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The Nature and Cause
of
Erysipelas.

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The Nature and Causes of Erysipelas.

Although Erysipelas has been well known and described since the days of Hippocrates, the ideas concerning its nature & origin have varied from time to time, according to the particular pathology which happened to be considered correct in the different schools of medicine, or according to the views & theories of opposing writers.

In fact, a careful study of this subject alone would form the basis for a very good history of medicine and medical thought, and would show that each addition towards the knowledge of this disease became the foundation for some brilliant theory not only as to its nature but to that of Pathology in general.

The object of this paper is to trace the gradual development of our information respecting Erysipelas, and, if possible, to reconcile the various ideas concerning it when they are examined by the light of

our present knowledge; for each discovery contained a certain amount of truth, and was a step onwards to a deeper insight into the characters of this mysterious disease.

The word 'Impetigo' (ἰμπίδα) is used in the works of Hippocrates, & is translated "a violent & often itching of the skin". Its derivation is a matter of dispute: Copland gives three modes of origin, viz. ἰμπίδα τὸ ἰμπίδα ἔνι τὸ ἰμπίδα, because it extends to adjoining parts, or ἰμπίδα, draw, ἰμπίδα adjoining, or ἰμπίδα, red, & ἰμπίδα, brown, lind. To these may be added Siddell's & Scott's ἰμπίδα, red, & ἰμπίδα the skin, which is considered by Campbell de Morgan the correct origin of the word.

History. According to the statement of Hirsch (Handbuch d. Brit. Surg. Pathol. I p. 243) Impetigo has occurred in a sporadic form at all times, and with the exception of the tropics, in all regions of the earth's surface alike. The disease was regarded by

Hippocrates (B.C. c 450) as constitutional and epidemic. He noticed that it made its appearance in the early spring along with the prevailing cold, and that it was more likely to attack those advanced in life who had any wound (however slight) which had been neglected. "Great inflammation took place, and the suppurates quickly spread all over. In most cases the abscess ended in suppuration, and there was great shagreening of the flesh, tendons & bones, and the defusion which seated in the part was not like pus, but a sort of putrefaction."

It will be seen that even so early a distinction had been drawn between ordinary and this particular inflammation, especially in its rapid extension, and the nature of its defusions.

Galen (A.D. 130 - 200) extends this distinction, and draws a contrast between phlegmon & suppurates; for although both possess heat & swelling, the former is red, throbs, &c. due to the afflux of blood.

blood, whereas the latter is paler, yellowish, does not throb, and arises from the presence of bile in the blood.

These ideas as to the nature of Erysipelas prevailed, with the exception to be noticed afterwards in discussing its pathology & aetiology, until the time of John Hunter - the end of the 18th Century.

It was regarded as a specific inflammation of the skin, which was caused by "peccant matter mixed with the blood" (Sydenham & Cullen)

John Hunter, however, made a great advance when he considered it as the type of a particular kind of inflammation; for in his work ("On the Blood") he says: - "Most inflammations that are not of the true adhesive and suppurative type are called Erysipelatous, although they probably do not in the least belong to it." "It is more commonly a cutaneous inflammation than situated in the deeper seated parts, although in some constitutions every inflammation, wherever it

exists, will most probably be of this kind. "There is an inflammation which attacks internal canals ~~but~~ how far it is the same I do not know. It is more common to the throat than any other part, often going down the trachea. Whatever it is, it may be considered, in some of its effects, to be in direct opposition to the adhesive and suppurative inflammation, for where the adhesive most readily produces adhesions, there the suppurative does not, as in the cellular membrane "The extravasation, in consequence of the suppurative inflammation, is not so great as in either the adhesive or adenomatous, nor is it of that kind which produces adhesions between the parts inflamed. It appears to support itself by continued sympathy, for it commonly begins at a point & spreads, while it shall be fitting well where it first began, but the inflammation may be such as to extinguish while it spreads." The idea, thus dimly hinted

at by Hunter, that Erysipelas of the skin was simply one of the manifestations of a particular kind of inflammation were followed out by others who gradually shewed the intimate relationships that existed between Erysipelas and various other diseases, until Nunnely of Leeds in 1845 wrote his monograph on the subject and included under the term the following: -

- I. Erythema, excepting *E. interstigo*, & *E. nodosum*
- II. Erysipelas, in the form commonly described under that term, whether of the head & face, trunk or limbs, -rites, idiopathic or sympathetic.
- III. Diffuse Inflammation of the Cellular Membrane, first described by J. Duncan in Vol I. Edin. Med. Clin. Trans.
- IV. Purpural Fever.
- V. Diffuse Inflammation of the Serous Membranes, which is perhaps more frequently seen in the peritonium, especially after wounds of it or in its neighbourhood, as after the operation for strangulated hernia or stone.

