

II.

ON THE ORIGIN OF SPECIES IN ZYMOTIC DISEASES.

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Read at the General Meeting, February, 1871.

It is with some hesitation that I venture to bring this subject before this Society, knowing full well that in the present state of our knowledge the usual means of elucidation, viz. :—the test tube, the microscope, and the pocket lens, are inapplicable to our subject; nevertheless, I consider Zymotic diseases a fit subject for the study of Naturalists, presenting as they do, most, if not all, the characteristics of the organic world, among which may be enumerated their power of self-propagation, their portability from place to place, their modification by seasons and years, the regularity of their manifestation, and the family relationship which exists between certain groups of them, indicating, as I take it, the development of certain divisions of them from some common prototype now possibly and most probably extinct; and when we consider the part they have played in the history of our race, the havoc which they have made among the more recently discovered races of mankind,* the desolation and sorrow which they frequently carry into the bosom of our families,† I am quite sure the Members of the Naturalists' Society will excuse an attempt, however feeble, to throw some new light on the subject.

The term Zymotic, derived from the Greek word *Zumé*, a ferment, was adopted some years ago by the Registrar General, and is applied by him chiefly to seven diseases, which he considers to be the chief members of the class, viz. :—Small Pox, Scarlet Fever, Measles, Whooping Cough, Fever, including Typhus and Typhoid, Diphtheria, and epidemic Diarrhœa. These seven represent but a small number of the whole class; indeed, the outlines of the class are as yet not well defined, and it is the opinion of

* See the late Dr. George Gregory's Lectures on "The Exanthemata."

† "With regard to Zymotic diseases, it may be stated generally, that from 21 to 26 per cent. of the total number of deaths in Great Britain during a year are due to diseases of this class."—*Aitken's Science and Practice of Medicine*, page 210. 2nd Edition.

Scarlet fever has, during the present decade, destroyed in three years over 80 thousand lives.—See different annual reports by the Registrar General.

many eminent men that several diseases now regarded as Non-zymotic will have to be added to the list.*

Before entering on the immediate subject of the paper I will mention the following characteristics of the whole class, which to my mind are fully proved.

1. They are never spontaneously developed but propagated from person to person. All the conditions supposed to be favourable to them existed among the red Indians from unknown antiquity, yet these diseases never appeared amongst them until they were communicated to them by the white man.

2. As a rule, they affect an individual but once in life. One attack protects the system against another attack of the same disease, but not uniformly; this protection varies in different individual members of the class. A second attack of Small Pox is rare, whilst a second and a third attack of Typhoid Fever is not uncommon.

3. One species of disease is no protection against another however allied to it in general character. I have known Typhoid, Typhus, and Small Pox, succeed one another at short intervals in the same person. When Typhoid Fever cases are admitted into a ward containing true Typhus, convalescents from the former frequently contract the latter, and so with the whole members of the class.

4. We know the conditions favourable to their development when the germs are present but we know nothing of their absolute origin, we can only trace their history and from their analogies deduce certain conclusions.

At an early period of my professional life I was much struck and puzzled at the resemblance between different diseases showing, as it seemed to me, a strong family relationship. A further acquaintance with the history of diseases proved that I was not alone in this respect, that it had taken mankind centuries to separate and classify certain members of the class, and that two of the most important, viz.—Typhus and Typhoid—had come down to the present decade of the 19th Century without being clearly recognized as distinct species. Accurate observers in England, France, and Scotland, have described the differences for a long period, but it did not strike them that these indicated a difference of species. I have classified some of these diseases according to their supposed affinity. I am not at all satisfied that it is the best classification, but let it suffice if it but serve to illustrate the subject and call forth further enquiry.

* Pulmonary Phthisis, Cancer, &c.—See Dr. William Budd's paper on the subject, in the "Lancet."

I have put on one Stock the leading Exanthems, or Fevers which are invariably accompanied by a decided eruption on the skin. The oldest in history of this group is Small Pox. Mr. Moore has shown that this disease was known in China and Hindostan a thousand years before the Christian Era, but it is not alluded to by any of the Greek or Roman writers. It was introduced into Europe in 569, the year of the birth of Mohammed, it then swept at intervals like a plague over Europe and at a later period over the new world until the sublime discovery of Jenner checked its ravages, and that discovery having been only partially utilized on account of the ignorance of human nature, the disease again threatens to re-assume its former vigour. To prove its affinity to the rest of the group I may mention that all the early writers in the seventh and eighth centuries, such as the Arabian writers Rhazes and Avicenna, confound the disease with Measles; they accurately and graphically describe the characters of each disease, but consider them only modifications of the same affection; they did nothing towards preventing their spread, believing with many modern Sanitarians that these diseases are simply the result of putrefaction of animal and vegetable matter and not the result of infection from person to person, a doctrine which even now presents the most formidable obstacle to the adoption of true preventive measures.

