

Cornil¹ studied the bacillus in tuberculous granulations as being the most simple lesions. He found generally in the centre of a tuberculous mass a vessel obliterated by fibrine, and bacilli in the centre of this; they were usually present also in the walls of this vessel and near by in varying numbers. He found that the number and dissemination of the bacilli varies very greatly, and could not find them at all in one case of tubercular meningitis. He found them in the spaces between the epithelial cells (lymph spaces of Ranvier), and in the connective tissue, and in the protoplasm about the nuclei of the embryonal cells which form tubercle.

Ballagi² concludes from his investigations that (1) Koch's bacillus can be separated from other forms of bacilli. (2.) A differential diagnosis from all other organisms can be reached by their staining reaction (Ehrlich's), and they can be thus separated in the tissue from putrefactive and disease germs (as the bacillus of leprosy). (3.) Putrefactive and other bacteria cannot be isolated by any known special staining method. (4.) The tubercle-bacilli do not occur with regularity in the sputum of persons in the first stages of phthisis (apex catarrh, hæmoptysis). (5.) In the sputum from patients in the advanced or fibroid stages the bacilli can always be found, especially in the form known as galloping consumption, although in no case do their numbers correspond invariably with the height of the fever or the stage of the destructive process. (6.) The tubercle-bacilli can be found in tuberculous organs when the process is not very old (chronisch). (7.) There are no bacilli in the sputum of non-phthical patients. (8.) Their repeated occurrence is conclusive of the diagnosis. Their absence, however, does not prove the absence of a tuberculous process. (9.) Their number and distribution is of no prognostic value.

Fränzel³ has now observed three hundred and eighty cases of phthisis, and followed them up for months. He has examined also eighty cases of other lung disease, and always with negative results. In every one of the cases of phthisis he found bacilli in the sputum, and was often able to make a diagnosis by their presence, when the physical signs were negative — a diagnosis which was invariably confirmed by the further progress of the disease. In five cases which progressed with the picture of phthisis, no tubercle-bacilli were found, and further observation showed that none of them were cases of "cheesy infectious phthisis" (which was confirmed in three by post-mortem examination.) These further observations lead him to adhere to the first of the three laws which he enunciated in his former article, that the presence of the bacillus in the sputum determines the presence of tuberculosis. He also considers the quantity of bacilli — as determined after repeated examinations extending over a long time — as of great prognostic value. (He thinks that the examination should be extended over weeks or months, and should be repeated every day, or at least every second day, — with notes and comparisons, and the conclusions to be drawn from the general average.) He thinks that such a long series of observations will give us a more certain prognosis than even the physical signs. As a result of his further study of the subject, he wishes to modify slightly his second law, that is, "that wherever, after repeated

and careful examinations, no bacilli are found in the sputum there is no tuberculosis of the lung." This law would now read as follows: "When, after repeated and careful examinations no bacilli are found, — provided that sputum is present and comes from the lungs, — there is either no lung tuberculosis or else there are no cheesy softened foci emptying their contents into the bronchi."

(To be concluded.)

PHLYCTENULAR DISEASE OF THE EYES.⁴

BY OLIVER F. WADSWORTH, M. D., BOSTON.

THE affection to which I desire to call your attention to-day is characterized by the eruption of vesicles or pustules on the conjunctiva or cornea, and often attended by much apparent photophobia. It is one with which you are doubtless all more or less familiar under some of the many names given to it. Phlyctenular, pustular, scrofulous, lymphatic ophthalmia, conjunctivitis or keratitis; herpes or eczema of conjunctiva or cornea; fascicular keratitis; ulcer of the cornea, — such are some of the designations it has received.

The extended statistics collected by Cohn show that affections of the conjunctiva and cornea make up half the sum of eye diseases. Horner found the same to be true as regards children alone, with this difference, that whereas when all ages are considered, the conjunctival affections out-number much those of the cornea, with children the proportion is reversed; in them the cornea being implicated in 27.2 per cent., the conjunctiva in 21.7 per cent. of all cases. Moreover, according to Horner, phlyctenular conjunctivitis and keratitis comprise more than half of the disease of these membranes in the child. Arlt also says this is without question the most frequent of inflammations of the eye.

