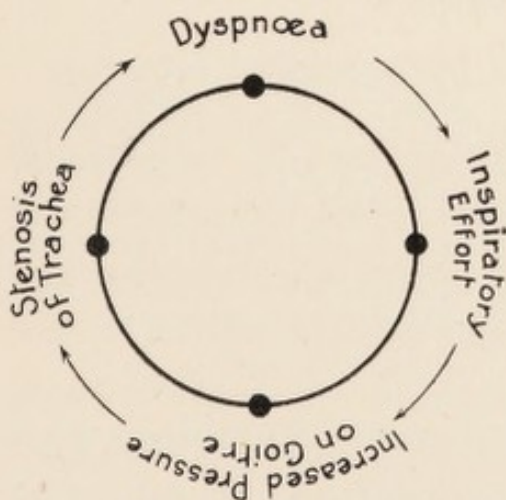
Death from Aortic Regurgitation



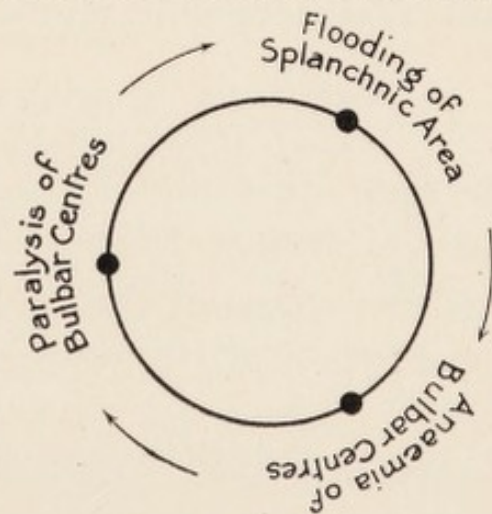
Death from Cerebral Hæmorrhage



Death from Pulmonary Hæmorrhage



Death from Goitre



Death from Shock

Fig. XII.—The Circle as a Cause of Death

tergo, if life is to continue, whereas the diminished coronary blood supply actually diminishes the force of the systole. In other words the cardiac ischæmia and the defective coronary circulation aggravate each other, until death closes the scene. Fatal angina pectoris is often due to this Circle, some unusual effort, with its extra requirement of blood, proving the proverbial "last straw." Syncope may be instantaneous, coeval with a single pang, attitude and expression remaining perfectly placid. No blood, no systole here represents the mechanism of death.

Venous Congestion. Progressive heart failure may prove fatal owing to the reciprocal action of cardiac venous engorgement and cardiac malnutrition. As the heart grows incompetent, the coronary veins are the first to feel the back pressure and their congestion interferes with the circulation through, and therefore with the nutrition of, the heart.

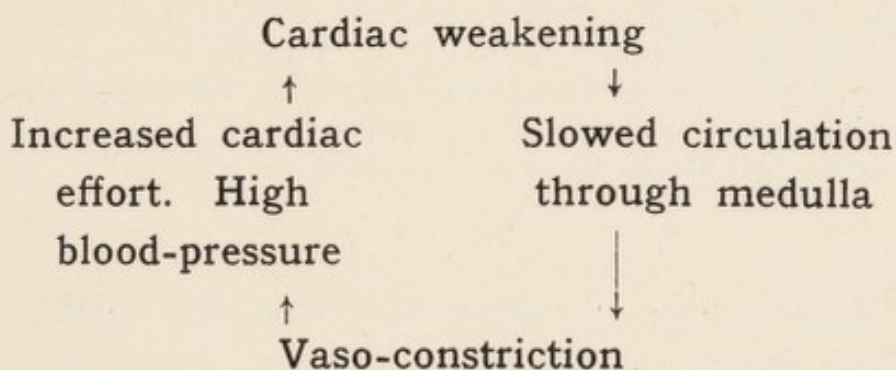
S. West thus describes the pathological sequence :

"If the nutrition is thus affected, the muscle will be weak, and the heart will dilate. This weakness still further increases the venous congestion, which in turn increases the weakness again. So a Vicious Circle is established, and an explanation given to the extraordinary rapidity with which the heart failure often develops when once it has set in."¹

High Blood-Pressure. Another dangerous condition is the paradoxical association of an overstrained and weakened heart with an abnormally

¹ *British Med. J.*, 1905, Vol. II., p. 1032.

high blood-pressure. The slowing of the circulation tends to produce anæmia of the medullary centres, which respond by inducing vaso-constriction, as a result of which a larger quantity of blood is forced up to the medullary centres. The already weakened heart is thus called upon for a supreme effort, and the weaker it is the more do the imperious medullary centres insist on more blood. At length comes a moment when the pressure within the weakened ventricle is raised beyond endurance. Suddenly, according to the "all or nothing" law, the heart stops in diastole. The Circle is thus graphically represented by Hirschfelder :¹



Rupture of Valve. Some fatal Circles are established in connection with valvular disease. For example, an aortic valve may rupture during violent exertion. The regurgitation throws a sudden and severe strain on the heart, which has no time to accommodate itself to altered conditions. Dilation of the ventricle follows, with a feebler systole, increased regurgitation and in severe cases immediate death.

¹ Diseases of the Heart and Aorta, p. 237.

Aortic Stenosis. Amongst the various forms of chronic valvular disease, stenosis and incompetence of the aortic orifice, associated with dilatation of the ventricle, most frequently lead to death. After, perhaps, many years of fairly comfortable life, the compensatory hypertrophy wears out and is replaced by dilatation. The fatal Circle may be summarised as follows:—regurgitation, dilatation, weakened systole, impaired coronary circulation, and increased regurgitation. Terribly sudden may be the syncope:

“Transition from a state of compensation to incompetence seems often very sudden. . . . Insufficiency of the myocardium which develops suddenly is due to the Vicious Cycle created by lowering the pressure in the coronary arteries which occurs directly the ventricle is unable to maintain the required aortic pressure. Thus, at the very time when the heart muscle requires the greatest supply of nutrition, the supply of blood to the myocardium lessens.”¹

Thrombosis. Sudden death is sometimes due to thrombosis or embolism of the heart or large vessels. If not immediately fatal, the embolus or thrombus may cause eddies and obstruction which in their turn lead to rapid and extensive clotting. This steadily adds to the size of the embolus or thrombus, thereby increasing the obstruction. The greater the obstruction the larger the surface on which the blood can coagulate, and the more rapidly does the obstruction grow. The circulation may indeed be completely arrested.

¹ Osler and Macrae, System of Medicine, Vol. IV., p. 31.

Congenital Heart Disease. Congenital morbus cordis is not an uncommon cause of death, the mechanism varying with the malformation. Sometimes the demise may be due to what Hirschfelder calls the "Vicious Circle of the open foramen ovale." The malformation is then usually complicated with pulmonary stenosis which allows enough blood to reach the lungs, so long as a quiet mode of life is pursued, while the remainder of the blood passes through the foramen ovale. If, however, violent exercise is taken, more blood must pass through the foramen directly to the left side of the heart (in consequence of the pulmonary stenosis) and thus escapes aëration. The result of the venosity is a rise in blood-pressure, which again causes more blood to be driven through the foramen, ending at times in speedy death.

Rupture of Heart. Spontaneous rupture of the heart may be due to a Circle associated with progressive degenerative changes and dilatation of the cardiac muscle. As the strain on the walls of a sphere or spheroid increases with its circumference, so the heart dilates the more the greater the strain on its walls, leading to further dilatation and occasionally to rupture. When rupture has occurred, the primary loss of blood stimulates the vaso-motor centre, which stimulus calls forth a general vaso-constriction, raises the blood-pressure, and thus intensifies the hæmorrhage.

Similar consequences are associated with rupture of an aneurysm.

II.—DEATHS ASSOCIATED WITH THE RESPIRATORY SYSTEM

Asphyxia. Asphyxia, due to the interruption of respiration, is a frequent cause of death, and great interest attaches to the mechanism of the Circle involved in the fatal issue. For example, when a goitre compresses the trachea and narrows the lumen, any casual effort that calls the supplementary respiratory muscles into action may lead to a most alarming dyspnœa. For unfortunately these muscles, as they contract, press the hypertrophied thyroid against the trachea and thus further diminish the lumen. They thus increase, instead of relieving, the dyspnœa, which often ends in strangulation. In other words such a degree of stenosis as is perfectly compatible with life, may prove rapidly fatal, through the intermediary of a Circle.

But we can pursue our analysis further and point out other Circles concerned in the mechanism of death from asphyxia. In consequence of the obstructed respiratory exchange the venosity of the blood increases, respiratory movements grow more vigorous, blood-pressure rises, and the heart is slowed by the cardio-inhibitory centres in the medulla. Owing to the increased pulmonary obstruction *a fronte* and the increased supply of blood *a tergo* (due

to inspiratory suction movements), the right heart becomes gorged with blood, and eventually dilated and paralysed. This in turn leads to further venosity, which poisons the myocardium and tends to further dilatation, until at length the right auricle and ventricle lose all power of contracting.

A similar process also involves the left side ; but the progressive and dangerous dilatation of the right side plays the chief *rôle*, and contributes mainly to the fatal exitus.