VI. Diffuse Inflammation of the mucous Membranes:
 this form is more frequently seen about the fauces,
 as in some forms of *Angina pharyngea* & *laryngea*.

VII. Very possibly some forms of Arachnitis belong to
 this class.

VIII. Diffuse Phlebitis, and also this form of inflam-
 mation of the Absorbents.

Kumley certainly shows that the above diseases
 are allied in their nature, and proves how one
 may be the cause of the other, as had been suspect-
 ed previously by the use of the term 'Erysipelas
 metastaticum' where the disease had suddenly
 vanished from one part, and attacked another -
 generally an internal - organ.

Others before him had pointed out the intimate
 relationship between Erysipelas & Purpural Fever,
 from Malouin in 1746, Poutreau in 1750, Clarke
 in 1788 & Hey in 1811-12 & Stokes of Doncaster in 1843
 Trauss ('On Constitutional Irritation') shows the
 connection between cutaneous Erysipelas and Dif:

pure Inflammation of the Areolar tissue, as well
 as of the mucous membrane of the throat; and
 also its connection with Phlebitis and Pyæmia;
 while Dr. Gross of Philadelphia in his "System of
 Surgery" speaks of an epidemic of Suppelas
 in Louisville Hospital in 1844-5-6, during
 which whole families were sometimes cut
 down by it, and every case in the Hospital
 received its peculiar impress, and "lost its
 living"; so much so that many patients em-
 bolizing from various diseases were suddenly
 seized with Diphtheria, Pneumonia & Bronchitis,
 over which the usual remedies had no control.
 He also describes another fatal epidemic, which
 prevailed in the South-western portion of the
 United States, and in Canada, and was known
 as "black tongue" and "suppelasive fever".
 It began in the throat with a deep red, glossy
 swelling, which extended to the tongue, noula,
 tonsils & face which last was most hideously swollen.

and distorted. Delirium & prostration accompanied it from the first. Some died early; others from local sloughing; a third portion from pyæmia, & abscesses in the lungs & other parts. If lying-in women were attacked, they usually exhibited high evidence of Metritis, Peritonitis, Phlebitis, &c.

Of more recent authors, I need only mention Erichsen who, in his "Science & Art of Surgery," includes under Erysipelas, all those varieties of Inflammation which are usually spoken of as "diffuse". He says that this form of Inflammation has a remarkable tendency to spread with great rapidity by continuity of surface, to change its seat, & not to be limited by any adhesive action. It may extend over any continuous surface: the skin, areolar tissue, mucous & serous membranes, and the lining membranes of arteries, veins & lymphatics are all liable to be affected. It simply affects the skin more frequently than any other membranous surface, because the skin is more frequently than

any other surface in the body, the seat of wounds
— the most common exciting cause of Erysipelas.
"Indeed, not only must we look upon Erysipelas
as a disease that may attack any surface, ex-
ternal or internal, but we must consider the
constitutional disturbance that takes place in
Erysipelas as the essential morbid condition.
"This, it is true, is usually complicated with dif-
fuse inflammation of the integument & areolar
tissue, and then constitutes one of the ordinary
forms of Erysipelas. But a constitutional fever
may occur of precisely the same type as that which
we observe to precede & to accompany the local
inflammation, without any such complication.
"This I had special occasion to observe in a very
fatal outbreak of Erysipelas, which took place in
my wards some years ago. On that occasion, all
the cases, in which the cutaneous form of Erysipelas
appeared, were marked by constitutional distur-
bance, attended by much gastro-intestinal irri-
tation.

tation; but precisely the same type of febrile symptoms, & the same irritation of the stomach and bowels occurred in patients in the same ward in whom no local or surface evolution of the disease took place." So, too, Droussseau in his 36th Clinical Lecture mentions a case which he calls *Erysipelato-phlegmonous Pneumonia*, because the inflammation of the parenchyma of the lung in this instance — instead of remaining confined to the situation in which it was originally developed — had a peculiar tendency to invade other parts, like phlegmonous erysipelas of the cellular tissue. Thoinot, Lehmann & others have described similar cases. A like inflammation of the pleura, anterior mediastinum, & lower portion of the oesophagus has been found by Lawrence, Kilgus, Hebra, &c. &c. We see, then, that Erysipelas was known as a peculiar inflammation of the integument & subcutaneous tissues in the earliest ages, and, in the text-books of the present day, the term is limited to this definition