The very frequency of its occurrence makes its discussion appropriate before an assemblage of general practitioners. But its frequency is by no means the greatest of its claims to our interest. Its habitual obstinacy; its tendency to relapse or recur on the least provocation; the variations in form which it manifests; the fact that its appearance is of itself alone evidence, almost invariably, if not wholly without exception, of some deterioration or imperfection of the general health; and, finally, the frequent permanent impairment and occasional destruction of sight that it causes, are sufficient reasons for its careful consideration and study. According to Birch-Hirschfeld, six per cent. of the inmates of the blind asylums of Saxony lost their sight from this disease. Such a percentage is undoubtedly higher than would be found in this country. The number made blind by it bears, however, but a small proportion to the number of those whose sight, in one or both eyes, is more or less seriously and irretrievably injured.

While the vast majority of those afflicted are young children, adults are not wholly exempt, though with them the disease is comparatively rare. In my experience, also, the course is usually mild in adults, even if sometimes prolonged. It is in children chiefly that severe forms are seen and disastrous effects produced.

Unfortunately, by the laity the malady is very gen-

¹ Cornil, Gazette Hebdomadaire, April 27, 1883.

² Ballagi, Wiener Med. Presse, No. 17, 1883.

³ Fränzel, Deutscher Med. Woch., No. 17, 1883.

⁴ Read at the Annual Meeting of the Massachusetts Medical Society, June 12, 1883, and recommended for publication by the Society.

erally looked upon as a troublesome but innocent accompaniment of teething, safe to take care of itself, and to pass away so soon as the irritation attendant on dentition has subsided, or as a sequela of measles or other exanthem, not specially requiring treatment. In consequence of this opinion the child is only too often made the subject of experiment with "household remedies," or allowed, even aided, to aggravate the disorder by following its own inclinations.

For the physician the understanding of the affection is made somewhat more difficult than need be by the prevailing habit in text-books of treating of eye diseases according to their anatomical situation. There is justification for this method of division, but as a result of it diseases of the conjunctiva and of the cornea are separated more or less widely, and where, as in the present instance, the disease is essentially the same whether its habitat be conjunctiva or cornea, the identity does not always appear with sufficient clearness. Other reasons for confusion are to be found in the multiplicity of titles, some of them implying a relationship with other diseases which does not exist, and in the fact that by some authors certain variations of the disease have been described under different names and as if distinct affections, by others different affections have been grouped under the same name.

The term herpes applied here is a misnomer. There is no evidence that the eruption has any such special connection with the sensitive nerves as is the case with herpes generally; the lesion of the cornea which may accompany herpes zoster is quite other in character than the phlyctenulæ, and the same is, usually at least, true when corneal or conjunctival affection is coincident with the ordinary herpes febrilis.

Eczema, on the other hand, is a frequent accompaniment of phlyctenulæ, as it is also a common affliction of young children. But a considerable proportion of the eczema observed in this connection is a secondary condition, due to irritation of the skin by overflow of tears and rubbing, or, on the lip and alæ nasi, by the catarrhal flow from the nostrils often present at the same time. The ocular changes do, indeed, resemble in some degree those found in eczema, yet there seem hardly grounds enough for adopting the title of eczema of the conjunctiva and cornea which Horner has proposed.

The main characteristic of the disease is the eruption of vesicles or pustules; these may be single or multiple, may vary in size from that of the head of a small pin to a diameter of several millimetres; the process may be exhausted with the eruption of one phlyctenula, or successive crops appear at irregular intervals; they may be situated on the conjunctiva, or cornea, or both, either successively or simultaneously, or may extend from one to the other. The duration of the individual efflorescence depends in the main upon its size and its situation; on the cornea the course is slower than on the vascular conjunctiva. The amount of irritation is far from being in definite relation to the severity or danger of the disease.

