It has been just observed that, under certain circumstances, bacilli are not found in phthisical sputa. So far as my experiments entitle me to give an opinion, these circumstances are mainly as follows. 1. If a patient be directed to cough and expectorate, very commonly the result of the examination will be negative. It would seem that such purely voluntary expulsive efforts may merely dislodge the secretion of the larynx and neighbouring parts, and may fail to bring to light bacilli existing in the deeper air-passages. In all cases, it is well to wait for natural expectoration, that is, to wait till the natural upward movement of the contents of the tubes has caused such an accumulation as to excite the reflex action of coughing. It is needless to say that this is sometimes quite hopeless; in certain cases, there is no natural expectoration, the cough is "dry." I lately made a *post mortem* examination on a patient who died of acute pulmonary tuberculosis, who never expectorated during her illness; in the secretion of the bronchi there were many bacilli; during life, the disease could never have been diagnosed by their means. 2. There is reason to believe that, at a certain stage of phthisis—a very early stage—bacilli are not present in the sputum. My impression is that they do not appear till there is some actual breaking-down in the lung, but I cannot prove this.³ 3. The existence of general bronchial catarrh in a severe form may render it difficult to find the organisms. On several occasions, I have failed to discover them in patients with advanced phthisis whilst suffering from this complication. Provisionally, we may accept the explanation that the bacilli are so widely separated by the abundant bronchial secretion, that one may examine a good deal of the sputum without happening to light upon a specimen.

Some writers have gone so far as to assert that it is possible to ascertain the amount of lung-damage, and even to venture on a prognosis, by observing the number of bacilli present in the expectoration. I can scarcely think that our present methods are exact enough to warrant such deductions. It should be remembered that the thin layer of sputum on a slide is a quite infinitesimal portion of the whole expectorated; and unless the organisms were equally distributed throughout the mass (and they certainly are not), it would be obviously rash to attempt to judge of the quantity in a patient's lungs or secretions by examining three or four, or even thirty or forty such samples. The particles of sputum selected might be comparatively free from bacilli, while neighbouring particles might swarm with them. On the whole, it must be acknowledged that there are very many sources of error and uncertainty in the test. Nevertheless, it seems to me to be true that the bacilli are seldom, if ever, found in such large numbers in the sputa of early phthisis as they are after the formation of vomica. I have only once seen what I call "swarms" in the table, where there was no reason to suspect actual excavation; and in that case (No. 47) I should be slow to deny the possibility that the disease may have advanced so far.

On the other hand, I have examined many cases of extensive excavation, and discovered only very few bacilli. Moreover, the finding of "swarms" seems to me to reveal nothing about the extent of the morbid process or its acuteness. Cases 17, 22, 42, 43, and 55 show that immense numbers may exist in instances where there is limited excavation, little constitutional disturbance, and, on the whole, a good prognosis. The grouping of the bacilli in densely aggregated masses, which has been lately described as a matter of consequence, seems to me to be of equally uncertain significance. The observations of Balmer and Fräntzel about the prognostic importance of the degree of development (size, segmentation, spore-formation) of the bacilli require confirmation; and I must add that there is reason to believe that some apparent differences in form may be due to slight differences in the method of preparation.

What value, then, are we to attach to the discovery of these organisms as a means of diagnosis? Probably the majority of phthisical patients, when they come under observation, present such characteristic signs and symptoms, that testing of the sputum is practically unnecessary. But there are certain chest-diseases which simulate phthisis, and in which the signs and symptoms may mislead a practised observer; and there are forms of phthisis in which the diagnosis must be always doubtful. I need only refer to the difficulties met with in malignant disease of the lung, chronic pleurisy, chronic pneumonia, bronchiectasis, incipient phthisis, phthisis, with extensive bronchitis masking the physical signs, and phthisis, with deep-seated changes obscured by surrounding emphysema. If we find bacilli in the sputum, we may venture on the diagnosis of phthisis. If we do not find them, we cannot.

³ How far the case may be altered in tubercular laryngitis, I cannot say; I have had no opportunity of examining the sputum in this disease, except when there were well marked pulmonary changes. By "actual breaking-down in the lung," I do not mean that such coarse lesions are necessary as give rise to obvious signs of disorganisation; probably very minute foci of liquefaction are sufficient.

not absolutely deny the existence of the disease. But if we do not find them, after repeated searches under favourable conditions, in a case where there are definite signs of lung-damage, or in a case where the disease has lasted so long that, if it were phthisis, we might reasonably expect disorganisation somewhere, then we are justified in suspecting that some other process is at work, or that the phthisical process has been arrested.

The conclusions that may be drawn from the experiments above recorded may be thus summarised.

1. Koch's bacilli occur in the sputa of pulmonary phthisis, acute and chronic, in all its forms.
2. They do not occur in the sputa of other common diseases of the chest.
3. They may probably be found in every case of phthisis which has advanced to the stage of breaking down of tissue.
4. The discovery of very few bacilli in the sputum conveys no certain information as to the gravity of the case. Their occurrence in enormous swarms in all probability denotes excavation.

