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# EXPERIMENTS ON KIESTEINE;

WITH REMARKS

ON ITS APPLICATION TO THE DIAGNOSIS OF PREGNANCY.

AN INAUGURAL DISSERTATION FOR THE DEGREE OF DOCTOR OF MEDICINE.

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IN 1831, M. NAUCHE communicated to the Society of Practical Medicine of Paris, some observations on a gelatino-albuminous product found in the urine of pregnant females subsequent to the first month of gestation, and which is separated from the other elements of that fluid by rest alone. To this product he gave the name of Kiesteine.

If the urine, he says, be exposed for a few days in a glass, the kiesteine shows itself at the surface, in the form of specks (*points*) and oblong filaments, which unite in a pellicle or scum of a line in thickness. A portion of this sinks to the bottom of the vessel, and forms there a whitish deposite of a milky appearance; the rest remains on the surface, adheres to the sides of the glass, and is converted into a solid membraniform substance.

The pellicle thus formed, he regards as furnishing a certain test of pregnancy almost from its commencement, if the woman is in health; and he asserts that he has frequently determined by reference to it the existence of that condition, when it would not otherwise have been suspected. He admits that in diseases in which there is a secretion of pus, in dropsy, in diabetes, and in children having worms, the urine is often covered with an albuminous, fatty, or saline scum, resembling somewhat that observed during pregnancy; but he affirms that after a little practice, these are distinguishable at a glance.

M. Nauche was followed by M. Eguisier, of the Sainte Geneviève Dispensary of Paris, who, in February, 1839, published an article in the *Lancette Française*, in which he described the pellicle as observed by himself.

"From the second to the sixth day," he says, "small opaque bodies are seen rising from the bottom to the surface of the liquid; and these aggregating by degrees, form a layer which covers the entire surface: this is the *kiesteine*. It has sufficient consistency to admit of being lifted up with some care by its edges. It is whitish, opaline and somewhat granulated, and may be well compared to the fatty scum of cool broth." He considers it an invariable attendant of pregnancy, and so well marked in its distinctive characters as to prevent its being readily confounded with others.

M. Eguisier had examined twenty-five cases. Seventeen of these, at periods varying from the fourth to the ninth month of utero-gestation, were under his care for slight indisposition: four had been pregnant from one to four months, and were under treatment for uterine disease: and the four others were affected, respectively, with ascites, sciatica, ulceration of the neck, and a supposed uterine disease, for which repeated cauterizations had been resorted to. In all of these the characteristic indications of *kiesteine* were present; and in the four last mentioned, the existence of pregnancy was ascertained in the first instance by reference to them alone.

In the following year, Dr. Golding Bird, of Guy's Hospital, published in the reports of that institution his paper "on the existence of certain elements of the milk in the urine of pregnant women," founded upon the observation of "about thirty cases."\* He gave succinctly the result of his examinations, touched on the microscopic and chemical characters of the pellicle, and expressed his belief that it is an imperfect caseous matter mixed with crystals of the ammoniacal phosphate of magnesia. Pursuing an idea of Professor Burdach of Königsburg,† that the elements of the milk existing in the circulation may, during certain conditions, be eliminated, and not finding an outlet by the mammæ, be again taken up and excreted by the kidneys, he supposes such elements to enter into the constitution of the *kiesteinic* pellicle.

A still later writer, M. Becquerel,‡ in his "*Semeiotique des Urines*," has noticed the observations of M. Nauche, but without admitting the truth of his conclusions. He had, himself, analysed and examined the urine of *three* pregnant females, and had occasionally inspected that of a "*certain number*" in different stages of utero-gestation, without discovering traces of the *kiesteine*.

I believe that I have referred in this brief sketch to all the personal observations which have been published in Europe upon this subject. They have of course attracted the notice of the journalists,§ and some of the

\* Guy's Hospital Reports, No. 10, April, 1840.

† *Traité de Physiologie*, Paris, 1839.

‡ *Semeiotique des Urines*, ch. ix., Paris, 1841.