The gradual asphyxia which so often supervenes during the terminal stage of illness is also complicated by a Circle. For it is characterised by shallow respirations which do little to aërate the blood, and thus lead to narcosis of the respiratory centre, still shallower respirations and death. This is indeed a merciful Circle which leads to a peaceful painless end.

Atelectasis. Pulmonary atelectasis is frequently fatal in weakly or rickety infants, whose death gives rise to great consternation, since a trifling catarrh may suffice to start the pathological sequence. Any accumulation of secretion is liable in such weaklings to diminish the quantity of air entering the air cells, and such diminution, as Wilson Fox

points out (cf. p. 63), favours a further accumulation. The associated venosity of the blood may, through interference with the normal reflexes, form an aggravating factor.

Hæmoptysis. Hæmoptysis may be complicated by a most pernicious Circle, which is largely responsible for the profusion and prolongation of the hæmorrhage. In the first place the intra-pulmonary irritation of the effused blood induces cough; each act of coughing, like any other exertion, causes rise of blood-pressure; each rise of blood-pressure is apt to renew the hæmorrhage. Thus in a severe attack a person may be "choked in his own blood." Mental excitement supplies an aggravating factor, as it also does in the allied condition of hæmatemesis. Such excitement may produce a rise of as much as 40 mm. Hg in the systolic pressure, a rise which often suffices to restart the hæmorrhage. Lastly, we may have the same general vaso-constriction due to anæmia of the vaso-motor centre that has already been alluded to. These factors, acting cumulatively, adequately explain the fatal hæmoptysis that is sometimes met with.

Empyema. A similar mode of death may result

from the perforation of an empyema into the respiratory passages. Every cough, although an act of self-defence, increases the flow of pus, which may flood the passages, in spite of vigorous expectoration :

“The more the patient coughs, the more profusely the pus streams into the bronchi as a result of the expiratory rise in pressure, and such a *Circulus Vitiosus* can only end in death.”¹

Other fatal Circles associated with the respiratory tract will be found in Chapters IV. and X.

III.—DEATHS ASSOCIATED WITH THE NERVOUS SYSTEM

Apoplexy. Cerebral hæmorrhage may cause death, through the intermediary of a striking Circle. The factors which give rise to the condition have already been described (cf. p. 16), and need not be repeated. Where death supervenes rapidly, the blood under the abnormally high pressure has probably compressed and paralysed the vagal and respiratory centres in the medulla. Such a terminal event, however, is uncommon. The fatal issue is probably more often due to another Circle which has also been

¹ Pick and Hecht, *Clinical Symptomatology*, tr. by Koessler, p: 259.

described (cf. p. 17), where exhaustion of the vaso-motor centre leads to splanchnic dilatation, cerebral and cardiac anæmia, further exhaustion and death.

Paralysis of Vaso-motor Centre. Death is sometimes due to inhibition or paralysis of the vaso-motor centres as a result of terror or other strong emotion.

During health the activity of those centres is increased or diminished according as arterial pressure falls or rises. But strong emotion may paralyse the vaso-motor mechanism. The splanchnic sluice gates are opened, the blood-pressure falls, the cerebral vessels are emptied, with the result that the depression of the centres is accentuated, it may be, beyond recovery. The heart too may be involved in the Circle, and intensify the danger. For owing to the progressive accumulation of blood in the splanchnic area, an insufficient quantity may return to the heart to enable this organ to carry on the circulation. The defective coronary circulation still further weakens the myocardium, with the result that the heart may suddenly stop in diastole. This is probably the mechanism of death in various forms of shock, in the collapse often met with during acute disease, in

severe diarrhœa, in perforation of abdominal viscera, etc.¹

Convulsions. Both general convulsions and that local form of convulsion—the respiratory glottic spasm of laryngismus stridulus—may cause death through the increasing venosity of the blood. The venosity is both cause and effect of the convulsions.

Fuller details as to the mode of death in these conditions will be found on pp. 21, 170.

Hydrocephalus. Death is occasionally met with in cases of hydrocephalus, when the fluid has accumulated in the ventricles as a result of a Circle. The primary lesion may be some obstruction in the communicating channels, leading to dilatation of the ventricles. The dilated ventricles may then so displace the adjacent parts as to press on and increase the obstruction to which the accumulation of fluid was primarily due. For example, the cerebellum and medulla may be pressed down into the foramen magnum so as to plug that aperture. Such plugging in turn increases the distention of the ventricles, raising the pressure to such a level that the respiratory centre is paralysed.

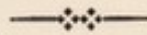
¹ Heineke, Die Todesursache bei Perforationsperitonitis, *Deutsches Archiv f. Klin. Medicin*, 1901, Vol. LXIX., p. 429.

These illustrations suffice to establish the proposition that the fatal issue of disease is frequently due to the operation of a Circle.

Similar Circles are operative in many forms of violent death, e.g. drowning, hanging, cut-throat and poisoning.



Chapter Fourteen



Artificial Circles



ILLUSTRATIONS of Circles which are not due to disease, but are artefacts, will be found in most of the preceding Chapters. It will be useful, however, to group under a separate heading some additional examples (Fig. XIII.).

Cathartics. The excessive use of cathartics, due to the wide-spread advertisement of quack remedies or to the impatience of over-zealous disciples of Æsculapius, is responsible for many an artificial Circle.

The irritation of the mucous membranes brought about by indiscriminate drugging depraves the secretions and produces a condition which is urged as a plea for further purgation :

“ And thus the practice proceeds in a Vicious Circle of habit from which the patient is rarely extricated without more or less injury to his future health.”¹

¹ Sir Henry Holland, *Medical Notes and Reflections*, p. 100, called attention to this Circle as far back as 1839, and there are probably still earlier references.

Constipation may be relieved, but is followed by a more obstinate constipation requiring stronger aperients.

Alcohol. Circles may result from the use of alcohol and various drugs, especially in neurotic persons :

“ In a neurasthenic individual a stimulant gives temporary relief, but leaves the neurasthenia as it is or even increases it, and afterwards the neurasthenia causes an irresistible desire for the stimulant which, while it gave relief, aggravated the disorder. Therefore the substances in question cannot be considered as the only causes of the disorders mentioned, but they form a secondary link in the Vicious Circle, which always in pathology plays such an important rôle, the primary link being the morbid constitution.”¹

The excessive indulgence in alcohol is often followed by dilatation of the stomach associated with impaired muscular activity. This condition provokes a sense of exhaustion and disinclination for work which tempts to further indulgence. The dilatation and stasis also tend to flatulence which aggravates the dilatation :

“ In this condition the stomach never contracts fully and effectively so as to expel its contents into the bowel ; hence it always contains some remnants of a meal, which ferment and cause “ wind.” This in its turn tends to inflate the stomach and itself to increase the dilatation, and thus the Vicious Circle goes on.”²

If the misguided victim still flies to the bottle for relief, he but pursues the will-o'-the-wisp that lures to destruction.

¹ Tuke, Dictionary of Psychological Medicine, s. Neurasthenia; cf. also Müller, Handbuch der Neurasthenie, p. 255.

² Horsley and Sturge, Alcohol and the Human Body, pp. 193, 205.