Dr. Darwin, whose work on the origin of species in animals suggested to me the somewhat bold idea of applying his hypothesis of evolution to these diseases, states that where different species have arisen from the same common prototype, their resemblance to the common type and therefore to one another is greater during the early stages of development. This applies to Small Pox when compared with other members of the group. The early eruption of Small Pox is frequently so precisely similar to that of Measles, especially when it appears first on the arms, that I have been unable to give a definite opinion for 24 hours. The general symptoms are much alike, but as either disease advances the diagnostic symptoms become more pronounced and unmistakeable. Time would fail me to mention in detail other resemblances, but they are such as to induce me to believe that these two diseases, in the unknown past of our race, came from a common origin. Of their absolute origin in time and the mode of that origin science and history as yet know nothing definitely.

Again, take Scarlet Fever and Measles, now known to be distinct species, each having as definite a history as any animal or plant, although the history of Scarlet Fever does not extend beyond two centuries. This disease, probably imported from Italy, made its appearance in London in

the year 1689. It was described by Sydenham and Morton. All the early physicians who wrote on the disease considered it to be only a modification of Measles. This confusion prevailed, more or less, down to the end of the last century.

These two diseases show the same general resemblance during their early stages as Measles and Small Pox. I have seen, at an early stage of Scarlet Fever, the eruption on the arms assume the crimson appearance of Measles, and the diagnostic differences have not been pronounced until a late period. But what makes this point intensely interesting is the existence of an important member of the group, which is as a bond of union between the two, showing the very links of development, as it were, which are so often lost in natural history, I allude to a small Exanthem which I have called according to the German writers, R \ddot{o} theln. It has been described by different writers under the names Morbilli, Roseola, and other names. One of the best and latest textual writers on English medicine describes it very unphysiologically as a hybrid of Measles and Scarlet Fever but it does not protect the system from either of those diseases, nor do *they* in turn afford the least protection against *it*. Describing the disease as it suddenly appeared before me in this city two years ago,—it begins with the general symptoms of Measles, the countenance is suffused and the eyes watery, with the cough so characteristic of that disease an eruption precisely like Measles appears on the face; on the second or third day this fades and a pure scarlatinal eruption appears on the trunk and extremities; so exactly does this resemble scarlatina, that when it appeared in a member of my own family who had previously had scarlatina, I pronounced it to be a modified form of that disease; in this opinion I was confirmed by an experienced member of the profession. The symptoms rapidly vanished leaving not a trace of any evil behind them. Finding a similar affection prevalent in the city a light soon broke on me that I had to do with the German R \ddot{o} theln. Every case could be traced to infection from another. Now I almost fancy that here we have the prototype still existing alongside of its two gigantic and powerful offsprings, viz., Measles and Scarlet Fever,* compared with

* There are several small Exanthems circulating around Measles and Scarlet Fever as there are known to be three or four around Small Pox. I have taken R \ddot{o} theln as typical of the former group, and Varicella of the latter. From the exemption of many persons from the infectiousness of Scarlet Fever I surmise that one of the former group is of the same species as, and protective from, Scarlet Fever. The discoverer of this valuable Zymotic Asteroid would acquire the fame of Adams, Leverrier, and Jenner combined. It exists: What is it?

which it is like an old Lion having lost its teeth and claws lying down between two young and powerful cubs. The relationship between them is clear and distinct but the older member seems nearly pushed out of existence by some unknown cause and it will probably soon disappear.

With regard to Measles, a very old member of the family, systematic writers on medicines considered it as a form of Scarlet Fever to a period as late as 1793, and the diagnosis was not made until the issue of the second edition of Dr. Withering's Essay on Scarlet Fever, in that year. Others considered it as a mere form of Small Pox. This is sufficient to prove a family likeness. A further argument which I would advance in favour of my views is the fact that years which (through some not understood conditions) are favourable to the spread of one member of the family, are also similarly favourable to the others. It is a well-known fact that epidemics of Small Pox and Measles prevail generally at the same time, or the one follows in the wake of the other at a very short interval. Many other points might be mentioned to show that they are related to one another in their pre-historic origin.

An objection might be made to my views that I have taken for granted that these diseases are the result of organic entities more or less permanent in their character during historic times. In answer to this I can only say that all sound tradition and written history tend to this conclusion. What Small Pox was in the Chinese and the Hindoo a thousand years before the Christian Era it is in the Cockney of to-day. What Scarlet Fever was in the time of the great and accurate observer Sydenham it is in our day.* There is not a particle of evidence on record which will logically tend to the conclusion that these Zymotic Diseases ever arise from any concatenation of conditions.†

They have as strong a claim to be considered special creations as man himself, but on this I do not propose to speculate. When and in what




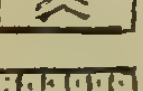
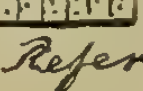
* Where a Zymotic Disease has ever broken out in a new country it has been always traceable to communication from without. For instance, Scarlet Fever, Measles, Small Pox, &c., among newly discovered races, were always traced to the invader. Pulmonary Consumption also was unknown among the South Sea Islanders and the American Red Indians, until the arrival of Europeans. Is it not Zymotic? Evidence points that way.