Attempts have even been made, from time to time, to confine the use of the term to the affection of the head & face, and the names of Arnott & Sir Thos. Watson are sufficient to allow the suggestion to be received with respect; but when we come to consider the pathology of the disease, we shall - I think - be compelled to admit that it would be, to say the least, unphilosophical to limit a term, which implies a constitutional disturbance, to one of its local manifestations, even although this be, in general, the most common seat of the disease. In opposition to such narrowing down of the word Erysipelas, the ideas conveyed by the term have gradually extended until the tendency is now rather to regard it as the type of a febrile inflammation which may attack any continuous surface & produce those particular inflammations of various organs which are spoken of as "diffuse". These inflammatory affections belong to the class of infective inflammations, or, in other words,

the inflammatory products which are generated in the course of the disease have the property of setting up an inflammation, similar in character to that at the original focus, in any part with which they may come in contact. These products diffuse themselves indefinitely by means of the lymphatic vessels, and lymph-spaces, and thus set up a spreading lymphatic inflammation. It would be beyond the limits of this paper to describe in detail each of the above diseases, and my remarks will, for the most part, be confined to that particular inflammation of the skin & subcutaneous tissues to which, in treat-books, the term "Erysipelas" is specially applied; for this may be considered as typical of the whole class of Erysipelatous inflammations, and will serve to show in what respects this differs from the ordinary adhesive or suppurative inflammation.

Pathology.

In considering the pathology of Erysipelas, we are at the outset confronted by two diametrically opposite views concerning its nature, which are roughly expressed by the names of the two great classes into which it has been divided, viz.: Idio-
 pathic or Medical Erysipelas (E. verum seu Sa-
 anthematicum) and Traumatic or Sympathetic
 or Surgical Erysipelas (E. nothum seu spurium).
 By the former term (Idiopathic) the idea is conveyed that Erysipelas is primarily a general disorder, allied to the Scanthematic fevers, the local mani-
 festation of which is a diffuse inflammation starting from any wound that may exist on the body of the patient, or - failing that - choosing by preference the points of junction of mucous membrane & skin. By the latter expression (traumatic) Erysipelas is described as originally a purely local inflammation, infective in charac-
 -ter which secondarily gives rise to constitutional disturbance. Let us consider each of these in detail.

Idiopathic Erysipelas was, as has been already stated, regarded as due to the presence of bile, or some corrupt & acid juices in the blood. When diseases came to be arranged, therefore, it was classed among the Fevers. Thus we find that Boissier de Sauvages (1706-1767), the great nosologist, makes Erysipelas a special genus of the order Exanthemata in the class Phlegmasia, placing it between Purpura & Scarlatina. Cullen (1712 - 1790) improved upon this by subdividing Erysipelatous affections into two distinct classes, according as the constitutional affection is symptomatic of the external affection (Erythema), or as the external inflammation is dependent upon the general constitutional disturbance. The former he placed among the Phlegmasia, and the latter among the Exanthemata. This distinction practically holds ground in the present day; for we hear many practitioners speak of mild cases of Erysipelas as erythema, & it will be remembered that Nunnely

includes it (with the exception of two varieties) amongst *Excipelatus* affectives.

Many authorities of the present day, Sir John Wat-
son, for instance, include *Excipelus* among the acute eruptive fevers, with which it certainly has many points in common: Thus, in 90 per cent. of the cases, the external manifestations of the case are preceded by fever (antenna), which is announced in the usual manner by chilliness — occasionally rigors — loss of appetite, general malaise, nausea, headache — even Epistaxis emutatis — pains in the limbs, sore throat, increase of the temperature up to 103.5 F. before the appearance of the rash. There is also a so-called period of ~~Emp:~~
~~Incubation~~ incubation, which, however, varies from a few hours to fourteen days after exposure to the infection. The disease also occurs in epidemics, and can be communicated, under certain conditions, from one person to another, not only by direct inoculation, but by infection.