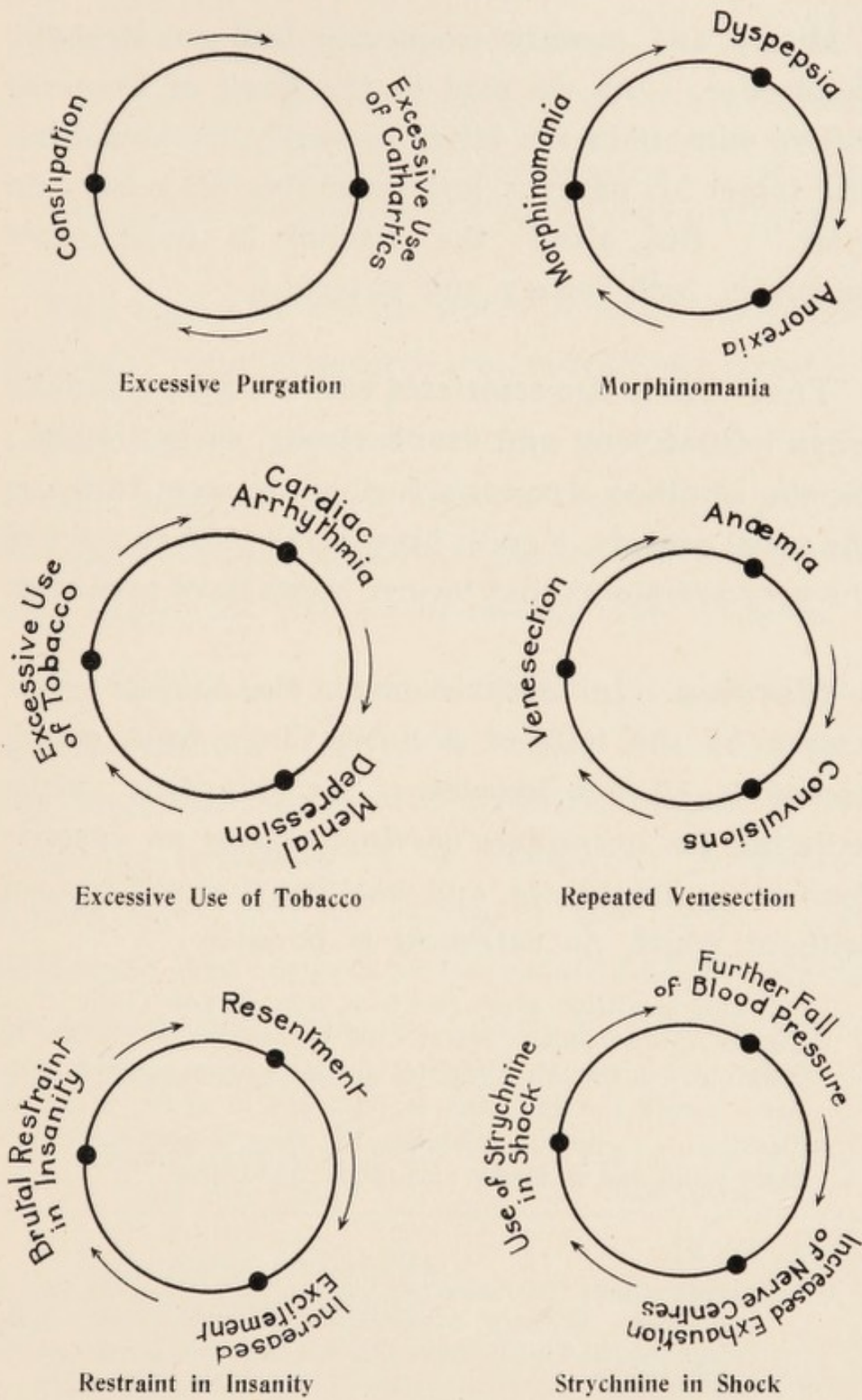


Fig. XIII.—Artificial Circles

Misery and poverty frequently lead to alcoholic indulgence. As we read in the Book of Proverbs "Give wine unto the bitter in soul; let him drink and forget his poverty, and remember his misery no more."¹ But alas! the alcohol in most cases intensifies both misery and poverty.²

Tea. Tea is also associated with a Circle, especially when infused long and drunk strong, as in Ireland; for the resulting dyspepsia further recourse to tea is the usual remedy, a fresh brew being used to remove the very symptoms that former brews have produced.

Morphia. In morphinomania the *habitué* is ensnared by the toils of a habit Circle from which escape is all but hopeless; for this drug, while satiating the immediate craving, creates an appetite for further indulgence, and weakens that self-control without which no salvation is possible:

"This condition gives rise to a true Vicious Circle. . . . The morphinomaniac flies to his syringe before meals in order to awaken an appetite which is always indifferent. After meals the injection is repeated in order to assist digestion. . . . As time goes on, the drug is used more and more often and in larger and larger quantities."³

¹ Ch. XXXI.

² This forms one of the numerous Circles that baffle the social reformer. Poverty, insanitation, unemployment, malnutrition, ill-health, misery, alcoholism are all intimately correlated.

³ Tourette, *Maladies du Système Nerveux*, p. 244; cf. also Curschmann, *Lehrbuch der Nervenkrankheiten*, p. 930.

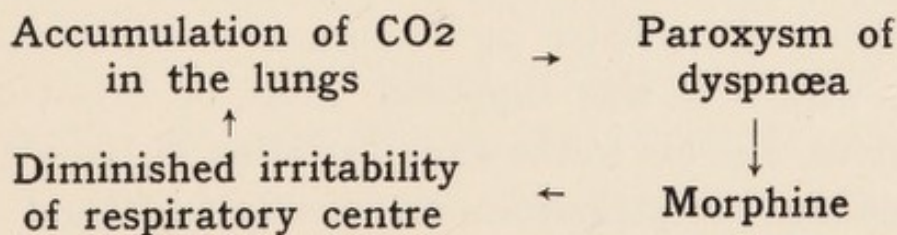
Tanzi well describes the condition :

“ Each new injection must be larger or more quickly repeated than the preceding one, in order to give the desired effect. Thus a Vicious Circle is established, which gives morphinism the character of a fatally progressive habit.”¹

Very applicable are the words of Virgil *ægrescitque medendo*: “ the disorder increases with the remedy.”

Very similar correlations may be established by cocaine and other drugs, whose use leads to repetition, to habituation and finally to volitional palsy. Cocaine may end in an even worse slavery than morphia.

The injudicious use of morphia in attacks of cardiac asthma may prove highly injurious. For the drug, while temporarily relieving distress, diminishes the irritability of the respiratory centre and allows more CO₂ to collect in the blood. The asthmatic then requires an increasing dose of morphia to relieve him, and a Circle is created which Hirschfelder represents in the following way :²



¹ Textbook of Mental Diseases, p. 334 ; cf. also *British Med. J.*, 1911, Vol. I., Epitome, p. 32.

² Diseases of the Heart and Aorta, p. 149.

A curious condition sometimes accompanies morphia poisoning due to hypodermic injection :

“ The morphine is excreted into the stomach and intestines, and this may be reabsorbed and so work in a Vicious Circle.”¹

Tobacco. Tobacco used in excess may establish reciprocal relations. Thus mental depression sometimes leads to over-indulgence. The result is dyspepsia and a feeble cardiac action, leading to further depression and more tobacco.

Bromides. There are various other drugs such as bromides whose incautious use has done harm. Few drugs have a greater tendency to lower the recuperative power of a disordered nervous system. Yet, especially in former days, bromides were extensively administered to cure the very conditions in which that recuperative power was lacking.

Traumatic neurasthenia such as is sometimes caused by a railway accident may serve as an illustration. Such accidents are frequently followed by spinal tenderness, stiffness and pain, associated with nervous prostration. These symptoms were formerly attributed to irritation or inflammation of the spinal cord, which, it was supposed, must be arrested by sedatives, and led to the administration of large doses of bromide of potassium for weeks together. Unfortunately bromide may produce symptoms closely

¹ Allbutt and Rolleston, System of Medicine, Vol. II. (i.), pp. 942-3, 956.

akin to those of traumatic neurasthenia, with the result that unwary practitioners often confused the effects of the bromide with those of the injury and continued to increase the dose. No wonder that the symptoms steadily grew worse. Cause and effect were inextricably confused, further bromide of potassium being administered to remove the very disorder the drug had produced.

A case of litigation is actually on record in which a claim was based on the presence of inflammation of the cord and its membranes as proved by a cutaneous eruption, which eruption was in reality an acne induced by bromide of potassium !¹

Strychnine. Strychnine has often been incautiously used in cases of post-operative shock associated with exhaustion of the vaso-motor centres and dilatation of the splanchnic area. Recent research, however, has proved that stimulants of any kind are useless for the purpose of arresting the fall of blood-pressure. In fact their administration further paralyses vaso-motor action, and lowers the pressure, being tantamount to flogging a tired horse to death. In other words, the symptoms of shock led to the administration of strychnine, the very thing best calculated to increase shock.²

¹ *Medical Times*, 1885, Vol. I., p. 437.

² Cook and Briggs, *John Hopkins Hospital Reports*, 1903, p. 470.

Mechanical Support. Another injudicious treatment is sometimes prescribed in cases of spinal curvature, where a mechanical support is relied upon for the cure of the muscular weakness. The support increases the spinal weakness, which by degrees requires more and more support. Applying the lesson to a much commoner article of attire than the spinal jacket, we may say that the corset creates the demand which it supplies.

Venesection. But perhaps the best example of an artificial Circle may be found in the use of venesection as practised for many centuries. Formerly, indeed, venesection was regarded as a panacea for almost every ailment, acute or chronic, and the evidence is only too clear that *venesectio ad mortem* was no uncommon occurrence, death being erroneously attributed to the illness instead of to the loss of blood.

The custom was to bleed until the patient became faint, when recovery was allowed to take place. In the case of some diseases, such as pneumonia, peritonitis and typhoid, where there is fever or pain, some remission of the symptoms followed recovery from the faintness, a remission which was hailed as evidence of the beneficence of the operation, and led to its being repeated again and again, if fever or pain recurred.

When, however, blood is drawn *pleno rivo*, the symptoms produced (palpitation, vertigo, violent

headache, jactitation, convulsions, coma) are apt to resemble those of inflammatory disorders, and were then liable to be imputed to a recrudescence of the original mischief, although really due to anæmia. Unwary practitioners were easily led astray. Cause and effect were confused, the venesection being repeated to remove the very symptoms it had produced. The *Lancet* of 1827 gives an illustrative case which may be briefly summarized :

A man fell from a scaffold and fractured several ribs. On reaching St. Bartholomew's Hospital early on a Friday morning he was bled 18 oz., and at noon 20 oz. more. The next day a further 18 oz. were taken, and on the following day 18 oz. at noon and 18 oz. in the evening. On Monday the pulse was small and jerking, but very compressible. This condition was regarded as "indicative of inflammation and not resulting from loss of blood or hæmorrhagic irritation." Accordingly bleeding was again ordered to the extent of 18 oz. The dresser in charge of the case, however, alarmed by the condition following the loss of a few ounces, desisted from drawing any more. Nevertheless, when about two hours later two surgeons saw the man in consultation, they ordered 20 oz. more to be drawn. After this the pulse became a mere flutter, death taking place a few hours later.¹

As Lauder Brunton says :

"Venesection . . . was carried to such an excess as to kill many patients who would have recovered perfectly had they been left alone."²

Uterine Disorders. A Circle has at times been created by unnecessary tinkering with the reproductive apparatus, especially in neurasthenic females suffering from some minor uterine ailment. The constant direction of her mind to the sexual organs

¹ Vol. II., p. 94. Cf. also Copland, Dictionary of Practical Medicine, Vol. 1., p. 177.