§ *Journal de Chimie Médicale*, Fév., 1839, p. 64. *London Lancet*, No. 417, p. 675. *Dublin Journal*, vol. VI. *Medico-Chirurgical Review*, 1839, p. 228. *Am. Journ. of Med. Sci.*, Feb. 1840, p. 483; *Ibid.* Aug. 1840, p. 501. *Am. Med. Intelligencer*.



more elaborate writers of the profession have alluded to them in their treatises.\*

Some indeed have assigned to the discovery a much earlier date, referring it to Savonarola, who, as far back as 1486, detailed minutely a series of changes incidental to the urinary excretion from the commencement of utero-gestation to the seventh month. I have been unable to obtain a copy of this venerable author, and cannot, therefore, speak personally with regard to his observations; but I find by reference to Fodéré, and others who quote his opinions, that after describing the colour of the fluid, he mentions a "cloud upon the surface," adverting at the same time to a deposit partially suspended resembling carded wool. His description may perhaps identify this superficial cloud with the pellicle of M. Nauche. If so, however, the question of originality will arise between Savonarola, and some of the still more ancient writers of the Moorish and Arabian schools.

The urine, it is well known, in common with all the excrementitious and secreted fluids, was anciently a subject of habitual though vague observation. Yet, if we except the increased redness, noticed by Hippocrates and some others, as pertaining to the latter months of gestation, nothing can in any case be gleaned from the works of ancient writers, by which the phases of the urine may be applied to the determination of pregnancy. Thus, Galen, Magnus of Antioch, and Pliny, allude in a general and obscure manner to the urine and its changes, without referring to the peculiarities it exhibits during pregnancy. But Avicenna and Rhazes are quoted by M. Eguisier, as describing the white cloud, the central deposit, and the minute bodies ascending and descending; not indeed as signs absolutely indicative of pregnancy; yet as generally attending it,—the deposit being perhaps the most constant.

It may, however, be conceded, that up to the present time, the existence and character of these appearances have not been the subject of entirely satisfactory investigation. To justify general conclusions, a larger number of cases should be examined, individually and in group, and their progress, changes, and points of difference noted. They should be viewed under different aspects, at regular and frequently recurring intervals. If the indications of a particular case should appear to vary from those of others, repeated observations would become necessary to detect the causes of variance; and the influence of similar causes upon other cases, where they existed, also should then be sought for. And I may be excused for adding, that a candid spirit, not too much biased in favour of theory to admit the existence of observed exceptions, that looks to each clearly ascertained result as an independent element, and rejects nothing that appears true because irreconcilable with what was known before, is not less important to the formation of correct opinions, than the most careful and varied scrutiny of facts.

\* Montgomery, Dunglison, Churchill, Rigby, Traill, &c. &c.

It is not meant to intimate by this, that the gentlemen who have treated on this subject have been regardless of these precautions, or wanting in the proper spirit of inquiry; but it is apparent that their observations have been rather of isolated cases than of classes, that they have not compared a large number of results, and that they have failed to detect any exceptions to their general conclusions.

M. Eguisier speaks of only twenty-five cases, Dr. Golding Bird of "about thirty," and M. Becquerel's scrutiny, with immediate reference to this question, embraced only three. So that, as to all those who have followed M. Nauche in Europe, it may be said with truth, that the aggregate of their observations does not number sixty cases. It should not, therefore, surprise us, if a more extended investigation were to lead to a modification of their conclusions.

In the spring of last year, while one of the resident physicians at the Philadelphia Hospital, I availed myself of the facilities which were liberally afforded me by the managers of that institution, to commence a series of observations on the subject of *kiesteine*; and I have continued them to the present time. The number of patients in the several wards was such as to make it easy to classify and group the cases, and my position enabled me at all times to scrutinize the circumstances of each, much more fully than could have been done in private practice.

My friends, Drs. McPheeters and Perry, who were residents with me at the time I began, had already made some interesting observations on the subject at the instance of Dr. Dunglison,\* which they subsequently published in his *Medical Intelligencer*; but though their politeness had enabled me to watch the progress of their investigations, I had not adopted their conclusions, and was in fact careful to avoid the influence which the known opinions of others might have had upon the freedom of my own.

My mode of conducting the experiments was this. The recent urine was placed in open glass cylinders, of diameters varying from an inch and a half to that of a common tumbler, and protected from dust by paper covers. These were arranged in a dry, well ventilated room, where the temperature was uniform and moderate, and were exposed in groups to the equal action of air and light.† I examined them frequently during the day; but as the changes were not rapid, I determined after a little while to note only one set

\* I should do much wrong to my feelings, were I to pass the name of this gentleman without acknowledging the obligations I am under to his unwearied kindness. No one promotes more happily a spirit of inquiry among the younger members of the profession, or is more prompt to render them service.