On the other hand, it differs from the true Eczanthe-
 mata in the extreme irregularity of its course,
 and in not conferring upon the patient any im-
 munity from a second attack; in fact, one attack
 predisposes to another. The tendency of Erysipelas
 to make its first appearance at the site of a
 wound, however slight, was for a time considered
 to be peculiar to this disease, but Sir Jas. Paget
 shewed in 1862 that this characteristic was
 shared by the Eczanthe-matous fevers, and gave
 instances from cases of measles & Scarlatina,
 where the rash was earliest and most intense
 at the site of some injury; whilst Dr. Budd
 records similar events in a case of Small-pox.
 The earlier dermatologists, such as Willan and
 Bateman, placed Erysipelas among the Eczanthe-
 mata, & recognised the two genera Erythema & Ery-
 sipelas, giving six or seven species of the former, and
 four species of the latter; but more recent ones,
 such as Alibert, Hebra & Klebs, consider it as

an inflammation of the skin, and Hebra distinctly says that he cannot concur with those who compare it with the Scanthematia, for he regards it as "a common inflammation of the skin capable of being excited by various causes, some of which have their seat in the integument, whilst others arise from affectations of other organs, or have an origin as yet unknown to us."

Riches, Heyfelder & others are inclined to think that in addition to the infectious form, there may be a non-infecting variety, produced by thermal, chemical or mechanical influences which may become infective secondarily, and then for the first time assume a specific character; ^{this} in a way recognising in other words Cullen's subdivisions of the disease.

A third view of the nature of idiopathic Erysipelas was that first promulgated by Richter of Göttingen (1744), who looked upon the disease as inflammation of the lymph vessels (lymphitis), which was

modified by Blandin (1845) into "capillary lymphadenitis"; but although this condition accompanies the progress of the suppurates, it never exists at a distance from the affected part.

Rossseau maintains that the suppurative inflammation is "almost always preceded by glandular enlargement which is dependent on a local lesion in the situation of the lymphatic vessels communicating with the swollen gland," and Campbell de Crozan believes the actual primary seat of the local inflammation to be in the absorbent system. Nismeyr, on the contrary, although he is certain that many forms of suppurates proceed from an extension of an inflammation from the walls of the ^{lymphatic} vessels to the skin, "cannot believe this mode of origin to cause idiopathic suppurates, which we have no reason for looking on as one of the Acute Exanthemata, or for regarding as infectious," but which bear some analogy to Pneumonia, Pleurisy, Laryngitis &c.

While there have thus been so many divergent
 opinions as to the exact nature of Idiopathic
 or Medical Erysipelas, there has been a pretty
 general agreement, at least in England, as to
 the nature of Traumatic or Surgical Erysipelas;
 for this term has always been applied to a local
 inflammation, rapidly spreading by the lymph-
 vessels & lymph spaces, infective in character
 which attacks wounds — recent ones, for choice.
 It is the diffuse inflammation which is thus set
 up that is supposed to cause the constitutional
 disturbance — fever, delirium &c. The severity
 of the inflammation is supposed to be pretty
 influenced by the character of the wound, viz: its
 depth & laceration, and by the susceptibility of
 the patient; it was in order to account for the dif-
 ferent degrees of constitutional disturbance that
 Krammely suggested, what he called, the "Erysipela-
 toid Diathesis". This form of Erysipelas has been
 divided into three classes, according to the seat

of the inflammation, viz: (1) Simple Cutaneous, (2) Phlegmonous or Cellulo-Cutaneous, (3) Cellular, or Diffuse Cellulitis, and thus presents a marked contrast to the elaborate distinctions of the Dermatologists, who have invented names for as many varieties of medical Impetigo, as their ingenuity could suggest out of the characters or situation of the Impetigo, such as *S. ambulans, serpens, miliaris, bulbosum, adenatum, furunculorum, faciei, capitis, &c. &c.*

Trousseau was the first who attempted to break down the distinction between idiopathic Traumatic Impetigo; for he regarded the disease as the visible manifestation of some intensely active & specific noxious agency working from without, at first locally like Diphtheria, and only secondarily infecting the whole organism. He thus looked upon every case as really one of traumatic origin, & considered that some lesion, however slight, was the determining cause in the de-

development of the disease. In opposition to this view many writers have considered these two varieties as distinct diseases, but although we shall be able to discuss them more fully, after we have considered the etiology of the disease, we may say now that they closely resemble each other in their mode of invasion, course & pathological changes, and that numerous instances can be found to show that infection from so called idiopathic suppurules will give rise to the traumatic form in patients suffering from an open wound; whilst during an outbreak of suppurules in a surgical ward patients without open wounds are occasionally attacked by the idiopathic variety. We are, therefore, justified in supposing that these two forms of suppurules are identical and any differences, which may be detected between them, may depend entirely upon the manner in which the supposed cause of the disease effects an entrance into the system.