² Encyclopædia Britannica, Vol. XXVI., p. 797.

induces an unhealthy mental condition which perpetuates and exaggerates her malady, and leads to further tinkering. Many a sensitive over-anxious woman, with a slightly prolapsed, ante- or retroverted uterus has been transformed into an incurable neuropath. Such patients come to be obsessed with their ailment and the obsession is readily aggravated by injudicious interference.

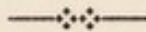
Restraint. Another illustration may be found in the general use in earlier days of fetters, hand-cuffs, strait waistcoats, and other brutal apparatus for the coercion of the imbecile or the insane. Such restraint, in lieu of promoting amelioration, provoked intense resentment and excitement or even permanent mania, the secondary irritation being urged as a plea for further coercion. Frequently a temporarily excited or eccentric person was goaded into a condition of permanent lunacy by the treatment that was inflicted.¹

These atrocious methods, not so long ago universally advocated by the profession, should keep us chastened in spirit, and serve as warnings lest a *nimia diligentia* lead to methods of treatment of which it may be said :

plus a medico quam a morbo periculi.

¹ Gardiner Hill, Non-Restraint System of Treatment in Lunacy, pp. 103, sq. ; Griesinger, Mental Diseases (N.S.S.), pp. 491, sq. ; *British Med. J.*, 1910, Vol. I., p. 519.

Chapter Fifteen



The Genesis of the Circle



IN the preceding Chapters attention has been drawn to *individual* Circles associated with various organs of the body. A general survey will now be attempted of pathological processes which are liable to establish a Circle, where favourable conditions are present (Fig. XIV.).

I.—DILATATION OF A HOLLOW VISCUS CAUSES WEAKNESS OF THE WALLS AND TENDS TO FURTHER DILATATION

Examples :

- Dilatation of Heart.
- Dilatation of Bladder.
- Gastrectasis.
- Bronchiectasis.

II.—OBSTRUCTION OF EFFERENT DUCT LEADS
TO RETENTION AND DECOMPOSITION OF
SECRETION AND TO INCREASED OBSTRUCTION

Examples :

- Appendicitis.
- Salpingitis.
- Cholecystitis.
- Sinusitis.

III.—INFLAMMATION OF A MUCOUS
MEMBRANE LEADS TO CALCULUS WHICH
AGGRAVATES THE INFLAMMATION

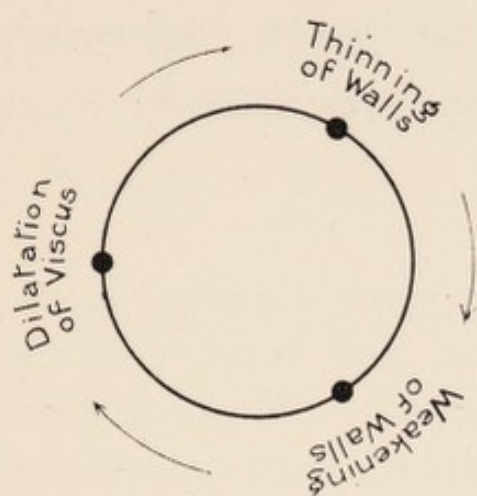
Examples :

- Renal Calculus.
- Biliary Calculus.
- Salivary Calculus.

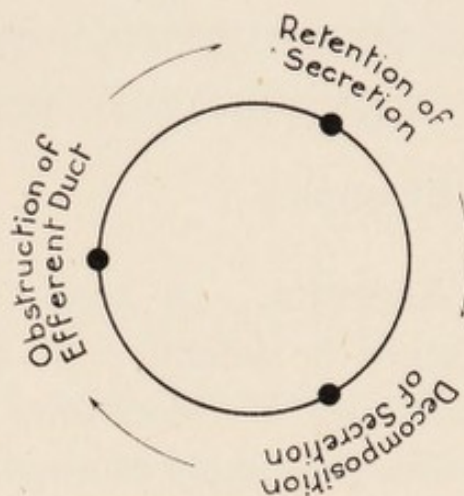
IV.—PRURIGINOUS DISORDERS PROVOKE
SCRATCHING WHICH AGGRAVATES THE
DISORDER

Examples :

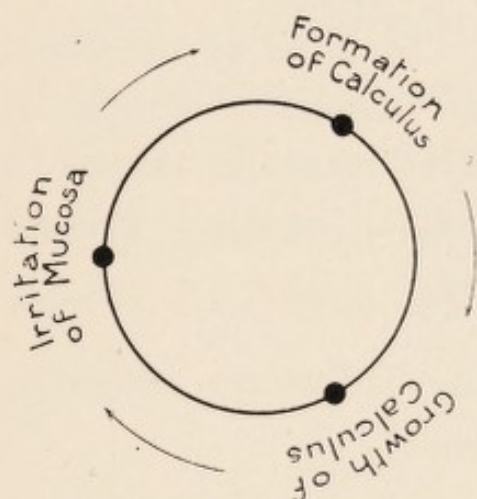
- Eczema.
- Urticaria.
- Pruritus.



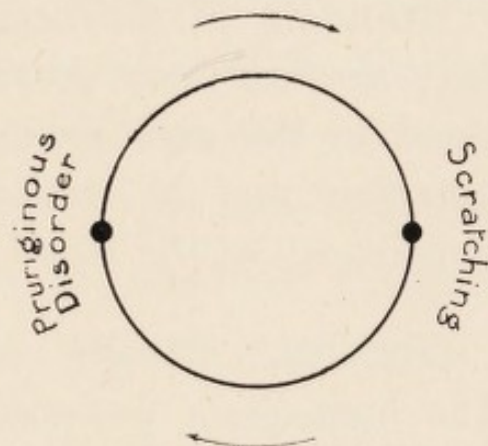
Dilatation of hollow Viscus



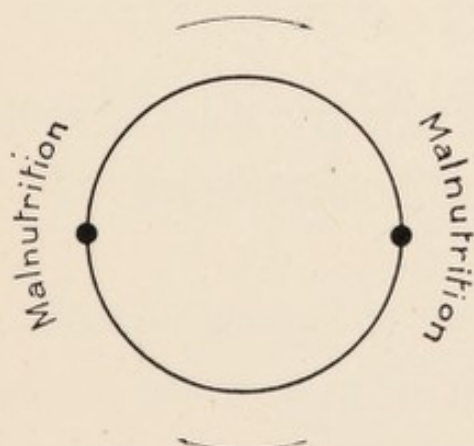
Retention of Secretions



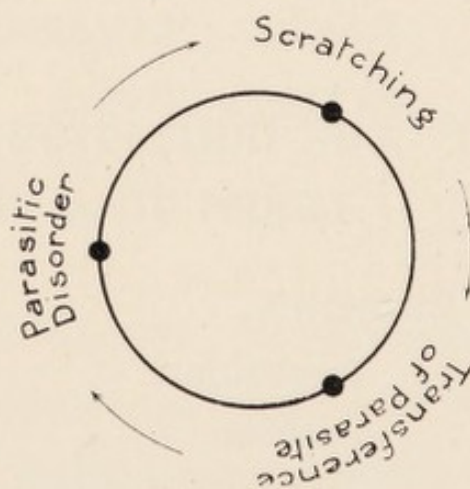
Formation of Calculus



Pruriginous Disorder



Malnutrition



Parasitic Disorder

Fig. XIV.—The Genesis of the Circle

V.—MALNUTRITION BREEDS MALNUTRITION ; SUPERNUTRITION BREEDS SUPERNUTRITION

Examples :

Anæmia. In anæmia the blood supplied to the viscera is defective in quality, and depreciates the functions of secretion, peristalsis and absorption. Hence the supply of nutriment to the body is curtailed, and the deficiency perpetuates the anæmia.

Stenosis of Coronaries. Stenosis of the coronary arteries may prevent an adequate supply of blood to the myocardium. The result is imperfect nutrition and a weaker systole, causing further impairment of the blood supply.

Obesity. Obesity prevents adequate exercise. The inadequacy promotes obesity.

Immoderate eating is also a common practice in the obese, resulting in a further accumulation of fat.

VI.—THE IRRITATION CAUSED BY A PARASITE LEADS TO A FRESH LODGEMENT

Examples :

Oxyurides.

Scabies.

Impetigo Contagiosa.

¹ Van Noorden, *Metabolism and Practical Medicine*, Vol. III., p. 704.

VII.—ONE DISORDER MAY DISTURB SEVERAL
FUNCTIONS AND PREVENT COMPENSATION

Example :

Atonic Dyspepsia. In atonic dyspepsia the various functions of secretion, absorption and motility are simultaneously impaired, and unable to assist each other. If secretion were alone involved, some increase of peristalsis would accelerate the passage of the food-pulp through the pylorus to be digested in the intestines and thus compensate for the deficient gastric secretion. But owing to the association of several functional disorders, an obstinate Circle is created.