FOOD AND RICKETS.

By ROBERT WILLIAM PARKER, M.R.C.S. Eng.,
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THE part which artificial food plays in the production of rickets has always been insisted upon, and by most authors it is regarded as the primary and chief, not to say sole factor, in the production of this now widely spread affection.

The writer of this present paper, while fully conceding the importance of a suitable diet for young infants and children, cannot but feel that the constitutional factors are a little too much left out of consideration, and that a sufficient value is not placed on the growing influence of heredity in the production of rickets; he believes, until these circumstances are more fully recognised and acted upon, that infantile rickets will develop in increasing proportions, and that, as a consequence, our improved sanitation and hygienic institutions notwithstanding, infantile mortality will become even greater than it is at present; and this, too, from causes which must be classed as preventable.

Rickets occurs very widely, and under very different social conditions; about the only point which can be said to affect all children alike is the matter of nursing, using the word, of course, in its widest sense, and including under it not merely suckling, but maternal care generally. Nature clearly intended that the food of an infant should be its mother's breast-milk. Do all children get it? Do those children who do get it escape rickets? On the other hand, do those children who do not get breast-milk always show signs of rickets? In the first place, it will be well to define what is here meant by rickets. Is it to be considered and classed as a disease; and if a disease, is it local or general? Are there degrees of severity? Is any part of the process physiological; and, if so, where is the normal line to be drawn? Or is it only a condition incidental to childhood, like dentition, through which, more or less, all must pass?

On referring to authors, rickets will be found described among the cachexiae of early life, and attention is particularly drawn to the fact that it is a general disease, affecting not the osseous system only, but the nervous, the digestive, and respiratory systems likewise. When this is the case, doubtless the sum-total is disease. On the other hand, are these various systems implicated—that is to say, appreciably so—in all cases? and if not, what shall such cases be called? Shall we agree upon some name to be given to the cases in which bone-lesions are the only manifest ones; and upon another for the cases in which the nerve-lesions predominate; and upon yet another for the cases where the abdominal signs are alone appreciable; although the local pathological anatomy in each of the three cases would prove identical with what we now call rickets, when all the conditions are found together in the same subject?

The following may be regarded as a typical case, and would be accepted by most authorities. A child about 2 years of age, unable to stand, with a large belly and offensive stools "on and off;" with a large square-shaped head, with unclosed fontanelle; often covered, and especially when asleep, with a profuse perspiration; said to be the subject of "catching of the breath" (laryngismus stridulus), and to "twitchings and convulsions;" with a chest compressed at the sides and prominent sternum, and with the junctions between the cartilages and ribs enlarged and "beaded," the epiphyses of the bones large, especially those at the lower end of the radii, giving the child the appearance of being "double-jointed."

On the other hand, would the diagnosis of rickets be correct if only one or two of the foregoing conditions were present, and perhaps not over well marked? For instance, should enlargement of the radial epiphyses be regarded as rickets when no other signs are present? Such a condition, whatever it be called, is immensely common, and often the only sign of disease. Yet this condition, and the histologic-pathological changes of which it is the result, are by some considered as pathognomonic of rickets, and, indeed, as the only pathognomonic signs we possess. Even in its worst form, however, this enlargement is only premature development, physiological in kind, though pathological in time, and one which seldom leads to any permanent change.

Passing on from the definition of rickets, the question of food shall be briefly considered. Do children, who are suckled and well suckled, ever suffer from rickets? The answer is, most undoubtedly they do; this at once introduces some element as a cause, other than mere artificial feeding. Little need be said in this place on the subject of suckling; its advantages both to mother and child are so obvious that one can only wonder why so many children are deprived of their natural food. Excluding a certain number of mothers who die; some whose breasts do not secrete milk, or secrete very scantily and for a very short time; some whom special forms of acute disease part from their infants—a very small percentage of the total number of mothers—what a considerable number of the remainder forego, on very trivial grounds, the duty of suckling; and of this number what a considerable proportion—I regret to say it—are encouraged by their medical attendants to do so! It may be replied, Where is the harm, if suckling is not a certain preventive of rickets? But, on the other hand, if an infant develop rickets even when breast-fed, how much worse will be its condition, if it have to trust entirely to artificial feeding. Experience amply confirms my statement (that suckled children get rickets), and it alone would suggest that privation of natural food is not the only cause of rickets. Very often, too, a child who is not suckled fails to receive other motherly attentions; it may be either before or after its birth, or both, for a mother's duty begins not with the birth of her child, but with its conception.

The constitutional element which thus enters into the argument raises the question of predisposition and receptivity. It is in this way, I imagine, that rickets occurs among the socially well-to-do. For no class can with impunity long neglect the laws of hygiene. The relatively close circle from which husbands and wives can be drawn, obliges a certain class of the population to utterly disregard questions of heredity, and the weakening influences of frequent intermarriages are well known. Among other classes, late hours, and the various exactions of social life, or the hurry and worry of keeping up appearances, take the place of the physical hardships and not unfrequent semi-starvation which obtain among the lower classes, and both act alike on the constitution of the pregnant mother, and on the foetus *in utero*. After birth, however, the child of the rich, even if not suckled, has every attention and every care which money can procure, while the poor child continues to experience the deprivations inseparable from its surroundings.