On the conjunctiva the eruption develops almost invariably in the near neighborhood of the cornea, and shows itself in two forms, the typical cases of which are sufficiently distinct in appearance. The more common is that of an isolated efflorescence. Beginning as a localized, elevated congestion, the centre soon becomes grayish-white or with a tinge of yellow, due to an agglomeration of lymphoid cells. The epithelial

surface is thrown off, the mass of cells beneath escapes, and there is left a depression with raised edges, which gradually flattens and is again covered by epithelium, while the congestion fades. Around the pustule both conjunctival and sub-conjunctival vessels partake in the congestion; toward the fornix, where the conjunctiva passes from globe to lid, the conjunctival congestion extends, diminishing in amount, but often increasing in breadth as it recedes from the focus of inflammation, so that the whole congested region assumes a fan shape.

Comparatively seldom, however, does the patient present himself with this typical form of congestion. Oftener, other pustules appear in various positions, simultaneously or before the first has healed, and the congested area thus becomes a wide one, with reddening of the lid conjunctiva also. If the individual pustule is small and superficial it may run through its whole course in a very few days. From this there is every gradation to the sluggish, somewhat deep ulceration, three or four millimetres in diameter, its base ragged, grayish, infiltrated, which may be a fortnight in healing over.

The other, less frequent, type consists in the almost simultaneous development of small, often very minute, phlyctenulæ, studded along a part or the whole of the limbus conjunctivæ, close to the corneal border. The attending congestion is more general, though greatest in intensity here also at the site of the eruption. The duration of the individual phlyctenulæ is short, but successive crops follow each other more or less rapidly, and extend the time indefinitely. Both forms begin with a sensation of burning or smarting as of a foreign body, more marked in the latter variety.

So long as the affection is confined to the conjunctiva alone the subjective symptoms are comparatively light, and the prognosis is positively favorable, even if the course be somewhat prolonged. Yet, until convalescence is fully established, the danger that the cornea too may be implicated is always threatening, and when that occurs the situation becomes more serious.

The manner in which the cornea becomes involved varies. A pustule may fall astride of the corneal edge, half in conjunctiva and half in cornea. Should the pustule be small it will generally heal readily and do no damage, but a large pustule in this position may give rise to a deep, funnel-shaped ulcer and to infiltration of the cornea beyond it. It is not so very uncommon for such an ulcer to extend in depth and cause perforation. The so-called fascicular keratitis commences as a pustule in this position. Here, instead of following the normal course, the infiltrated raised edge of the ulcer is pushed farther and farther into the cornea, the tissue breaking down and leaving a groove in the corneal substance behind it. At the same time a bundle of new-formed vessels extends from the conjunctiva, keeping pace in its growth with the progress of the infiltration, filling, or more than filling, the groove, while only a scarcely perceptible depression separates its corneal extremity from the gray, crescentic wall which precedes it. Usually the infiltration moves at first toward the centre of the cornea, but it generally swerves a little from a straight line. It may stop at any part of its course, or cross nearly to the conjunctiva on the opposite side. It never perforates, but the vessels disappear when the process is at an end, leaving a grayish cicatrix which is exceedingly persistent and characteristic.

Different again is the behavior where there are numerous small phlyctenulæ along the edge of the cornea, in the limbus. Then, if the condition persist some time, vesicle following vesicle, the irritation excites the growth of vessels from the edge into the cornea close beneath the epithelium. The progress of the vessels depends on the degree of the inflammation at the site of the efflorescence, and they extend farther where this is greatest, but the regularity with which a fringe of straight vessels is formed along the whole circumference of the cornea is sometimes very striking. With the subsidence of the inflammation in the limbus the corneal vascularity vanishes without leaving a trace. More than a superficial ulceration of the cornea, hardly extending deeper than the epithelial layer, I have never seen with this form, but an infiltration, leading to annular ulceration of serious amount, is described as a very rare complication.