† These precautions were not unimportant. My attempts in the "Green Room" of the Hospital were unsuccessful, in consequence of the dampness producing fungoid modifications of the scum; and in very cold or very hot weather, the pellicle formed very reluctantly, or was anticipated by the decomposition of the urine. The room should be sufficiently lighted to admit of minute examination, and the specimen should be kept *absolutely at rest* during the progress of the inquiry.



of observations in the twenty-four hours. My notes were always made upon the spot. If from any cause, an individual observation or a series was unsatisfactory, or inconclusive; or if it led to a different result from others, I repeated it at once with increased care; and I was always careful to observe the constitution, habits and circumstances generally of each patient.

The examination of the first group of cases satisfied me, that the urine during pregnancy assumes appearances different from those witnessed under other circumstances, and which I was therefore disposed to regard as characteristic of that state. Subsequent inquiries confirmed me in the general accuracy of this opinion, but compelled me at the same time to admit its liability to exception.

The more obvious of these appearances regard the superficial formation described by Dr. Bird, and recently investigated by Drs. McPheeters and Perry; but there are others which point to a series of intestine changes somewhat more obscure, though scarcely less interesting. My observations applied to both; and I regret that the limited time at my command during the studies preliminary to graduation, obliges me to select a single class as the subject of this dissertation. I take, however, that indication which seems to me best fitted for practical usefulness in diagnosis, the *pellicular change*, and which I suppose to be most properly called the *Kiesteine*.

The urine, submitted to observation in the way I have described, presents but little change during the first thirty-six hours. The mucous flocculi, if they exist, gradually subside during this period, forming a whitish cloud-like deposite at the bottom and sometimes on the sides of the glass; while more or less alteration occurs in the colour and transparency of the fluid.

The surface remains for a short time entirely unchanged; but in most cases, a greater or less number of shining acicular specks, apparently crystalline, begins to be seen within the first eighteen or twenty-four hours. These are generally scattered over the surface without regularity; but in some rare cases, they are so disposed as to form a translucent film of uniform thickness, which afterwards assumes the more defined characters of the pellicle. How far these crystals are essentially connected with the formation of the pellicle, I am not prepared to say. In many cases, I have not succeeded in detecting their presence, even by the microscope; and, indeed, I have failed to discover any *unvarying* indications whatever of the approaching development of the *Kiesteine*.

The cloudlike appearance, which is alluded to by Nauche and Eguisier, although possessed of much interest, I have not found to be a uniform premonitor of the forming pellicle: I have supposed it to be nothing more than the *Enæorema* of the older writers, depending upon the imperfect aggregation of mucous flocculi; for I have seen it repeatedly when there was no pregnancy to account for it, and it was uniformly absent where the fluid presented perfect transparency.

The time at which the pellicle begins to form varies considerably I have

seen it well marked at the end of thirty-six hours, and have known it make its first appearance as late as the eighth day. At first, it is hardly discernible. It is generally seen forming at the centre or on the sides of the glass, presenting a delicate milky or bluish white aspect. It is however in some cases uniformly disposed over the surface from the commencement, and assumes the appearance of a nearly transparent film, which gradually becomes more distinct. But it has not always the continuous strongly marked character, which some have ascribed to it. I have seen it begin in striated irregular lines, somewhat resembling a spider's web, in rings, circles, trapeziums, and irregular figures of almost every shape, which gradually became obscured by the full development of the pellicle.

When it has attained this stage, which occurs generally about the fifth day, it presents a continuous scum of an opaline white or creamy appearance, with a slight tinge of yellow, which gradually becomes deeper and more decided. The uniformity of this colour, however, is generally broken by granulated spots of a clearer white, giving it a dotted or roughened aspect. The crystals of the forming stage now appear like shining points, and I have sometimes found numerous small brownish specks, sprinkled over the surface, not unlike the gratings of nutmeg. It is at this period, that the pellicle may be compared "to the fatty scum of cooled broth."

In this state it continues for some time, preserving all its characters unbroken. The glass, where the surface meets it, is discoloured by a white opaline ring; and a series of such rings, varying in extent from a line to the fourth of an inch, marks the descent of the surface during the progress of evaporation.