VIII.—A DISPLACED ORGAN MAY CAUSE
MECHANICAL DISTURBANCE WHICH
AGGRAVATES THE DISPLACEMENT

Examples :

Retroversion of Gravid Uterus. A retroverted gravid uterus may be so impacted as to press on the urethra, cause retention of urine and distention of the bladder. The distended bladder increases the retroversion and impaction.

Gastroptosis. In gastroptosis the displaced stomach may pull down the horizontal section of the duodenum. The result is a kinking of the gut which hinders the escape of the food-pulp, and promotes further gastroptosis.

IX.—A NEUROSIS MAY CREATE OTHER
NEUROSES WHICH INTENSIFY THE PRIMARY
DISORDER

Example :

Neurasthenia. Neurasthenia may cause insomnia which intensifies the neurasthenia.

X.—CERTAIN FUNCTIONAL DISORDERS
TEND TO BECOME HABITUAL AND PROVOKE
RECURRENCE

Examples :

Blepharospasm.

Vomiting.

Cardiac Arrhythmia.

XI.—THE EFFORT TO REMOVE AN IRRITANT
MAY LEAD TO ITS INCREASE

Examples :

Hæmoptysis. Hæmoptysis is primarily intended to expel the accumulated blood which is irritating the respiratory tract. But the cough may so raise the blood-pressure as to start fresh hæmorrhage.

Strangulated Hernia. The vomiting associated with a strangulated hernia is a means of emptying, and thus securing rest for, the irritated bowel. The vomiting, however, may increase the strangulation.

XII.—IMPERFECT REPAIR MAY PRE- DISPOSE TO A FRESH ATTACK

Examples :

Endocarditis. The lesions left by endocarditis shew but little tendency to repair. Frequently there persists a liability to recrudescence and a diminished power of resistance to exposure, which establishes a Circle of indefinite duration. Each attack adds to the existing lesion and paves the way for a fresh attack.

Appendicitis.

Iritis.

XIII.—THE ACCUMULATION OF SECRETIONS CAUSES IRRITATION AND FURTHER ACCUMULATION

Examples :

Balano-posthitis.

Intertrigo.

Cerumen.

XIV.—STRANGULATION MAY BE BOTH CAUSE AND RESULT OF CONGESTION

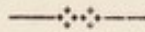
Examples :

Paraphimosis. In paraphimosis the constriction of the glans causes acute congestion and œdema. These in their turn increase the strangulation.

Volvulus. When a loop of intestine is strangled, acute congestion results, leading to distention of the lumen with blood and gas. Increased strangulation follows.



Chapter Sixteen



The Breaking of the Circle by Nature



IN first thoughts such a self-perpetuating process as a Vicious Circle might be supposed incurable. And the supposition would in many cases be correct, as is shewn by the epithets "endless," "eternal," "fatal," "lifelong," "highly pernicious" which have been applied to these pathological sequences.

But it would be a serious error to conclude that no Circle can be broken. For Nature has from time immemorial succeeded at times in triumphing both over the primary disorder and over the secondary disorder which was aggravating the first (Fig. XV.). By what mechanism is such a result attained ?

PREDOMINANCE OF ONE FACTOR

Were the factors which constitute the Circle isodynamic, recovery would be impossible. If, for example, with the Circle of pulmonary hæmorrhage, the cough (factor A.) expelled an ounce of blood from the respiratory passages, while the associated increase of blood-pressure (factor B.) caused another ounce to escape from the bleeding vessel, the morbid process would continue until death resulted from anæmia.

Or if in pruriginous disease the secondary scratching caused as much fresh eruption as the *Vis medicatrix* cured, recovery would be hopeless. What Unna says of eczema would be widely applicable :

“ By this noxious Circle very trivial attacks of eczema, such as the erythemato-squamous or pityriasiform variety, may be transformed into hard callous eczema, which lasts for the rest of life.”¹

But since the *Vis medicatrix* represented by factor A. as a rule is predominant over the *Vis malefica*, here represented by the factor B, recovery is the general rule, even when no special treatment has been applied.

REST

The enforcement of rest is another method by which Nature breaks the Circle, pain being often an intermediary. Thus progressive myopia may be attended by such severe asthenopia that all work

¹ Mracek, Handbuch der Hautkrankheiten, Vol. II., p. 300.

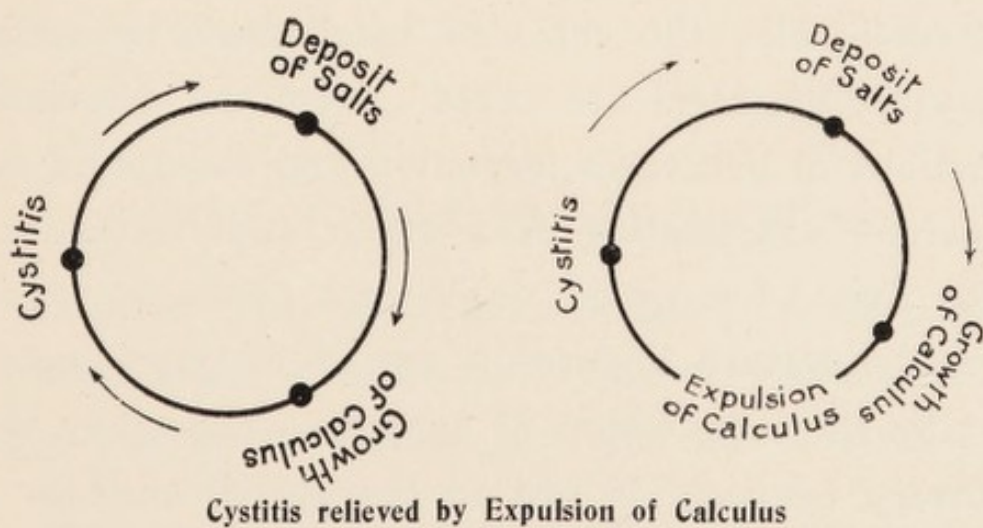
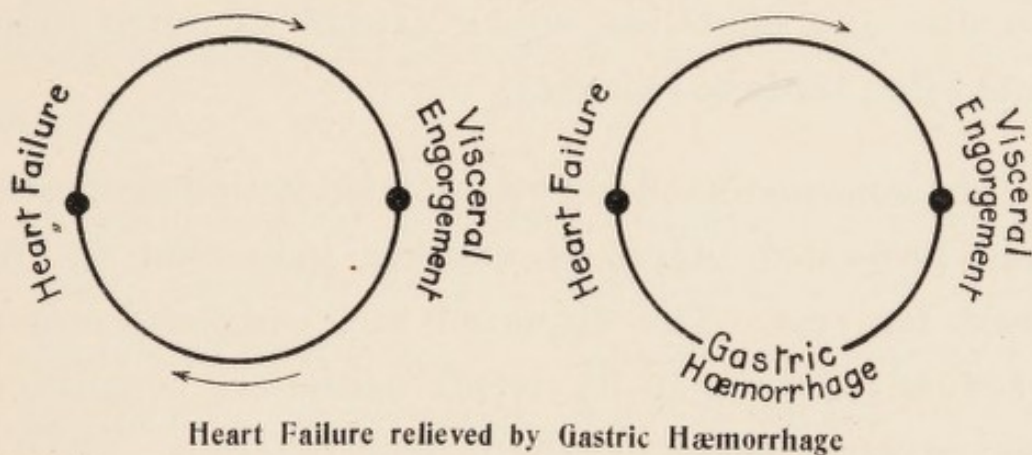
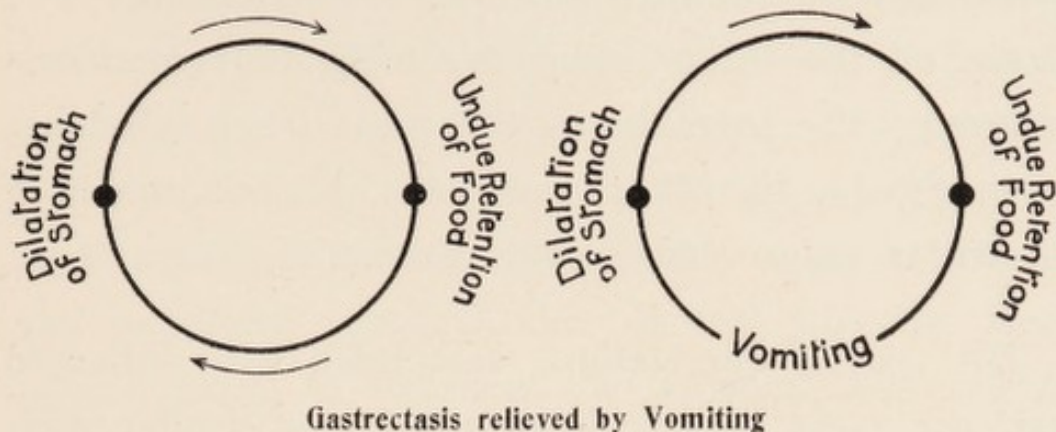


Fig. XV.—The Breaking of the Circle by Nature

involving accommodation must be abandoned. The strain on the ocular muscles during convergence is relieved ; the increase in the posterior staphyloma is arrested. In other cases the abandonment of binocular vision leads to the same end.

