

easier. Little patients intuitively discover who are their friends, and soon yield themselves in passive obedience.

In seeing a young child in the ward or outpatient room of the hospital, do not at once alarm your little patient by precipitate examination, but take time to watch the colour and expression of its countenance, its respiration, and general physical condition, while you talk with its mother, and its attention is directed away from you. You will thus achieve the first steps in your diagnosis. Then, having some object at hand, as a bunch of keys or a paper-cutter, you make friends with and amuse it, while you ascertain the condition of the skin, the frequency of the pulse, and the state of the abdomen or fontanelles, as the case may be. It is well to do all this when the child is quiet; and therefore you avoid putting your finger into its mouth, or listening to its chest, until all other information is gained, as these can seldom be attempted without some resistance. Having completed your examination, you have then only to put the proper construction on the facts you have elicited.

For further information on these points, I would recommend you all to read the first lecture in Dr. West's admirable book on the *Diseases of Infancy and Childhood*. There you will learn, as far as a book can teach you, how to encounter the various difficulties in investigating the maladies of young children; and there you will find directions for diagnosis in greater detail, and given in all respects far better than I can hope to give them to you.

## Original Communications.

### THE STRUCTURE AND GROWTH OF TISSUES:

A SHORT ACCOUNT OF THE CONCLUSIONS DERIVED FROM SOME NEW OBSERVATIONS WITH THE HIGHEST MAGNIFYING POWERS.

By LIONEL S. BEALE, M.B., F.R.S.,

PROFESSOR OF PHYSIOLOGY AND OF GENERAL AND MORBID ANATOMY IN KING'S COLLEGE, LONDON; PHYSICIAN TO KING'S COLLEGE HOSPITAL; HONORARY FELLOW OF KING'S COLLEGE; ETC.

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#### II.—OF THE CELL THEORY. PROFESSOR HUXLEY'S VIEWS. CELL-WALL. CELL-CONTENTS. NUCLEI AND NUCLEOLI. GERMINAL MATTER. FORMED MATERIAL. OF THE POWERS OF GERMINAL MATTER.

WE must not look upon the component parts of tissues as fixed and stationary structures, which may exert an influence upon certain substances coming into contact with them, without themselves undergoing change; neither can the arrangement of these component parts be compared to that of bricks in a wall or a tessellated pavement; nor does their formation at all resemble the process of crystallisation or the precipitation of inorganic particles from a fluid in which they had been previously dissolved. The *germinal matter* of each component part may be regarded as consisting of particles, from each one of which endless growth may proceed as from centres, and the *formed material* external to it, as possessing peculiarities depending upon the powers of the particles of germinal matter of which it consisted at an earlier period of its existence, but no longer capable of multi-

plication—no longer able to animate lifeless particles. Every particle, then, of every elementary part, like every tissue and organ composed of these, and every living organism, passes through certain phases of existence in a definite order, moves in a definite direction, retains for a time certain peculiar properties, is at last resolved into substances of a simpler composition, and is removed to give place to particles which are ready to succeed it. The peculiar powers which it has manifested during its existence were inherited from its predecessors, which possessed similar powers; and these will be transmitted to those which succeed it.

*The Cell Theory. Professor Huxley's Views.* The general view entertained on this matter is the one which was brought forward by Schleiden and Schwann, who supposed that little bodies (nuclei) made their appearance in a blastema, and that an investment (cell-wall) was afterwards formed around them. Through this wall fluids passed in and out, and their composition and characters were modified while they formed part of the contents of the cell. Each cell was regarded as a centre to organisation.

On the other hand, Professor Huxley was led to adopt, with some important modifications, Wolff's view, which supposed that tissues exist originally as a transparent viscous mass, in which cavities are developed. These become the cells and vessels, and their walls may be thickened by deposits from the solidescible nutritive fluid. All within each space Professor Huxley terms the *endoplast*; while the walls of the spaces and intervening material are called *periplasts* or *periplastic substance*. In the latter substance, he considers, the most important changes take place. In this substance, fibrillation and vacuolation occur; and, "by its differentiation, every variety of tissue is produced". This differentiation is the result "of intimate molecular changes occurring in its substance, which take place under the guidance of the *vis essentialis*, or, to use a strictly positive phrase, occur in a definite order, we know not why." (*Med.-Chir. Review*, vol. xii, 1853.)