The cheesy odour, mentioned by Dr. Bird as a valuable aid in diagnosis, and as "by no means unfrequent in those specimens in which the pellicle is very thick," I have found in but seven cases. Many pellicles of great thickness were entirely without it; and in two of those presenting it, the pellicle was thin and not very well developed. Drs. McPheeters and Perry were unable to detect it in either of the twenty-seven cases examined by them, and I have found it unequivocally developed in at least three cases in which pregnancy did not exist.

The pellicle, if left undisturbed for some days, breaks into cracks, commencing generally from the central portions, but not always extending to the edge of the glass. These are again crossed by other fissures, and the pellicle is more or less broken up. In the mean time, the flakes, which have been forming from the commencement of disintegration, have their edges depressed into the fluid, while at the same time the general thickness of the pellicle is much diminished; and this depression or dip gradually increasing, the depending particle is detached, and sinks slowly to the bottom. Its complete disintegration, however, is but seldom seen; being anticipated by the decomposition of the fluid. The deposit is of course considerably increased by the fallen portions of the pellicle, and is found irregularly dis-



posed over the bottom of the vessel; but as I have remarked, most abundant on the side farthest from the light.

I cannot agree with those who consider this deposit as presenting well marked distinctive characters to the eye, and I certainly have not found it uniformly coincident with the approach of the pellicle. It has indeed in many cases been absent at that period; and in others, until augmented by the detached pellicle, I have been unable to distinguish it from the very many deposits found in other urine. How far a chemical investigation may give it value, I am not prepared to say: although its liability to be confounded with other sediments makes it practically unavailable as a test, it offers a fine field for microscopic and chemical research.

This description of the appearances and changes of the pellicle, though more detailed than those of Nauche and his followers, still applies only to the better defined examples. In a considerable proportion of cases, some of the phases mentioned are not to be found together; and I have not been able by the most careful observation to discover the causes of variance. This I allude to here, because the absolute and unqualified language, which I have met elsewhere upon the subject, seems to me calculated to mislead the unpractised inquirer.

It must not however be inferred that the presence of *kiesteine* is determinable only by vague and undefined characteristics. On the contrary, the tables which are appended to this dissertation, will show that they are as well defined as most pathological phenomena, though like them they sometimes require for their discrimination a practised comparative scrutiny.

The table marked A exhibits a condensed record of my observations, more or less frequently repeated, on the urine of eighty-five pregnant females. Of these, as will be seen, sixty-eight gave a well marked pellicle of the sort called *kiesteinic*, eleven gave the pellicle under a modified form, but with appearances which enabled me to recognize it clearly, and six gave no pellicle whatever. Of these last, one was labouring under mammary abscess and convalescing from typhoid fever, and one was in a condition of extreme *anæmia* from repeated uterine hemorrhages; but the others, unless they succeeded in practising reiterated deceptions on me, which I can hardly believe, must be regarded as absolute exceptions.

The cases in the table were all of them observed at the hospital, and were of course considerably advanced before being submitted to my inspection. I have since, by the courtesy of my friends in the city, and especially of Dr. N. Benedict, been invited to examine the urine of several patients in cases of very recent yet unascertained pregnancies. My diagnosis has been in every case successful, and I have detected the *kiesteine* repeatedly before the second period of suspended menstruation. I found it in one of these before the fourth, and in another before the fifth week, computed from the middle of the preceding period. In several others I have determined it before the end of the third month. In one case the *kiesteine* was not visible

on the fourth, fifth or seventh week, although perfectly manifest on the tenth.

The urine of unimpregnated females in a state of health rarely undergoes any change which in this respect can be misapprehended. I have examined twenty-eight cases in a perfectly healthy condition, and have sometimes known pellicles form on the urine, as well as on that of males; but the distinctive character of the *kiesteine* was wanting in every case.

In certain pathological conditions, however, discrimination is somewhat more difficult. The pellicle that is not unfrequently seen on the urine in the last stages of phthisis, in arthritic diseases, and in cases of metastatic abscess, vesical catarrh, and uterine tumours, has points of resemblance to the *kiesteinic* which might readily mislead the unpractised. With reference to this, I have examined a large number of cases in various states of health and disease, and noted the results; but it may not be necessary to give more than a concise summary of them.