If the cornea is affected independently the pustules show the same variation in their behavior as on the conjunctiva. There is the same difference in size and number, the same irregularity in the time of their successive appearance and in their duration. They may present themselves at any part without distinction. There seems to be no place of least resistance. Congestion about the pustule is, of course, wanting, but there is circumcorneal congestion, chiefly on the side nearest the inflammatory focus, and fading toward the fornix. A small pustule may be absorbed without coming to ulceration, but this is uncommon. From the superficial, grayish, subepithelial swelling, which, losing its covering, readily heals without leaving any sign, there is every degree to the extensive, deep, yellowish infiltration, causing deep destruction of the corneal tissue, even perforation, healing slowly, generally with the assistance of vessels growing out from the conjunctiva to its edge, and only by the formation of permanent cicatricial tissue. Through this tendency to the formation of vessels on the cornea there is sometimes, when the eruption has been repeated and long continued, a sort of pannus developed. Such a pannus mostly may be distinguished by the greater irregularity of its form and distribution from trachomatous pannus, which latter almost always starts from above, while its lower edge is approximately horizontal. Seldom, indeed, a sluggish, deep infiltration is complicated by hypopyon and a low form of iritis. When it is borne in mind that, besides all the variations that have been indicated, a catarrhal conjunctivitis, with even considerable swelling of the membrane and mucous secretion, may be superadded, the possible diversity in the appearances presented is manifest.

The degree of injury to the eye as an organ of vision depends chiefly upon the situation of the lesion; a considerable opacity near the circumference of the cornea may be of little moment in this respect, yet without directly interfering with the entrance of light to the pupil it may still do harm by changing the proper curve of the cornea. The growth of vessels toward the ulceration is always a welcome manifestation, since the reparative process is hastened by their means, and it may be said in general that the perfection of recovery, the eventual freedom from opacity and changes of curvature, is the greater the nearer the ulcer is to the circumference and the shorter the time till healing is accomplished.

Of the subjective symptoms the most prominent and most troublesome is usually photophobia, so called.

With an isolated eruption on the conjunctiva or a single pustule on the cornea this symptom may be but little pronounced. As a rule, however, it is present, and especially if the efflorescences are numerous and repeated does it often reach such a degree as of itself to become almost a distinguishing characteristic of the disease. A child thus affected may never open its eyes even in a moderate light for days or weeks; it buries its head in its hands, in the pillow, or in the clothes of its attendant, resisting violently any attempt to turn its face toward the light. It seems sometimes as if there were an effort to drag all the features, forehead, cheeks, lips, to one common centre and heap them up over the eyes. To some extent in accord with the amount of the photophobia is the quantity of watery secretion poured out, which, by keeping the lids continually moistened, causes excoriations and increases the irritation. Yet it would be a mistake to suppose that the severity of the ocular affection is to be accurately gauged by the photophobia. Rarely, indeed, where this is pronounced, is the conjunctiva alone involved; there may, however, be but few pustules on the cornea and those small and near the periphery. Precisely the worst cases, those with large, sluggish infiltration, extending deeply and causing large loss of substance (dense permanent cicatrices), or perforation with its consequences, have this symptom usually but little marked.

The title scrofulous ophthalmia, though it affirms too much, yet indicates rightly the general direction in which the cause of the disease is to be sought. Not that all individuals afflicted are scrofulous, even when the most extended application is allowed to the term; many are so, and it is in such that the most serious and persistent cases are to be found, notably the sluggish form, as well as those with great blepharospasm. But a condition of health below the norm, which carries with it an impaired power of resistance to harmful influences, is always present. Exposure to rapid changes of temperature while imperfectly protected by clothing, followed by the onset or exacerbation of catarrhal inflammation of the mucous membrane of the nasal passages and fauces, too often coincides with the beginning or increase of the ocular symptoms to be denied an influence as a causative factor. The exanthemata — measles, scarlet fever — may be regarded as acting to depress the tone of the general system, while the congestion of the mucous membranes they cause, in which the conjunctiva shares, may well prepare the ground in some measure for the local affection.