The view to which I have been led is essentially different from either of these. So far from the cell-wall being built up around the nucleus, I maintain that it results from changes in, and the coalescence of, the oldest particles of a mass of germinal matter (nucleus). New nuclei may make their appearance in this germinal matter; and, at a later period, these may become active, and new ones may appear within them; and so on infinitely, if the mass be placed under circumstances favourable to its growth.

The *periplast* of Professor Huxley corresponds to my *formed material*—that is, to the cell-wall of the vegetable cell, to the matrix of cartilage, to the fibrillated structure of fibrous tissue, etc. So far from attributing to this structure active properties, I hold that matter, when it assumes this form, no longer possesses formative power, or power of growth or reproduction. It may become infiltrated with various substances, thickened by deposits, or altered by the action of various agents; but it is no longer capable of causing or producing change by its own powers. I do not regard this material (cell-wall, intercellular substance, periplast) as a product of secretion of the contents of the cell, but I believe it results from the alterations taking place in the particles while they possessed active vital properties, by virtue of a power which they derived from their predecessors, in obedience to which they always move in a direction from centre to circumference.

It would be almost impossible, without going too much into detail, to indicate in various living structures the parts which exactly correspond to the names which have been usually employed in the description of those structures which are generally appealed to for examples. I propose, therefore, only to express my views with reference to these parts in general terms. Their exact

nature will be more fully discussed when the growth of the different tissues is described.

*Cell-Wall, Cell-Contents, Nuclei, Nucleoli.* In many cases, the so-called cell-wall, cell-contents, nucleus, and nucleolus, can be demonstrated; but often the cell-wall is seen to pass gradually into the cell-contents. The nucleus is not always present, while sometimes there are many nuclei. The nucleoli are by no means constant. Cell-walls have been described by some writers in structures in which others have failed to demonstrate them; and we know that, in many of the lowest animals, the living tissue is not inclosed in any membrane at all. The greatest confusion, too, prevails as to whether certain appearances result from the presence of *nuclei* or *cells*, or are due to mere *spaces* in the interstices of a tissue; whether an organism is to be looked upon as a single cell inclosing other cells or nucleoli, or as a compound body composed of several cells; and there are many other difficulties in our existing nomenclature which render it impossible for me to describe by its aid various points which I have observed. I propose, therefore, to use the more general term *elementary part* (often but not always corresponding to the term *cell*), composed of *germinal matter* and *formed material*.

*Germinal Matter; Formed Material.* I regard the *nucleus* as consisting of germinal matter in a comparatively quiescent state—in a state of dormant vitality, but ready to burst into active existence the instant the conditions necessary for its development are present; the *nucleolus*, as germinal matter another series removed from the nucleus, excepting, of course, in those cases in which the so-called nucleolus consists only of a particle of oil set free in or upon the nucleus.

The *germinal matter*, undergoing active changes which end in the particles being resolved into *formed material*, is in a state of vital activity, and passes through changes very rapidly, compared with the nucleus, which as yet has not commenced the active period of its existence.

The *formed material* is the result of the series of changes occurring in the particles of germinal matter, and may be firm and fixed in composition, exhibiting structure like fibrous tissue; infiltrated with calcareous matter, as bone; firm, exhibiting no indications of structure about to undergo change, and even capable of assuming a crystalline form, like the red blood-corpuscle; soft, transparent, and viscid, like mucus; or the formed material may be combined with much fluid, as bile.