In thirty cases of phthisis pulmonalis, the urine of four presented a pellicle somewhat like the *kiesteine*, and one a pellicle bearing a strong resemblance to it, though, more unequally and irregularly disposed, and thus distinguishable by the eye. Fourteen of the cases were in the latter stages of the affection, and among these were three that presented the pellicle.

In arthritic diseases, eight cases of acute rheumatism and a large number of chronic rarely presented any well-marked pellicle, and never one that could be confounded with the *kiesteinic*.

Sixteen females between the ages of sixty and one hundred, as well as ten epileptics, presented no change that could give rise to confusion.

Numerous blennorrhagic and leucorrhœal cases were likewise examined. In the urine of these an increased quantity of mucus was generally present, disposed in flocculi, as M. Becquerel and others have noticed, but this was by no means uniform. In most of them the pellicle was of a cloudy character, much obscured by rapidly induced decomposition. In only two of them did it approach in appearance the *kiesteine*. But in these the resemblance was close; the most remarkable difference being in the manner of its formation, which was apparently referable to the advance of decomposition. The pellicle, moreover, was thickened by depending flocculi of mucus, which gave to its lower surface an irregular fungiform appearance.

The particulars in which the *kiesteine* differs from other pellicles regard the manner of its formation and departure, even more than its appearance when developed. As I have already mentioned, it generally begins to show itself within a day, or at furthest within two days after the discharge of the fluid, and advances gradually to its complete development. The other pellicles, on the contrary, rarely give indications of their approach until the fluid has stood a longer time, or even till decomposition has supervened, and then form with rapidity. I have known them entirely defined within a few hours.



The kiesteinic pellicle, when fully formed, has almost always a much greater degree of tenacity than the others: I have often, for purposes of microscopic examination, lifted large flakes entirely out of the urine; and when it was well defined, this was easily done: with the others it was never practicable. It seems also to be independent of putrefaction; it is not obscured for some time by the disorganization of the liquid on which it rests; and the characteristics which I have already described as accompanying its disappearance are very seldom simulated.

The appearances which I have observed seem to point directly to the conclusion, that the formation of the kiesteine is unconnected with the presence of extraneous pus or flocculent mucus. I was aware that these and other animal matters might under certain modifications give rise to a scum upon the surface, the "*cremor urinæ*" of the older writers. This has been noticed by M. Becquerel, as especially observable in leucorrhœa; and I have observed it very frequently, not only in that disease, but in cystitis, gonorrhœa, vaginal and uterine hemorrhages, and immediately after delivery when the lochial discharge was mingled with the urine.

By the kindness of Dr. Stewardson, I have had the opportunity of seeing M. Becquerel's recent and very elaborate work on the "*Semeiology of Urines*,"\* and I have been struck with the discrepancy between his observations and my own in several particulars connected with this inquiry.

After remarking that the urine is modified in its appearances by the constitutional changes incident to pregnancy, he says, that it often, especially in the latter period of gestation, grows palish, diminishes in density, containing less solid matter in solution, and partakes of the general anæmic character of the patient; and that it also *often remains unchanged after exposure*. Without attempting to deny the presence of the matter denominated kiesteine, he is not prepared to admit it, but refers to the "influence of a certain quantity of mucus on decomposition" as capable of producing the appearance which has been mistaken for it.

I cannot avoid referring to the results of some experiments, which appear to me to be at variance with these suggestions. Many of the specimens which I examined had been first submitted to filtration, with a view of separating any mucus they might contain; yet in every case, the pellicle formed with the same regularity as when this precaution had not been resorted to.

It was formed also on urine which, when treated with acetic acid, presented no coagulation, and which underwent no change when treated while hot with alcohol. And in many cases, where the urine was withdrawn by the catheter, and freed of course from the possibility of vaginal extermixture, the formation of the kiesteinic pellicle was uninterrupted. I can scarcely believe, that in such cases it was owing to the presence of the extraneous mucus.

\* Reviewed in the Number of this Journal for January last.

The observation, too, that the urine becomes paler in the later stages of pregnancy has not been confirmed by my experience. The urine when deposited embraced a great range of colours; the different shades of yellow with more or less intermixture of red being the most common. The degree of its transparency also varied much. But towards the last month of gestation, the urine, with more or less uniformity, as will be seen by the tables, became much darker, assumed a reddish or salmon colour, and often diminished in transparency. This change has been noticed by the ancient writers; and, although not invariable, seems to me deserving of more attention.