The morbid correlations associated with inflamed varicose veins may be interrupted in a similar way. Prolonged recumbency relieves the reciprocally acting tension and dilatation which caused so much pain, and often leads to recovery.

The common back-ache associated with a congested and prolapsed uterus is another indication of the need for rest. The displaced and congested organ gradually returns to its normal situation, congestion and prolapse being simultaneously relieved.

Rest is also the common mechanism by which dyspeptic disorders are cured. Here the associated functions of peristalsis, secretion and absorption are impaired, depreciating each other, and constituting what Ewald has called "a Vicious Circle *in optima forma*." Nature imposes a period of physiological rest by the suppression of appetite. Especially will recovery be rapid if rest to the gastric mucosa is combined with such an improved circulation by means of exercise as will stimulate peristalsis, and thus remove the products of imperfect digestion.

Hypertrophy of the heart in cases of valvular lesion is a beautiful example of Nature's method of breaking the Circle. Thus in acute aortic regurgitation the coronary arteries are inadequately filled, the myocardium is enfeebled, leading to a feebler systole and increased regurgitation. But if only the work of the heart is lightened by physical and mental repose, compensatory hypertrophy will in time largely make up for the valvular defect, and enable the heart, even though unsound, to carry on the circulation.

Sleep is another of Nature's methods of breaking Circles, especially in neurotic disorders which are complicated by insomnia. The obstinate correlations may continue in operation, until the nervous system is completely exhausted. But at length "Tir'd Nature's sweet restorer—balmy sleep" breaks the Circle.¹

EXTRA-ORDINARY MECHANISMS

At other times some extra-ordinary mechanism or unusual effort is called for. This may be illustrated by a case of gastrectasis in which the dilatation and

¹ There are many other ways in which such neurotic Circles may be broken. Dr. Claye Shaw tells of a lady who was cured of the Circle of insomnia, depression and headache by the very natural process of having a baby. *Lancet*, 1911, Vol. I., p. 357.

the retention aggravate each other. The usual reflexes lie dormant and peristalsis is in abeyance. But sooner or later the burden may become insupportable. The machinery of vomiting is started and the stomach pumps up its contents perhaps to the extent of a bucketful. Even a greatly dilated stomach may in this way be again braced up, the unburdening leading to great amelioration or even to actual recovery.

Active peristalsis may succeed in curing obstinate constipation where fæcal stasis has led to paralysis of the intestinal wall and the paralysis to yet more obstinate stasis. Dangerous correlations are in operation. But after a period of rest vigorous peristalsis may set in, and sweep away even a great accumulation of fæces.

Another illustration may be found in heart failure, where secondary visceral congestion has aggravated the heart failure. Here the *Vis medicatrix* may take the form of a sharp attack of gastric or intestinal hæmorrhage ; indeed such a loss of blood is often a blessing in disguise and prove *vitæ artifex, mortis fugator*. On the one hand the overburdened heart is relieved, while on the other the engorged viscera can resume work and again supply wholesome nutriment to the failing myocardium. The lost equilibrium of the vascular system is restored.

Hare has well described the beneficial action of some attacks of hæmoptysis :

“ Manifestly in phthisical hæmoptysis, there is in operation one of the most highly Vicious Circles in pathology—a Circle which is largely responsible for the profuseness and prolongation of the hæmorrhage. The intra-pulmonary irritation of the effused blood causes cough : each act of coughing, like any other sudden exertion, causes rise of blood-pressure : each rise of blood-pressure is apt to cause fresh hæmorrhage : and so on over again, the Circle continuing to revolve in many cases until the loss of blood has been sufficient to reduce the blood-pressure materially and thus terminate the hæmorrhage. This natural cure of hæmoptysis was, at one period in the history of medicine, imitated by physicians who resorted to venesection in this emergency—a somewhat expensive, but by no means irrational imitation. The treatment by amyl nitrite is another imitation, less complete, but much more economical, than venesection. The Vicious Circle is broken through at the same point and by similar means, namely, by reduction of localized blood-pressure through reduction of general blood-pressure. But the blood is saved instead of being lost : consequently, the procedure may be repeated as often as necessary.

The point at which the Vicious Circle is broken through is of the greatest importance.”¹

Syncope is another means by which Nature often arrests severe hæmorrhage :

“ Syncope, instead of destroying, proves the very means of preserving, life under certain special circumstances. The fatal termination of grave hæmorrhages, traumatic and idiopathic, is very frequently prevented by failure of the heart’s action giving the necessary time for the stagnating blood, within the bleeding vessels, to coagulate and close their opened orifices.”²

¹ The Food Factor in Disease, Vol. II., p. 97.

² Walsh, Diseases of the Heart, p. 192.

Attention has been drawn above to the sequence of events occurring during the growth of a biliary, renal, or other form of calculus. For many a long year such morbid correlations may persist. But all at once, without apparent cause, active peristalsis is called into operation and the offending calculus is expelled.

Enough has been said to illustrate the principle that the resources of Nature are often successful.

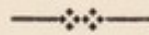
But there are many Circles beyond her power to break. Art must then succour Nature. Happily

τέχνη κρατούμεν ὧν φύσει νικώμεθα.¹



¹ "Art triumphs where Nature fails."

Chapter Seventeen



The Breaking of the Circle by Art



THE treatment of disease when complicated by a Circle presents problems peculiar to itself (Fig. XVI.).

The physician is no longer confronted with a morbid process which Nature is doing her best to rectify. Where a Circle is present, Nature is aggravating the disorder. The *Vis medicatrix* is now the *Vis devastatrix*, and what looms before the sufferer is at best a prolonged disorder, at worst a *descensus Averno*.

Many years ago a great teacher wrote: "Let it be a cardinal principle of treatment to make an effort to interrupt Vicious Circles."¹ But even to-day our text-books give but little assistance in the solution of the problems presented by reciprocally acting consequences. It may be useful to indicate the principles on which treatment under such circumstances must be based, and to illustrate those principles by a few examples.

¹ Mitchell Bruce, Principles of Treatment, p. 263.

LOCUS MINORIS RESISTENTIÆ

One signal advantage presented by the Vicious Circle is that there are at least two points at which its evil round may be interrupted. In the words of Lauder Brunton, "We must see where the Circle can best be broken," since "if we can break the Circle at one point, we allow recovery to commence."¹

Our first step then is to seek the *locus minoris resistentiæ*. The discovery may not be easy, for it presupposes an accurate diagnosis of the various factors that constitute the Circle, and this may involve a painstaking investigation, as has been emphasised by Clifford Allbutt :

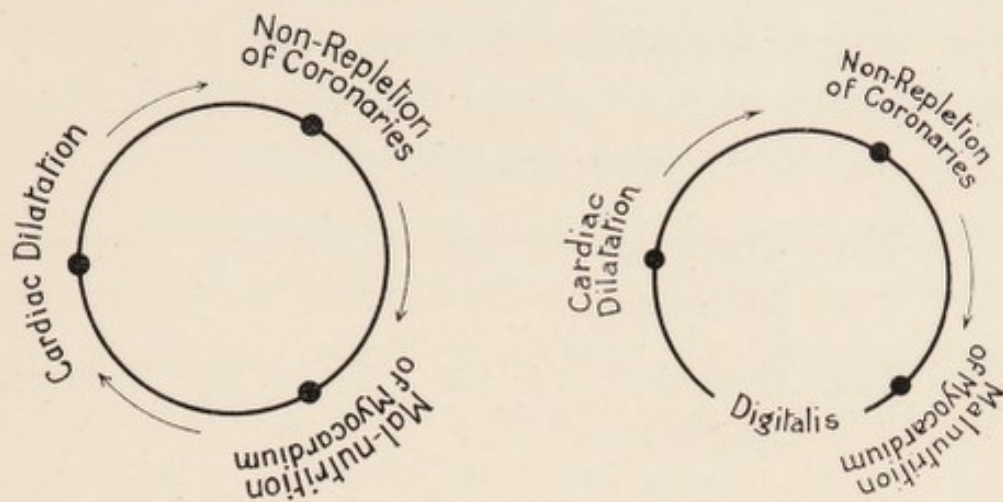
"First of all we shall begin by a close searching for any Vicious Circle of function, and, if found, of cutting any link of it, whatsoever or wheresoever. . . . A floating kidney, a disorder of the uterus, a faulty eye, a "tea" or "tobacco" heart, or other local irregularity, trivial enough perhaps in itself, may close and perpetuate the Vicious orbit of function."²

When the factors constituting the Circle have been elucidated our duty is to break it through at the weakest point.