Morbid Anatomy. Within the limits of this paper, it would be impossible to describe the post-mortem appearances found in all those diffuse inflammations, which have been shown to be connected with suppurates; & the following observations will refer chiefly to the Catarrhs or Cellulo-cutaneous varieties of the disease. After death, the redness has generally disappeared, leaving a faint yellowish tint, but the swelling is still perceptible. The skin feels hard & inelastic, & the subcutaneous areolar tissue contains an excess of serous fluid, which - according to the severity and duration of the disease - will be pale or yellow, reddish & turbid, milky & semi-purulent, or a greenish pus. The serous fluid found in the vessels is largely albuminous, has always a neutral or feebly alkaline reaction, & contains from the very first a few pus-cells (H. Str.). The areolar tissue itself is reddish & vascular, & thickened & solidified by fibrinous effusion, or dead & rotten like flakes of tow, or, as James

Described it, like "wetted chamois leather." The subjacent fascia may be destroyed & the intermuscular spaces infiltrated, whilst parts of muscles may be invaded, & tend well soft & friable — this condition extending, according to Ponfick, even to the muscular tissue of the head & vessels. "Purulent depots" may be found in the joints, or in the areolar tissue of various parts of the body: such a condition which Busk described as a minor degree of pyæmia.

In other respects, the appearances are not unlike those signs of blood-change found in cases of typhus & other malignant fevers, viz:— Early post-mortem staining, subserous petechiæ, swollen & softened spleen, and cloudy swelling of the liver & kidneys. Busk found the lungs highly congested, & the smaller pulmonary vessels containing pus, as was also the case in the small veins of the head when they had been the seat of the disease; Bostan has described a similar condition in

the vessels of the brain. The principal morbid characters are found in the blood, which — according to Pichan. Dufrillay — is dark-coloured & thin, and, after the disease has passed beyond the acute stage, loses its disposition to separate, and forms a thin, loose coagulum; whilst Hiller states that microscopic examination before death shows that many of the white corpuscles have undergone degenerative changes, and become masses of highly-refracting globules. Soxh, Campbell de Moisan says that the corpuscles are much altered, broken up, & irregular.

Microscopic examination of the affected part of the skin shows large numbers of migrating leucocytes (caused, according to Virchow, by acute irritation of the glandular apparatus) lying in the spaces of the fibrous tissue, amongst the fat-cells, and in the lumen of the lymphatic vessels, whilst these vessels themselves are thickly filled with uniform granulated cells. Within the test.

year or two minute globular bacteria, known as micrococci or microspheres (Cohn) have been found filling the lymph spaces & lymphatic glands at the advancing margin of the suppurative inflammation. They were first discovered by Hütter, who has been corroborated by Neppom, Lunikowsky, Wilder, Roth, Zeigler, Fehleisen, Koch & others. These organisms are not obscure when the rash is receding, nor in those parts which have been affected for any length of time. The part which they are supposed to play in the production of this disease will be discussed later on.

Etiology. Erysipelas, even though ^{the term} has been confined to the specific inflammation of the skin, has from the earliest times been recognised as a constitutional malady which arose from impurity of the blood — this impurity being attributed to bile or "materia picea" (Cullen). The various schools of medical thought which sprang up in the

seventeenth Century, along with the advance of science, such as the Iatro-Chemists, Iatro-mathematicians, &c., tried to modify this pathology by attributing Erysipelas to changes in the chemical composition or in the velocity of the blood; just as, a few years earlier Van Helmont (1577-1644) had endeavoured to supersede the "humours" of the ancients by his theoretical "Archæus" or "Enteint-principe," which was really nothing else but the same thing under a new name.

The humoral pathology in one form or other, however, remained paramount until Hoffmann (1660-1742) founded the School of Solidists by teaching that "Spasm" was the agent which brought about disease, and that pathology should be founded on the defects in the "microcosmic motions" of the solids of the body, and not in affections of the fluids. He influenced Richter (who, as we have said, regarded Erysipelas as an inflammation of the lymphatic vessels)

and to a certain extent John Hunter who drew a marked distinction between the adhesive or suppurative and suppurative inflammations, and believed that the particular inflammation was largely modified by the structure & physiological properties of the part attacked. His ideas prevailed until comparatively recently; for Caspary Smith taught that Erysipelas was simply an inflammation of the skin, and that all its phenomena & peculiarities arose entirely from the structure attacked. So, too, Sir W^m Lawrence maintained that this disease was merely "a particular modification of cutaneous or cutaneous-cellular inflammation." He could by no means agree with those who regard it as a "distinct species of inflammation, and as capable in that character of affecting various parts of the body as well as the skin." It was against his paper in *Med. Chir. Trans.*, vol xiv, that Nunnally wrote his treatise, and showed that Erysipelas was really a constitutional malady, and that the affection of

The skin was simply one of the manifestations of a particular inflammation which might, and did, attack most of the other tissues, although its effects were known by the different names mentioned at p. 6. 7.