To form a definite diagnosis we must obtain a view of the eye. In many cases this presents no special difficulty, in others the ingenuity and patience of the physician are taxed to the utmost if he wishes to avoid the use of forcible measures, and often in vain. If the child can be coaxed to open its eyes, this is, of course, preferable; occasionally the application of cold to the lids will relieve, temporarily at least, somewhat obstinate spasm. Yet whatever means are employed they will fail in many instances, and then the only resource is the elevator of Desmarres, the child being placed on its back, and its head fixed between the knees of the operator. The use of the fingers to raise the lids in such case can never be as effective, and must produce painful and sometimes dangerous pressure on the eye.

Inspection of the eye is also necessary for the formation of our prognosis. Hesitation or mistake as to this

may forfeit the confidence of the parents, a confidence often tried at the best by the persistency of the disease, and without which careful attention to the details of the treatment is scarcely to be expected. It is not to be forgotten, however, that only a provisional prognosis can be given from the condition at the moment, and the state of the general health is always to be taken into account. Although the central portion of the cornea may have escaped hitherto, no one can safely predict that it will not be affected later. Moreover, we do well to warn the parents before dismissing the case from treatment that, for several years, with any depreciation of the general health, the disease may reappear.

The treatment may be divided into general and local. What has been said of the ætiology indicates both the importance and direction of the general treatment. It should never be neglected even in the lightest cases. The diet should be easily digestible and nourishing, and attention to it in detail is always advisable; healthy action of the skin is to be promoted by frequent bathing; iron, malt, and cod-liver oil to be prescribed according to the case. The advantage of fresh air and light can hardly be overestimated. Even in the coldest weather it is usually better that the patient, properly clothed, should be taken out for a time daily, and this is the more needed the poorer are the hygienic surroundings at home.

Blepharospasm, so-called photophobia, is to be feared, not for itself, but for the prejudicial consequences it entails. The violent action of the orbicularis irritates still farther the already inflamed cornea, incites to friction and consequent excoriation of the skin of the lids with the result to increase the general nervous excitability, and prevents the free bodily movement so necessary, in children especially, for the preservation of health. In considering the means for its relief, we should constantly remember that the stimulus that excites it starts from the irritated terminations of the trigeminus, not from any hyperæsthesia of the retina. The indication then is to relieve the abnormal sensibility of these terminations. It is the irritation of the corneal nerves that chiefly excites the blepharospasm, and so far as they are concerned the local narcotic effect of atropine makes this our most reliable agent. The alleviating effect of even the first application is sometimes very great. A two-grain solution may be employed every other day, or two or three times daily, and if the case is seen early the spasm may thus be kept within bounds. But should the photophobic habit, if I may be allowed the expression, be once firmly established, relief is more difficult. When the lids are persistently kept closed it is commonly useless, or worse than useless, to intrust the application of this or any collyrium to the parents or attendants. In the efforts to force open the lids of a struggling child with the fingers, more harm is likely to be done than the atropine will counteract, and the increased flow of tears excited by the struggle will rapidly remove the small amount that has been instilled. The elevator is hardly safe in untrained hands. The application may, perhaps, be made when the child sleeps, but otherwise in such cases it is better left to the physician. Sometimes, however, reliance must be chiefly placed on less direct treatment. The benefit of cold applied to the lids has already been referred to. All friction of the lids must be prevented. Excoriations of the skin about the eyes may be washed with a solution of silver nitrate, or an ointment, containing ten grains of zinc oxide, or three or four grains each

of zinc oxide and white precipitate to the drachm, be applied. The same treatment may be employed for eczema of the upper lip and *alæ nasi*, or elsewhere about the face, if present. Irritants are harmful. Darkness only aggravates the symptom. Within doors the light should be moderate and even, and be increased as the condition improves, but sudden changes of light, producing, as they do even in a state of health, contraction of the orbicularis, are to be carefully avoided. In the open air a dark shade, large enough to protect both eyes, though only one be affected, and arranged to stand out free from them, with a veil or smoke-glasses if required, are of use. It is by attention to details that success is to be attained.