The former is probably less frequently suckled than the latter, given child for child, and then artificial food begins to play its part. Among the poor, it is a very exceptional circumstance for the child not to be suckled, though few are brought up on breast-milk entirely; either the milk is not secreted in sufficient quantity, or it is not "satisfying" in quality; or the mother has to go out to work, and must needs trust her child during the day to the care of a neighbour, who feeds it "on the bottle." Here, again, artificial food comes into play. There is a widespread belief among poorer women, that, so long as they continue to suckle their infants, they will not again become pregnant; and for this reason many mothers continue to suckle their children for long periods (more or less up to two years of age): a practice which is a fertile source of rickets, less by supplying insufficient food to the child than by exhausting the mother's strength, by depreciating her health, and so acting indirectly on her next child. On the other hand, if there be some truth in this widespread belief—and there doubtless is—it indicates that suckling is one of the means which nature adopts to keep children from harm, but mothers from too frequent pregnancies; and it should be an inducement to mothers to practise the little self-denial which these maternal duties entail, and which save them from the more exhausting and exacting cares incidental to too rapid child-bearing.

It is unusual, at the present day, to see a child who has not some of the signs of rickets; and this is due, in the writer's opinion, to what, in the present paper, he has spoken of as the "constitutional factor." It is, however, though not at all exclusively, among the very poor that the extreme degrees are met with, that is to say, among

those in whom both the constitutional and dietetic shortcomings are combined, aggravated, and persistent.

The artificial food to which reference has often been made, under whatever high-sounding name it may be disguised and sold, is, after all, either some form of flour (baked or unbaked, and containing more or less starch), or milk, fresh or preserved, alone or combined with other ingredients. Neither of these substances in itself is hurtful, as many thousands can testify who have thriven upon them. Even if some other kinds of food besides breast-milk be occasionally given, "bits off the table what we eat ourselves," as the phrase goes in the out-patient room, how very difficult it is to prove that the rickets depend on these causes!

The ingredient in food to which is ascribed the chief part in the production of rickets is starch; and the object of the various methods of "preparing" artificial food for infants is the reduction of the insoluble starch into soluble dextrine. Is it not a little strange that so harmless and bland a substance as starch—one which forms a large proportion of our food in later life—should lead to the serious lesions which we find in severe rickets? If starvation were to result, there would be less surprise; but the severer forms of rickets are beyond understanding, unless other than food-causes be invoked. It cannot be questioned that many children thrive on artificial food, and that many would die if it were not given to them. It is also certain that a varied diet proves very useful in many cases, where even breast-milk fails to satisfy a child. Lastly, the question of starch-indigestion rests, at best, on a narrow foundation, although it has attained such a widely spread acceptance.

The immense amount of rickets which is now met with, not alone in hospital, but also among well-to-do patients in private practice, renders it incumbent on all, and especially on those who concern themselves with children's diseases, to insist on the importance of due care and precautions on the part of the expectant mothers. It can never be too strongly impressed upon them that maternal duties commence at the time of conception, and that neglect of common-sense precautions during this all-important period will surely react on the infant, and entail upon it evils which no subsequent care can entirely remove.

The inquiry is important, and is one on which each reader should individually come to a conclusion without being too much biassed by the "influence of authority" in these, as yet, largely "matters of opinion."

"Est turba semper argumentum pessimi."

The writer hopes that the question of diet, as the sole or chief cause, will be reconsidered from the present standpoint; for, unless and until it is generally admitted that other and important causes are at work, and probably responsible for the increase of the disease, little can be done to arrest it.

The views set forth are offered as suggestions rather than as dogmatic assertions; and for the most obvious of all reasons. The object will have been attained if more attention is in future directed to the circumstances surrounding mothers during gestation, with a view to minimise the "constitutional factor" in the causation of rickets.

It would be beyond [the limits of the present paper to enter into the connection, if any, between rickets in children and dyspepsia in adults. Who shall say that some of these rickety children do not represent the naturally dyspeptic portion of mankind, and that both suffer less from the effects of unsuitable food than from a natural weakness of the digestive and assimilative systems?

NOTES ON RESUSCITATION OF THE NEWLY BORN AND ON THE TREATMENT OF POISONING BY ANÆSTHETICS.

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REFERRING to the debate, at the Royal Medical and Chirurgical Society on March 11th, on "Artificial Respiration in Stillborn Children," it seems that the chief point in connection with the subject was either omitted in the discussion, or not reported in the JOURNAL.

Whilst resident accoucheur at the London Hospital, I was once performing artificial respiration, after Silvester's method, with insufficient assistance, in a cottage, on an infant, when it appeared that the chest could not expand, since the air, immediately on entering the larynx, forced the epiglottis, *ipso facto*, like a valve, over the superior orifice of the organ.

The nurse—an ancient one, and not one of an intelligent order—