The cell-wall is not a constant structure, and it and the so-called intercellular substance may be represented by a fluid. The formed material is sometimes very readily affected by certain external conditions, and its state is much influenced by the nature of the fluid which bathes it. It is easily destroyed by living structures which may grow at its expense. The germinal matter possesses an inherent power of resisting to a certain extent the action of destructive agents; but conditions which would certainly destroy it do not affect the vitality either of the nucleus or nucleolus.

The *formed material* is not coloured by alkaline colouring matters (carmine, litmus); the germinal matter in an active state is most distinctly coloured. The nucleus and nucleolus are intensely coloured, although in many cases these structures are separated from the colouring matter by a considerable thickness of formed material. If the latter be stained, the colour may be removed by fluids which exert no influence on the colour of the germinal matter.

Many circumstances lead me to the conclusion that germinal matter possesses an acid reaction, and I have not yet been able to discover any facts which militate against this conclusion.

[To be continued.]

## REMARKS ON OBSTRUCTION OF THE BOWELS: WITH CASES.

By EDWARD COPEMAN, M.D., M.R.C.P., F.R.C.S., Physician to the Norfolk and Norwich Hospital.

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CASE XXVI. *Impaction: Recovery.* September 12th, 1856. Mr. —, aged 60, was attacked several days ago with pain in the abdomen, beginning in the centre, and then fixing itself in the region of the ileo-cæcal valve, where there is a decided fulness as if from impacted fecal matter. He has been treated actively with leeches, blister, calomel and opium, and various purgatives. These produced free *liquid* evacuations, but the abdomen is still much distended, the bowels flatulent, with a threatening of a return of pain; furred tongue, and turbid urine. I advised a large warm poultice to the abdomen, and three grains of scammony in a pill every morning; also an ounce of compound decoction of aloes, and a drachm of tincture of hops twice a day, and a mixture, containing tincture of sumbul and ammonia, to be taken occasionally for pain or flatulence.

The pills acted very satisfactorily, bringing away *easily* considerable quantities of hard lumpy fecal matter; and the patient soon lost all feeling of ill health.

CASE XXVII. *Constipation: Amenorrhæa: Recovery.* B., aged 17, was admitted into the Norfolk and Norwich Hospital on January 12th, 1855; having for some time previously lived in service, and been under medical attendance. The catamenia had been absent for several months. She has been subject to most obstinate constipation, the bowels remaining unmoved for ten days or a fortnight at a time. She also states she is frequently unable to pass urine for two or three days together, and has passed none since her admission yesterday. In addition to these symptoms, especially when the constipation has been prolonged, she is troubled with vomiting, more particularly after food, for which she had been strictly dieted. At present, she says, she has had no relief from the bowels for ten days, and has vomited an aperient draught taken yesterday.

The abdomen is tumid, but hardly in proportion to the stated duration of the constipation; and her general health appears to have suffered but little; indeed, she has a good colour and healthy countenance. She was ordered to have a turpentine and castor oil enema immediately, and another in two hours, if required.

7 P.M. She has had two injections without relief; meanwhile, she has taken her diet without vomiting. A third injection was administered through an O'Beirn's tube, but without any better result; it passed readily, but returned almost unchanged. She was ordered to have two cathartic pills at bedtime; two drachms of castor oil three times a day; and an enema every morning, if required.

This treatment was continued for some time but without any decided amendment. On February 1st, a pill containing aloes and soap was substituted for the castor oil, but she seldom had a relief without an injection. On the 19th, I prescribed a pill containing half a grain of extract of nux vomica, and two grains and a half of nitrate of bismuth, three times a day. She now passes her urine regularly, and does not often vomit her food; but the abdomen is distended with flatulence, and the bowels remain very obstinate. On March 12th the compound gentian mixture was prescribed, and five grains of compound iron pill three times a day. The bowels are acting very irregularly, and the motions are hard and lumpy. On the 14th there was no improvement, and I gave her aqueous extract of aloes and ox-gall, of each two grains in a pill to be taken three times a day. On April 16th, she was taken unwell for the first time for six months. A few days ago her bowels began to act freely, and continue to do so; but previously to this she has scarcely on any