Whatever might be the exact nature of this mysterious disease, it was soon noticed that the presence of a wound had a great influence in determining the invasion of the Erysipelas, and "Exciting Causes" were thus differentiated.

It was also seen that although the disease attacked two persons placed under the same conditions of treatment, it made more extensive & rapid progress in the one case than in the other; hence "Predisposing Causes" came to be distinguished, and were after a time divided into "Extrinsic" & "Intrinsic", according as they were attributed to the patient's surroundings, or to his own condition, bodily & mental. Some persons were, however, noticed to be more than ordinarily liable to attacks of Erysipelas, & to account for this Travers used

the term "Constitutional Irritability," called by Nunnally "Erysipelatoid Diathesis," and by Abernethy "Constitutional Susceptibility". This condition was characterized by great vascular excitement without corresponding nervous energy, and by the effusion of non-adhesive lymph.

Nunnally expresses his ideas in the words, "a great tendency to act without corresponding power."

D. W. P. Allison ("On Inflammation"), although he notices the tendency to erythematous inflammation which exists in some persons more than in others, says that "in many cases it is obviously given, not by internal constitution, but by some hitherto imperfectly understood, external cause, which is obviously of local & temporary operation; because at certain times, & in certain districts, it prevails more extensively than at others. The disease is certainly capable of being transmitted from one person to another by inoculation, and is certainly propagated in many cases, by contagion."

Thus, in time, & in spite of much opposition, 'contagion' & 'infection' were also regarded as Causes in promoting the Extension of the Disease.

Let us now examine each of these Causes in detail, commencing with

Predisposing I Intrinsic. The greatest predisposing Cause is undoubtedly neglect of proper hygienic conditions, as exemplified by intemperance and melancholiness, over-fatigue & insufficient exercise. Amongst the special diseased conditions of the blood, which predispose to Erysipelas, are: - Diabetes, granular disease of the kidneys attended by albuminuria, disease of the liver, Gout, Arthritis, Chlorosis, & repeated attacks of Erysipelas. So, too, those whose nervous system is habitually depressed, as the idiotic & semi-idiotic, are very prone to severe attacks; whilst the opposite condition of violent mental emotion has a tendency to further the development of the Disease. Heredity seems to exercise some influence in

predisposing towards Impipela, and several instances of this peculiarity have come under my own observation. The extremes of life, old age & infancy, when the vital powers are enfeebled, are important factors to be considered, when discussing predisposing causes, and a special variety, Impipela neonatorum, has been distinguished by most writers. As regards the influence of Sex, the disease is said to be more common in women, especially at the menstrual period; but of the fatal cases which occurred in England between 1862-68, the male ^{deaths} ~~cases~~ numbered 56 per cent., so that there is no great disparity between the sexes.

II. Extrinsice. The season of the year (Spring & Autumn) certain meteorological conditions, as East winds, low temperature and sudden atmospheric vicissitudes, have always been considered causes; but overcrowding in hospitals (to happen which Dr. Geo. Gregory invented the term 'Schlasis'), want of fresh air, impure air & water, bad food and dirt of all kinds are

undoubted agents in promoting the spread of the disease. It is also sometimes epidemic, and was then supposed to be the result of "those peculiar conditions of the atmosphere, styled 'strains epidemics stationarius'", which is generally a round about way of hiding one's ignorance of the real cause.

Exciting.

The principal exciting cause is certainly the presence of a wound, and, as has been said, Brownson believes some brain to be necessary in almost every case of Rupifelas. The mere size of a wound does not influence the liability to its onset so much as the character (Erichsen); for lacerated wounds are more apt to be followed by Rupifelas than clean-cut incisions, & the depth of a wound determines to a considerable degree the severity of the attack, which is more intense in those injuries that penetrate the fascia, even although this be cut to a very limited extent. So, too, a recent wound is far more liable to take on rupifelation than when adhesive

or suppurative inflammation has been set up, the formation of limiting fibrine appearing to lessen the liability to the occurrence of disease. The preference of Impetigo for attacking wounds, has been well shown by Volkmann who has proved that in cases of so-called idiopathic Impetigo of the trunk & extremities, scarcely an example could be found where the disease had not started from some local disturbance, such as a scratched pustule or the like; whilst B. König found that in thirty-three cases of spontaneous Impetigo, a slight injury was the starting point in nineteen of them, and that in the others the dissemination was hindered by the frost swelling of the parts.