† Every variety and mixture of filth was found among the Red Indians and South Sea Islanders, yet these never gave birth to any Zymotic Disease known to Europeans. The Pythogenic theory of Fevers, coupled with mere Sanitarianism, have retarded preventive medicine long enough. Dirt is not nice, but, like a certain personage, it may be painted too black.

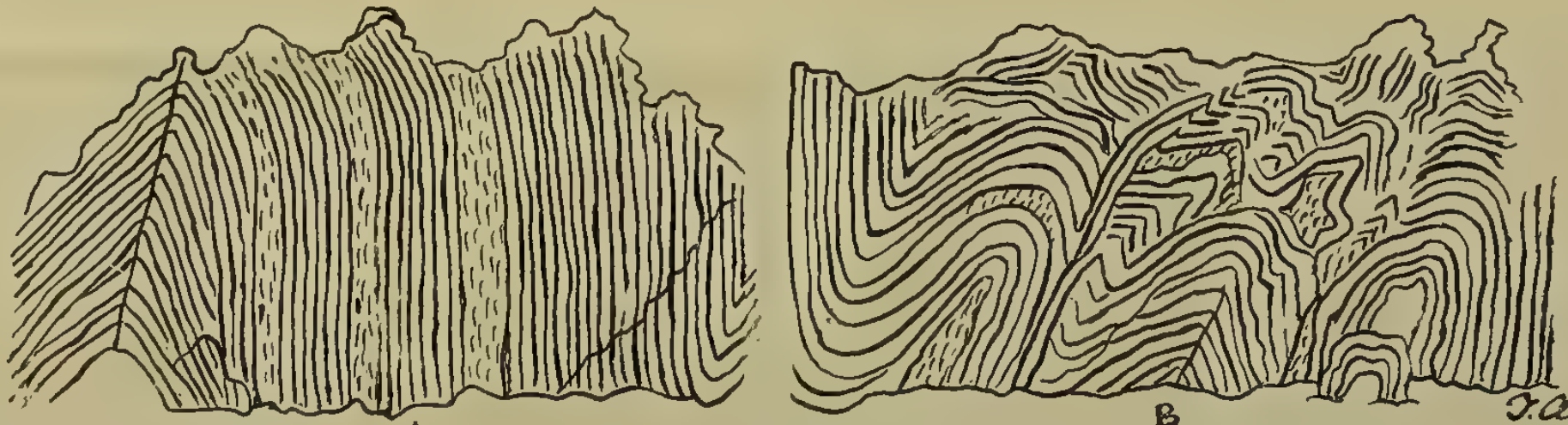
Map to illustrate Fort Major Austin's Paper on
 Llandeilo Flags, and Contorted Strata.



St. George's or Irish Channel.

-  Igneous Rocks.
 -  Carboniferous Limestone.
 -  Old Red Sandstone.
 -  Llandeilo, & Caradoc.
 -  Slates and Schists.
- References.

Contorted strata of Slates and Schists, height 111 feet.



On the Eastern or County of Wexford shore of Waterford Haven.

J. Austin.



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manner the first breath of life was breathed into the first Zymotic, we know not. I have advanced an hypothesis which, if proved to be true, will show that even the morbid processes of nature observe the same law of development by evolution as is supposed by one of the first Naturalists of the age to apply to the whole of the animal and vegetable kingdoms. Pathological Anatomy and Organic Chemistry are not as yet sufficiently advanced to enable us to demonstrate the organic germs of these affections, and the nature of the subject (which prevents much being done by way of experiment) offers special obstacles. But there is no room for discouragement. Let us all try to throw what light we can, however feeble, on these enemies of our race, and the time may come when they will be as extinct as the Dodo and the Megatherium.*

III.

PERSONAL EXPERIENCE OF THE DEEP-SEA DREDGING EXPEDITION IN
H.M.S. *Porcupine*, FROM FALMOUTH TO LISBON, IN JULY, 1870.

By WM. LANT CARPENTER, B.A., B.Sc., F.C.S.

Read at the General Meeting February 2nd, 1871.

ABSTRACT.

The equipment of the expedition was very nearly the same as in 1869, a few slight additions only being made, which the experience of the previous year had suggested. The *Porcupine* sailed from England on July 6th, under the command of Captain E. K. Calver, the scientific work being under the charge of Mr. J. Gwyn Jeffreys, F.R.S.; the author having been entrusted with the chemical and some of the physical investigations.

The first week was occupied in dredging on the slopes of the plateau on the edge of which Great Britain and Ireland rest, near the northern extremity of the Bay of Biscay, at depths ranging from 400 to 800 fathoms, which past experience had shewn to be usually the most biologically productive. Many forms of animal life were obtained which had been hitherto supposed to be confined to more northern latitudes. On one

* Note, April 29th.—From observations of cases of Small Pox during the present epidemic I could add many facts in corroboration of the general hypothesis proposed. These would somewhat modify the relation of the zymoses to one another as regards time but instead of invalidating would greatly confirm the views advanced. They would also fully exonerate the early observers from any charge of ignorance.