When the eruption is limited to the conjunctiva a simple collyrium of borax in water or camphor water is often all the local treatment needed. Calomel, dusted lightly upon the conjunctiva from a camel's hair pencil, every day or two, till congestion has disappeared, seems to have a good effect in preventing relapses. But it must be employed with precaution. It should be pure and dry, only a very thin film of it should be formed on the conjunctiva, and the lower fold should be inspected after a moment or two, that if any have collected there in a clump or thread it may be removed. The action of calomel was for a long time unknown; now it has been demonstrated that it is soluble, to a slight extent, in salt water, and it probably acts as a weak solution of bichloride. In the presence of iodine there is produced a biniodide of mercury, and it should, therefore, never be used when the patient is taking any preparation of iodine, else a troublesome eschar may be the result. Properly used it is painless, and I have myself never seen any ill effect from it.

In general, astringents are to be avoided, but when the condition is complicated with a catarrhal inflammation of the conjunctiva, mild collyria of alum, zinc, or silver nitrate are in place. Yet these should be employed cautiously and their action watched if any fresh eruption exists.

With an eruption on the cornea I rely, with most oculists, on the action of atropine. Its soothing influence has already been alluded to. The frequency of its application is to be governed in the main by its effect on the pupil, and it is to be continued till the ulceration is again covered by epithelium. Here, also, calomel is apparently of benefit, but is, in contradistinction to the conjunctival affection, only to be applied after epithelial regeneration is well under way. Yet I would make one exception to this last statement. In the fascicular form of keratitis it has seemed to me that calomel, applied somewhat freely during the progress of the band across the cornea, has sometimes checked its course. So erratic, however, is this variety, and the opportunity for studying it so comparatively infrequent, that I am willing to admit it may have been coincidence rather than effect that I observed. With the ointment of yellow oxide of mercury, much used in the same conditions as is calomel, my experience has been limited, and it has appeared to me at least less agreeable to the patient.

The sluggish, deep infiltration, whether at the edge of the cornea or more central, showing little or no tendency to the formation of vessels, demands, besides atropine, the application of hot fomentations, continued half an hour or an hour three or four times daily. These help to relieve the pain, sometimes considerable,

and invite the vascular outgrowth from the conjunctiva needed to furnish material for repair. Should perforation occur, pain usually ceases as by magic, and the reparative process begins. The subsequent care after perforation does not differ from that required in similar circumstances arising from other cause.

Many and various have been the remedies recommended to promote the absorption of corneal opacities left by this or other diseases. My own belief is that none of them are of special value, and that the opacities are best intrusted to nature to reduce, as she certainly will in part. Our task, after the immediate attack has passed, is to see to it that measures to improve and preserve the general health are continuously carried out and thus recurrence prevented.

RECENT PROGRESS IN DISEASES OF CHILDREN.

BY T. M. ROTCH, M. D.

ASTHMA DYSPYPTICUM.¹

DR. OSKAR SILBERMANN, of Breslau, first published, in 1876, an article on the so-called dyspeptic asthma of children, and at the same time mentioned the reflex phenomena experimentally shown by Mayer and Privram to be produced by irritation of the stomach. Silbermann has lately had three more cases, which he reports as follows: (1.) A boy, thirteen months old, breast fed until the eleventh month, and always healthy, excepting that he had lately, for a short time, had diarrhoea, was seized with vomiting, great dyspnoea, the respirations being 70, and very rough, cyanosis of the face, pulse 160, small in character, cool extremities, and an anxious expression of face, apparently as if he was about to expire. The temperature was 37.6° C. The epigastrium was somewhat distended, and tender on pressure. Remedies for dyspepsia were given, and the child was perfectly well in two days. (2.) A girl, six months old, was taken sick with gastric symptoms, was very cyanotic, respirations 60 in the minute, pulse small, 120, temperature 36.9° C., repeated vomiting. Perfect recovery on the following day. (3.) A girl, eight years old, was seized with dyspeptic symptoms, and had a small, irregular pulse of 160; the epigastric region was distended and sensitive, the respirations were 28; twelve hours later the respirations were 60, and harsh in character; there was a high degree of dyspnoea, and great cyanosis; temperature 37.1° C. She recovered completely some hours afterwards.