Infectious. The poison of Impetigo is undoubtedly infectious, as the experience of hospitals only too abundantly testifies. Its power of infection seems, however, to be somewhat limited, like that of Diphtheria, for, during the first epidemic in St. Bartholomew's hospital in 1872, Savory noticed that almost always, the

Disease attacked the patient bying next to the
 one previously affected, whilst Goodfellows, Ritzmann
 and others have made similar observations.

Inoculation. The poison of this disease is also, to a decided ex-
 tent, inoculable, as was suspected long ago by
 Willan who inoculated with the fluid contents
 from the vesicles & produced a similar eruption.
 Both, recent experiments on rabbits by injection of
 the fresh contents of the suppurated bullae, the expressed
 edematous fluid from portions of suppurated skin,
 and the blood of the affected animals filtered through
 linen have proved that the disease can be inoculated
 from man to the lower animals; whilst Lukomsky
 shewed that the mere painting of the fluid, taken
 from parts affected with Impetigo, upon wounds
 will produce a similar inflammation.

Pathologists were particularly struck by the steady
 & uninterrupted progress of the disease, which —
 according to Pflieger's investigations — seems to advance
 according to mathematical laws, "halting where

"mechanical obstacles, or the resistance of pressure stand in its way," & thus led them to suppose that the fluid causing the edema carried the irritant along with it, & so produced the continuous spreading of the eruptions, so different from ordinary inflammation. Such considerations, combined with such experiments as those mentioned above, led observers to search for what may be called the "active principle," which rendered these fluids so specifically inoculable, and which was supposed to be "some agent, ferment like or more chemical in its action, with an activity & vitality of short duration only, but with great capability of reproduction" (Ziemssen). These researches resulted in Hülk's discovery of the micrococci in the inflamed tissues, & especially abundant in the edematous parts, much less so in the blood.

These micrococci are the smallest of all the bacteria, of scarcely measurable size, appearing under the microscope as bright round, or oval

spherules, without spontaneous movement, and found in the tissues either isolated, or arranged like ~~beads~~ strings of beads, or grouped into colonies in which the separate spherules are held together by a gelatinous cellular substance. These were found by Arpree in the blood of suppurative patients, and were most abundant in the blood taken from the suppurative part. Wilds, too, states that they exist in the pus of the wounds from which the suppurative inflammation starts, & Orth has found them in the contents of the suppurative bubble. Billroth, Ehrlich, von Recklinghausen, & Lukomsky found that the lymphatics and canaliculi of the skin at the border of the suppurative part were filled with micrococci, which have also been seen in the blood-vessels, muscles, liver, spleen & kidneys.

It was maintained by many that similar organisms existed in normal blood & healthy tissues, but the researches of Pasteur, Burdon-Sanderson and

Koch have negatived this assumption; and Rice has stated that what were taken to be micrococci were "small round bodies more or less numerous, which are most probably debris arising from the disintegration of the white blood corpuscles."

Ziegler has satisfied himself by experiment that these micrococci which he distinguishes by the name of the disease (*Micrococcus suppuratorius*) are the cause of Suppuration; Orth, too, produced the disease by inoculating with an artificial infecting fluid obtained by the cultivation of *Suppuratorius* serum, containing bacteria, from the bullee in Pasteur's solution; & last year Ehrlich set up Suppuration by inoculating a patient with the fourth generation of these organisms, which he had cultivated after Koch's method.

These micrococci have also been found in other infectious diseases which are allied to Suppuration, such as Cellulitis, Punctate Catarrh, Metritis, Suppurative Peritonitis, Croupous pneumonia, and

some forms of Endocarditis, and are additional evidence in support of the theory that Erysipelas, when the term is confined to the inflammation of the integument, is simply a type of a diffuse infective inflammation which may attack any organ or tissue.

It is but right, however, to say that these organisms have not been found in all cases of Erysipelas; & again, that they have been seen in patients suffering from such diverse diseases as Diphtheria, Scarletina, Variola, Measles, Cholera, Yellow Atrophy of the Liver, and that, so far as we know at present, the micrococci found in the one disease are not to be distinguished from those in the others.