Having convinced myself, that the urine of healthy females undergoes during utero-gestation a change, which is indicated by a pellicle in many respects similar to that described by Nauche, and also that the urine of other states might in some rare cases require for its distinction a careful comparative scrutiny; I next sought to determine by observation, whether the kiesteinic pellicle occurred in other conditions.

The well known fact that the elements of the milk have been found in the urine,—the opinion of some physiologists, that, separated from the blood and existing in the mammæ, it may during gestation be reabsorbed and excreted by the kidneys,—and more immediately, the supposition of Dr. Bird, that the kiesteine was owing to its presence,—naturally led me to examine the urine during the various conditions of lactation.

By resorting to the nursery wards of the hospital, at that time containing a large number of patients, and subsequently by examining all the delivered cases of the obstetrical wards, I was enabled to observe no less than ninety-four cases. These I have grouped in the table marked B.

The results establish the fact, that the kiesteine is *by no means peculiar to pregnancy*; and they have at the same time an important bearing on circumstances which contribute to the theory of the production of this pellicle.

Of the ninety-four cases of females in a state of lactation, forty-two gave the usual urinary changes without any indication of the kiesteine; eight presented a scum, but modified or imperfectly formed; while forty-four exhibited the perfect kiesteinic pellicle, as well developed as in ordinary cases of pregnancy.

The conditions, which appeared to exert an influence over its formation or its absence, may be the subject of a few remarks.

Immediately after delivery, and during the lochial discharge, when the urine owing to its intermixture was more or less reddened, a scum formed of a semi-transparent hornlike appearance, marked by arborescent figures of a sanguineous tinge.

In the interval between the birth of the child and the free establishment and exit of the lacteal secretion,—of twenty-three cases in which I succeeded in preventing lochial admixture, fifteen gave a kiesteinic pellicle.

After the more immediate sequelæ of pregnancy and delivery had disap-



peared, when the secretion of the milk was perfectly established, and the mother had begun to suckle freely, it appeared in two cases only.

Of the large number of cases that were examined during lactation, several gave the pellicle well marked, when there was no lacteal disturbance to explain it. In these, however, the breasts were full and even turgid, indicating an exuberant supply or inadequate withdrawal of the secretion.

Of cases in which the flow of the milk was prevented by mechanical or local obstructions, as in mammary abscess, &c., eleven in number, seven gave the kiesteine: of those in which the secretion was interrupted or partially suspended by constitutional disturbances, eight in number, it was given by only three: while of ten healthy females, eight at the *period of weaning* exhibited it perfectly well defined.

Four of these who had presented the kiesteinic pellicle, while weaning, had their milk afterwards regularly withdrawn by the cupping glass and the mouth. After the lacteal secretion had been in this way freely re-established, the urine was again examined, and no pellicle appeared. Intermitting the use of the cupping glass, and allowing the breasts to become turgid again, the urine of two again presented the pellicle.

These results, while they demonstrate that the kiesteine is not peculiar to utero-gestation, indicate also its unquestionable connection with the lacteal secretion.\*

Its presence during pregnancy, and even after delivery, until the milk is freely withdrawn by the child; its very rare occurrence during uninterrupted lactation; its reappearance when the discharge of milk is prevented, but not when the corresponding secretion is arrested; and finally its return for the time during the process of weaning, and its occasional absence when that process is intermitted; all these, regarding them as the general results of the observations above cited, point to one probable conclusion,—that the kiesteine makes its appearance, whenever the lacteal secretion exists, and its discharge is prevented or considerably impeded. I am confirmed in this judgment by its perfect consistency with the theory suggested by Dr. Golding Bird, in the Guy's Hospital Reports for April 1840.

Having described this pellicle under its various forms and conditions, it may be proper to add a few words on its nature and properties.

Dr. Golding Bird, to whose interesting observations I have before so often alluded, states that “none of the specimens examined by him were coagulable by heat, nitric acid, or, with but one or two exceptions, by acetic acid.”

In all the cases mentioned in my first tables, the urine was submitted to the action of nitric acid; in about forty to that of heat; and in many, it was

\* With reference to the remark in the text, I am at this time observing the urine in some cases of uterine tumour, and in other conditions which exercise an influence on the mammary secretion.

tested with the ferro-cyanuret of potassium, after having been acidulated with acetic acid.