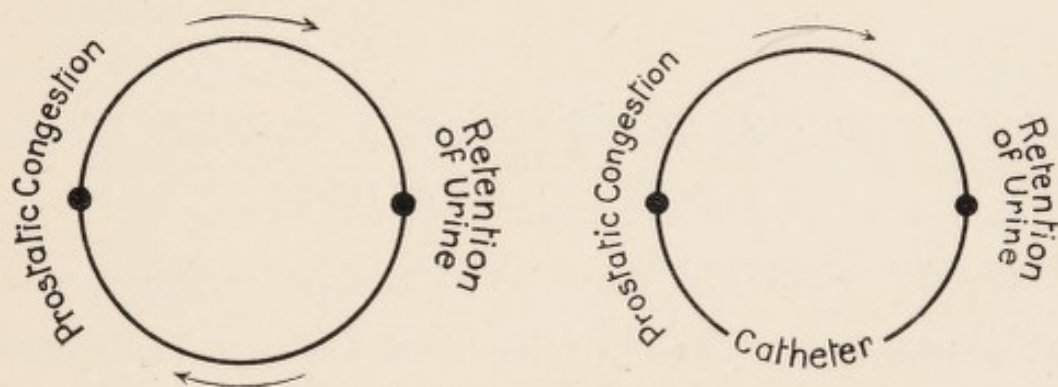
If the gyration can be stopped, the whirling currents will be restored to their normal direction. "The hound which had turned to hunting its own tail may be put again on the track."

¹ Therapeutics of the Circulation, p. 129 ; *British Med. J.*, 1910, Vol. II., p. 1392.

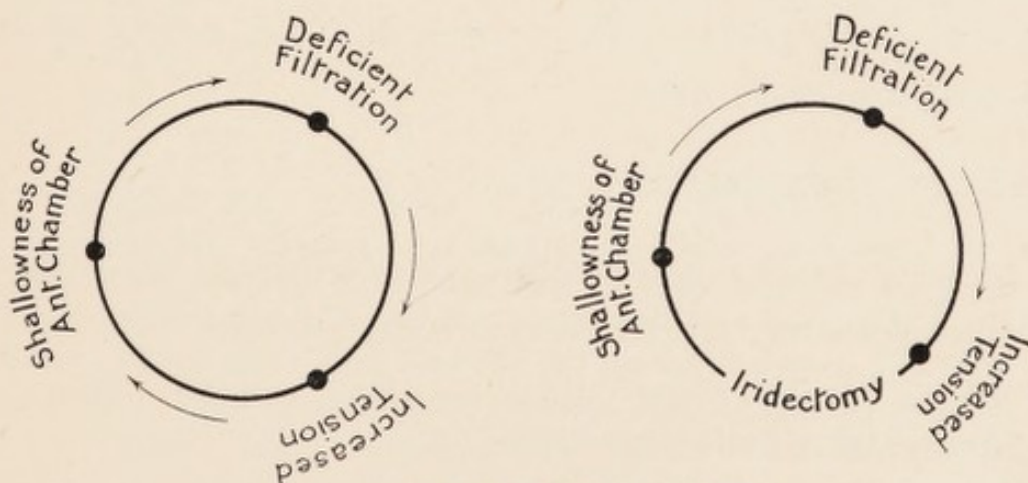
² Allbutt and Rolleston, System of Medicine, Vol. VIII., p. 777 ; *British Med. J.*, 1910, Vol. I., p. 413.



Heart Failure relieved by Digitalis



Prostatic Retention relieved by Catheter



Glaucoma relieved by Iridectomy

Fig. XVI.—The Breaking of the Circle by Art

The *modus operandi* will vary with the special circumstances of each case. But some illustrations may be grouped under the following heads :

- I. The Breaking of the Circle by Hygienic Measures.
- II. The Breaking of the Circle by Surgical Appliances.
- III. The Breaking of the Circle by Drugs.
- IV. The Breaking of the Circle by Operation.

I.—THE BREAKING OF THE CIRCLE BY HYGIENIC MEASURES

Rest. Physical rest is a powerful means of breaking some Circles. An illustration is presented by many cases of cardiac failure, where a dilated and over-burdened myocardium is associated with visceral engorgement, the two conditions acting and reacting on each other.

Gibson thus describes the Circle :

“Sooner or later, according to its form and severity, chronic valvular disease, with compensation, itself disposes to failure by establishing a Vicious Circle of slow progressive impairment of the viscera and their great vital functions—the lungs, liver, stomach, bowels, kidneys, indeed the myocardium itself.”¹

In many such cases if the patient is kept so quiet as “not to take one beat out of the heart that can

¹ Textbook of Medicine, Vol. II., p. 127.

possibly be avoided," immense relief is given to the failing myocardium. More blood is sent to the lungs and viscera and circulates in a more nutrient and aërated condition. The cardiac action is strengthened, its tonicity is raised, so that it is able to pump out the stagnating blood and lower the venous pressure. Even apparently moribund persons recover and continue practically well for years.

Lauder Brunton emphasises the value of such absolute rest :

"As in many other things the conditions in cardiac disease form a Vicious Circle. The disordered circulation disturbs the function of other organs, and these in turn make the circulation worse. . . . In such cases it is evident that the patient is bound to die, and to die a somewhat painful death, unless medical art can afford him some assistance. It is very fortunate, however, that in such cases medical art can do so much. . . . If we can break the Vicious Circle at one point, we allow recovery to commence ; and one of the most important agents—I think I ought to say *the most important agent*—in the physician's power is *absolute rest*." ¹

Exercise. Under other circumstances the opposite measure, viz. increased exercise, is called for, as in the Circle of obesity, which Krehl describes :

"As soon as the accumulation of fat begins to deter the patient from taking active exercise, a Vicious Circle is established, and he tends to increase in weight more and more." ²

¹ Therapeutics of the Circulation, p. 129.

² Clinical Pathology, tr. by Hewlett, pp. 342, 344.

If the physician insists on some athletic sport, or at any rate on a more active mode of life, the morbid relations may be interrupted and health restored.

Cleanliness. Want of cleanliness may give rise to various Circles, as, for example, to seborrhœa genitalium, where retained and putrefying secretions irritate the prepuce and glans and thus provoke further secretion and putrefaction. In Corner's words :

“ The greater the irritation of the glands by decomposing secretion, the greater the amount of secretion they produce. In this way a Vicious Circle is established.”¹

The removal of these secretions will rapidly diminish the excessive glandular activity, and thus check the morbid reactions.

Prevention of Infection. This may be illustrated by the success of preventive measures where thread-worms are present. When a case is left to Nature, the irritation secures by auto-infection the continuance of the race of parasites producing it, and patients thus keep up their stock of parasites for many years. If, however, precautions are taken so as to prevent re-infection from without as well as auto-inoculation, the worms disappear rapidly, and a radical cure may be looked for in 4-6 weeks, that is the period by which all the ova swallowed on a particular date will have developed into worms and been evacuated in the fæces.²

¹ Male Diseases in General Practice, p. 398.

² Allbutt and Rolleston, System of Medicine, Vol. II. (ii.), pp. 892-3.

Nose-Breathing. A fourth illustration may be found in the restoration of nasal respiration, where mouth-breathing has established a Circle.

In weakly children nasal secretions are sometimes allowed to accumulate and block the nostrils, until the child resorts to mouth-breathing. This in its turn favours the retention of nasal secretions and the consequent nasal obstruction :

“Obstruction, by preventing or interfering with the expulsive force of the expiratory current, prevents the removal of the usually abnormal amount of secretion, either by blowing the nose or otherwise ; its accumulation is in its turn an efficient factor in producing obstruction, and a Vicious Circle . . . is thus established.”¹

By efficient use of the pocket handkerchief the nasal passages can be cleared and the Circle broken.

II.—THE BREAKING OF THE CIRCLE BY SURGICAL APPLIANCES

Elastic Bandage. Varicose veins are frequently complicated by a Circle, since the dilatation leads to increased tension on the vein-walls, and the increased tension aggravates the dilatation. As Romberg writes :

“It is often impossible to say how the disorder originates. For the venous dilatation (due to some mechanical obstruction) and the anatomical changes in the vein-walls act reciprocally on one another. Thus a Vicious Circle, whose pathogenesis is obscure, controls the course of events.”²

¹ Ashhurst, *Cyclopedia of Surgery*, Vol. V., p. 404.

² *Krankheiten des Herzens und der Blutgefäße*, p. 496.

The use of an elastic bandage supports the weakened walls of the veins, prevents their further dilatation, and breaks the Circle.

Catheter. Prostatic retention of urine is associated with reciprocal correlations. For the enlarged venous plexuses surrounding the prostate in elderly men readily become congested, causing obstruction to the urine which accumulates in the bladder. The pressure of urine in its turn aggravates the venous engorgement, and so the process is perpetuated. Catheterisation, by evacuating the bladder, relieves the pressure on the venous plexuses and cures the retention.

Pessary. Uterine congestion and prolapse are other conditions which aid and abet one another, and so give rise to a Circle. A well adjusted pessary prevents the prolapse, relieves the congestion and breaks the Circle.

Concave Lens. A fourth illustration is presented by progressive myopia in which the myopia and the elongation of the eye-ball react on one another. As Satter writes :

“ If the elongation of the eye-ball has once begun, myopia has a tendency to react upon itself by a kind of Vicious Circle as long as the noxious conditions which caused it are still in action. The posterior wall of the sclerotic, now somewhat attenuated, is more liable to give way, and the more egg-shaped the globe becomes the longer is the region of contact of the muscles with the surface of the eye.”¹

The prescription of concave lenses removes the near point, relieves the undue pressure on the globe, and checks the progress of the myopia.

¹ *Transactions of the Ophthalmological Society of the U.K.*, 1907, Vol. XXVII., p. 12.