In regard to the first of these objections, we may say that the detection of such minute organisms is always a matter of difficulty, so that it is not surprising that they should not be found in every instance. In the second place, the study

of Bacteria is in its very earliest stages, and it is possible that, by improved methods of microscopic investigation (such as staining &c.), differences may be detected amongst these micrococci so that they may be systematically arranged, and a separate "contagium vivum" found for each distinct disease, as Koch has done for Tuberculosis, and Pasteur in the case of Anthrax.

Until this has been done, we cannot affirm with absolute certainty that these bacteria are the actual cause of the disease in which their existence has been made known, or whether they are merely its parasites; but the probability of the former hypothesis being the real explanation of their presence is becoming stronger year by year. As corroborative of this assertion, some experiments of Orth's show that the odour of *Spirillum* is at least weakened in its infective properties as soon as the vitality of the bacteria is impaired by the use of Carbolic Acid & such disinfectants; whilst the almost

magical results of the Antiseptic mode of treatment, in arresting or preventing an outbreak of Surgical Suppurations, point as strongly in the same direction.

Even allowing, however, that they are the determining cause of Suppurative inflammation, we must remember that, unless the predisposing causes likewise exist, the micrococci will have little chance of producing the disease; for we know by experiment that their vitality is very low, and that unless they light upon a soil suited for their existence they soon perish.

Hence it is that those whose vitality is impaired by disease, bad hygienic surroundings, or overwork are more liable to severe attacks of the disease. There persons of fair health who may have been exposed to the infection of Suppurations; the most intractable form of so-called Idiopathic Suppurations is found in persons of gouty or rheumatic diathesis, in whom the disease assumes the "Osseous

variety, lasting for months and even causing death from exhaustion.

The mode in which these micrococci effect an entrance into the body may be two-fold, viz:— either by means of an open wound, or by the air-passages. The former is the more usual mode of infection, or rather inoculation, as countless instances have shown, but "experience has proved that, in special circumstances, bacterial invasion of the system may actually start from the mucous membrane," and also "that fine corpuscular or particulate matters are very quickly taken up by the lymphatic capillaries of the lung, & are so carried into the lymphatic glands & into the blood" (Ziegler). We also know that the micrococci of *Empyema flavescens* live in the lymphatics, whence they make their way into the circulation, and are supposed to withdraw the oxygen from the blood, and, by means of the unoxidized ferments which they form, to produce extensive

chemical changes in its composition, so as to disturb the "functional, formative & nutritive activities" of the cell-life of the tissues, resulting in inflammation & consequent tissue-necrosis.

In reviewing what has been written, we find a few grains of truth in most of the opinions concerning the nature of this singular disease, from the "malum precans" of the older humoralists down to the ideas of Richter & Blandin who noticed the visible implication of the lymphatics and thought that one of the symptoms of the disease was the disease itself. The tendency of dermatologists of the present day to confine the use of the term to the affection of the skin & the skin alone & to attribute the peculiarities of the eruptions to the structure involved is simply resting to the worst features of the school of the solidists. From all that we know of the disease, we are justified in supposing that Impetigo is an independent disease, due to a specific animal poison, which may affect the system to a greater or less

extent, according to the general health of the patient, his surroundings, & also the mode in which the poison finds its entrance into the system, so that Brown's theory as to the disease being at first local seems in the majority of cases to be correct, but the possibility of the poison entering the circulation through the pulmonary lymphatics, & so producing true idiopathic Impetigo must not be forgotten.

There can be no doubt that the use of the word Erythema, which, though merely a symptom, has by many been regarded as a milder form of Impetigo has been the cause of many mistakes as to the exact nature of the disease, but there is just as much sense in calling this disease an Erythema, as in saying that it is a Dermatitis, Lymphitis, Adenitis, or any other - - - itis; because all these may be manifestations of the disease, which, as it is due to a particular poison, may - according to circumstances, especially those favouring its inoculation - attack any tissue, and will continue just as long

as the conditions favourable to the development of its supposed cause (the micrococci) exist. I say 'supposed cause,' because we must remember that as the pathologists of our time have shown that what were supposed to be diseases were simply the symptoms of some other disease, so future investigators, with improved methods of observation may advance further on the road to the solution of the mystery which surrounds disease, and prove that our so-called 'causes' are simply its accompaniments.

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