The reflex gastric symptoms of slow pulse and increased blood pressure, experimentally produced by Mayer and Privram, are not altogether similar to the appearances observed in asthma dyspepticum. Traube and Henock supposed that a reflex irritation starting from the stomach caused a vaso-motor contraction in the arterioles, thus causing coldness of the extremities, weak pulse, and all the other appearances. Silbermann interprets the phenomena as primarily a paralysis of the vagus filaments, from which is developed a retarded action of the left ventricle with overfilling of the pulmonary circulation and the right heart, and secondarily overloading of the blood with carbonic acid, and the consequent dyspnoea and oedema of the lungs.

¹ Berlin. klin. Wochen., 23, 1882.

GROWTH AND WEIGHT OF INFANTS.²

Dr. Emil Pfeiffer, of Wiesbaden, has investigated the subject of infantile growth in reference especially to the figures of Fleischmann representing the increase in weight during the first year. Fleischmann's observations having led him to announce the rule that the average weight of sucklings at the end of their fifth month is equal to 550 grammes more than double their weight at birth, and at the end of the first year 900 grammes less than three times their birth weight; he has from this formula deduced a line, or, rather, curve of growth, by which he determines whether any individual infant is normal or abnormal in development. Pfeiffer, although as yet he has not established any rule of his own, warns us that Fleischmann's deductions are probably unsound both in actual figures and on physiological principles, and considers that Fleischmann's results have already been greatly modified by the growth curves collected by Mech, and that the figures of Bouchaud are more correct, although more complicated, Fleischmann's formula being especially noticeable for its simplicity.

Pfeiffer illustrates the practical weakness of the Fleischmann formula by two cases: (1.) An infant, weighing at birth 5000 grammes, was found at the end of the twenty-second week to weigh 9100 grammes, which was much less than the 550 grammes more than double his initial weight. This same infant when one year and ten days old weighed 12,790 grammes, which again was far more than the 900 grammes less of the formula, and yet no one could say that this child was poorly developed, for at the end of its first year it weighed 25 pounds, had its eight incisors and four molars, and was strong and well. (2.) A female infant, born in the thirty-third week, with a birth weight of 2225 grammes, weighed at the end of the twenty-second week 5125 grammes, which was 675 grammes rather than the 550 grammes of the formula, while at the end of the first year it weighed 8430 grammes, which was 1755 grammes more than three times the original weight rather than the 900 grammes less of the formula, yet this infant was not very strong, and in fact was considered rather small and weakly.

The Fleischmann formula would have made the first infant attain the enormous weight of 14,100 grammes at the end of its first year, while the second infant would have weighed only 5575 grammes, the usual weight of an infant three and a half months old. Pfeiffer considers that much more reliable results can be obtained by reckoning from the absolute amount of increase without regard to the initial weight, and from a growth curve constructed in this manner, estimating the deviations from the normal average weight which may arise in any individual instance. This method, already adopted by Vierordt and Bouchaud, is nearer perfection for the general run of cases in that it is also sufficient for determining the weight of both very heavy and very light children. Pfeiffer then states that from his observations on nursing women he has found that during the first five months the secretion of milk amounts to not, or if any, very little over 1000 to 1100 grammes a day, and that these figures representing the total amount which the child can get from the breast, the simply breast-fed child, whether heavy or light, takes the same amount of nourishment during these first five months. It is therefore clear that the

² Jahrbuch. für Kinderheilk., Band xix., Heft 2.