III.—THE BREAKING OF THE CIRCLE BY
DRUGS

Nitrite of Amyl. Hæmoptysis may be complicated by "one of the most highly Vicious Circles in pathology," the hæmorrhage, cough, mental perturbation and rise of blood-pressure being the factors that act and react on one another.

One physician considers that he can best break the Circle by using nitrite of amyl¹ to lower the blood-pressure. A second prefers to lull the cough by means of morphia. A third pins his faith to the styptic action of ergot. In each case what appeared the *locus minoris resistentiæ* is attacked.

Digitalis. Many cases of failing heart are complicated by tachycardia. The enfeebled myocardium beats so rapidly that the ventricles can neither fill nor empty themselves as they should. The result is progressive weakening of the myocardium, and a dangerous Circle is present which may be broken by digitalis. In Pavlov's words :

"An uncompensated heart beats rapidly and thereby only aggravates its condition. Its time of rest, that is of recovery, of restitution of the organ is shortened. A Vicious Circle is set up. The weak action of the heart lowers blood-pressure, the lowering of this leads (from known physiological causes) to an increase in the number of beats, the quickening leads to weakening of the organ. Without doubt the digitalis aids by breaking through this Vicious Circle in that it greatly slows the pulse, and thereby gives new power to the heart."²

¹ Hare records some remarkable cases in which the Circle that complicates hæmoptysis was instantaneously broken by amyl nitrite. Cf. *Food Factor in Disease*, Vol. II., p. 97.

² *The Work of the Digestive Glands*, tr. by Thomson, 1910 p. 233.

Sedatives. Conditions of exaggerated reflex excitability are often met with, in which prolonged irritation and weakness have led to a state of unrest which perpetuates and intensifies the weakness. Thus the respiratory centre may be exhausted by constant irritation of the air-passages giving rise to incessant cough. Or the gastric centre, taxed by severe stimulation from the stomach, kidney or uterus, lapses into a similar condition of irritable weakness. Although useless, the vomiting continues incessantly and may prove fatal :

“ Rest is urgently indicated for all cases of this kind and has to be secured in many instances by means of morphine which breaks the Vicious Circle of unrest and irritability, and a beginning once made, rest begets rest.”¹

Other Circles are closely associated with the presence of pain or insomnia. The reciprocal correlations can here be attacked by a suitable sedative, which by the removal of pain will break the Circle, as Herman has well described :

“ The great causes of neurasthenia are conditions which (a) cause continuous pain and (b) prevent sleep. The two things often form a Vicious Circle. A small local cause disturbs sleep, and want of sleep makes the nervous system over-sensitive. In proportion as the neurasthenic symptoms have coincided in time with the development of local pain, so surely may we conclude that the removal of the local pain and the procuring of sound sleep will cure the neurasthenia.”²

Emetic. A troublesome Circle may be due to dilatation of the stomach associated with prolonged

¹ Mitchell Bruce, Principles of Treatment, p. 231.

² *British Med. J.*, 1910, Vol. I., p. 183.

retention of food. The dilatation increases the stasis and the stasis in its turn the dilatation :

“Dilatation may be the cause, accompaniment or sequel of chronic gastritis ; subacidity with fermentation and stagnation forms a Vicious Circle constituting Cohnheim’s so-called vinegar and gas factory, and may likewise be regarded as an important etiological factor.”¹

The timely use of an emetic may rapidly and completely relieve the condition. Even a greatly dilated and over-loaded stomach may be braced up. The unburdening is followed by contraction and renewed functional activity.

IV.—THE BREAKING OF THE CIRCLE BY OPERATION

Surgery achieves some of her greatest triumphs by attacking the *locum minoris resistentiæ* and so breaking the Circle.

Cholecystotomy. Biliary, renal, vesical and other calculi are all associated with reciprocal correlations established between the mucosa and the irritating calculus. Rolleston thus describes the Circle associated with gall-stones :

“Although gall-stones are due to inflammation, of a comparatively mild character, of the gall-bladder, their presence predisposes to fresh infection of the gall-bladder and thus to cholecystitis and to a Vicious Circle.”²

Here the surgeon can remove the calculus that is perpetuating the morbid condition. The pathological sequence is interrupted, and the mucosa returns to a more or less quiescent condition.

¹ Osler and Macrae, System of Medicine, Vol. V., p. 285 ;
Cohnheim, Lectures on General Pathology (N.S.S.),
pp. 859, 862.

² Diseases of the Liver, 1905, p. 746.

Thyroidectomy. Another Circle frequently broken by operation is associated with tracheal stenosis due to goitre.

When an enlarged thyroid compresses the trachea so as greatly to reduce the lumen, any unusual effort may interfere with the adequate supply of oxygen. Nature, in response, calls the supplementary respiratory muscles into action. But unluckily the contraction of these muscles, so beneficent in some respects, presses the hypertrophied thyroid further against the trachea, thus narrowing the lumen even more than before. They thus increase, instead of relieving, the dyspnœa, which often ends in self-strangulation. In Frænkel's words :

"The sufferer gets into the clutches of a Vicious Circle. The greater the want of oxygen, the more vigorous and prolonged the muscular contractions ; the more vigorous the latter, the greater the compression of the trachea and the less room for the admission of air."¹

Here prompt relief can be given by thyroidectomy which relieves the stenosis and arrests the dyspnœa.

Iridectomy. Glaucoma is another grave disorder which "perpetuates and intensifies itself in a Vicious Circle."

The correlations are thus described by Lawson :

"The sudden raising of the intra-ocular pressure increases the congestion, to be followed in its turn by a serous exudation from the venous channels, with a consequent further increase of pressure ; and thus a Vicious Circle is quickly established, with symptoms of ever-increasing violence."²

¹ Lungenkrankheiten, p. 8.

² Diseases and Injuries of the Eye, p. 236.

The iridectomy lowers the intra-ocular pressure which would otherwise end in blindness.

Laparotomy. Intestinal obstruction may be complicated by various Circles which the surgeon breaks by laparotomy. One of them is thus described by Nothnagel :

“ Paresis and paralysis of the bowel may appear very early in the course of peritonitis, especially in perforative peritonitis, where it is most probably due to reflex inhibition of intestinal peristalsis. Paresis gives rise to meteorism, since gas continues to collect and accumulate in the bowel as it is not driven onward. . . . As soon, however, as a considerable quantity of gas accumulates in the intestine, the Vicious Circle is completed, for gaseous distention of the intestine leads to further impairment of its muscular powers and eventually to over-distention and paresis, or to definite paralysis.”¹

These few examples will suffice to illustrate the principle of breaking the Circle by attacking the *locum minoris resistentiæ*.

TREATMENT OF SEVERAL FACTORS

At other times it may be impossible to ascertain the weakest link in the chain. The wisest course is then to attack each of the factors concerned, at any rate in such complex conditions as Amand Routh describes :

“ We have frequently to deal with a Vicious Circle, with local and constitutional states so interacting, that no real improvement is possible until both the general and local states receive their due share of attention.”²

¹ Diseases of the Intestines and Peritoneum, p. 773.

² Allbutt, Playfair and Eden, Gynæcology, p. 737.

Striking examples of this are met with where digestive disorders are associated with disease of other organs, whether as cause or consequence of the visceral condition. Thus Mitchell Bruce writes :

“The pathological relations of the gastric disorder or catarrh and the diseases of the other organs are usually complex, a Vicious Circle being set up between them ; and the stomach therefore calls for direct treatment as well as attention to the cause.”¹

If the practitioner cultivates the habit of thinking of disease as operating in Circles, he will continually meet with illustrations of that interdependence of organs and of the importance of attacking each factor in the morbid process.

THE IMPORTANCE OF EARLY TREATMENT

Lastly, since the Circle is a self-aggravating process, it should be broken at the earliest moment. As Clifford Allbutt graphically puts it :

“In Vicious Circles every gyration deepens the groove, an abnormal habit is formed, so that arrest of such a local waste of energy and such a distress becomes more and more difficult. . . . The longer the “habit”—the fixture of organic memory—the harder the impulse needed to “break the Circle,” for the habit has become independent of the original cause which indeed had often vanished.”²

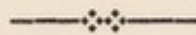
Worthy to be kept in lasting remembrance are the words of Ovid :

*Principiis obsta ; sero medicina paratur,
Cum mala per longas convaluere moras.”*

¹ Principles of Treatment, p. 459.

² *Nature*, 1911, Vol. I., p. 374.

Chapter Eighteen



Conclusion

Although this Monograph is far from exhaustive, enough has been said to establish several propositions :

First. Many diseases are liable to be complicated by a Circle.

Secondly. This complication perpetuates and aggravates morbid processes. It leads to the destruction of organs and is frequently the cause of a lethal exitus.

Thirdly. The *ιατρός πολύπειρος* who is familiar with the natural history of disease, and remembers the aphorism *melius est prevenire quam preveniri* may often prevent the establishment of a Circle. Let him obey another venerable maxim :

Venienti occurrite morbo.

Fourthly. There are some Circles which unaided Nature is able to break. Under many conditions, however, recovery is only possible when Nature's resources are supplemented by those of Art.

Fifthly. The study of the Circle throws much light on pathological sequences. Increased accuracy of diagnosis will follow.

Lastly. Since *qui bene diagnoscit bene medebitur*, treatment will be more scientific, more philosophical, and more successful.

Lectori amico salutem.



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