Of those which were exposed to heat, seven presented a coagulum; but remembering the precautions urged by Dr. Rees\* to prevent the earthy phosphates being mistaken for albumen, I submitted the fluid in these cases to other tests, and thus found that of the seven cases apparently albuminous, three were in reality phosphatic. Four only, of course, were to be regarded as containing albumen.

Ammonia gave a deposit of varying density; and acetic acid in several cases caused coagulation.

The urine, tested daily with litmus, was found in almost every instance to be faintly acid, up to the time of disintegration of the crust. At this period, however, it undergoes the ammoniacal development, and acquires well marked alkaline properties, which probably induce the disintegration.

The pellicle itself, treated with alcohol, became of a fatty saponaceous character; the crystals remaining but little affected. Treated with ammonia, the granular matter was partially dissolved, and the crystals were made more manifest: they were even susceptible of isolation by careful washing and filtration. Acetic acid destroyed the crystals, and reduced the accompanying matter to a pulraceous mass, without materially altering its structure.

In the present state of physiological chemistry, but little can be determined with regard to the nature of the *kiesteine*, and its very doubtful claims to be considered as a new principle. The absence of coagulation by appropriate agents indicates in a measure that neither caseum nor albumen exists in very perceptible quantities; while the acid reaction up to the moment of disintegration seems opposed to the idea of its being a mere attendant upon increased quantities of pus or mucus.

Still, these with other as yet undetected principles may be constituents of the pellicle itself; and the question, whether any matters developed in it are identical with the caseum of the milk, must be determined by further observations, made perhaps in a more advanced stage of science. For, independently of the possibility of this principle occurring without the intervention of the mammary secretion (see Andral, &c.), Orfila himself has acknowledged his inability to distinguish the caseum from other organic matters;† and M. Dumas has announced a substance in every respect similar to it, as one of the ingredients in the composition of pus.

My remaining observations were microscopic. I employed for them during the earlier stage of my inquiries, a simple Raspail instrument, with a Wollaston eye-glass; but the few results which I feel justified in detailing

\* See paper on "Real and supposed pathological conditions of the urine," by G. O. Rees, M. D., Northern Dispensary, London. Guy's Hospital Reports.

† *Traité de Chimie*, &c.



were attained by an excellent Berlin microscope, belonging to Dr. Goddard, and which he with great kindness assisted me in using. I can have no reason to doubt the correctness of observations made under the guidance of so practised an observer; but owing to the many sources of fallacy attendant upon microscopic evidence generally, I do not venture to claim for these the same confidence, which is due to my examinations by the unassisted eye.

The pellicle, taken immediately from the urine on a glass plate, carefully introduced, when examined with a magnifying power of one hundred diameters, exhibited, while yet moist, a well defined series of flakes of a somewhat darkish yellow, made up apparently of minute granules. This appearance, which I at first thought to consist of minute globules of mucus or pus, was at once recognised by Dr. Goddard, as closely resembling, if not identical with, the granules of the colostrum. Having with some difficulty procured a supply of this fluid, a comparison of the two exhibited still more clearly this interesting resemblance. The granules of the *kiesteine* were however more flattened than those of the colostrum, a change they might readily have undergone during their passage through the kidneys; but the general aspect of the two was such as to give strong evidence of their identity.\*

Connected with these appearances, and sometimes obscuring them, the *kiesteine* presented under the microscope an irregularly disposed amorphous matter, sometimes arranged in groups of granules that resembled the urate of ammonia,† and sometimes of badly marked globules, allied to those of pus or mucus, and accompanied by laminæ resembling epithelia.‡

Throughout the field of the instrument was seen, in varying numbers and distribution, a series of rectangular rhomboidal prisms, more or less distinctly marked, and strongly refracting light. The triangular prisms were also occasionally distinguished, but not in the “myriads” seen by Dr. Bird; and sometimes other crystalline forms were observed in addition to these. They all belong most probably to some of the earthy phosphates. Not only were the triangular prisms recognised to be those described by Dr. Bird, as belonging to the ammoniacal phosphate of magnesia, but by comparing them with the microscopic plates of Rayer and Vigla, and Mandl, (*Etude Microscopique sur l’Urine*,) many others were discovered, coinciding with the varied forms of this prominent salt.

On treating the pellicle, collected as for examination, with acetic acid, applying a gentle heat, and then carefully washing the residuum; the crystals, as in a similar experiment by Dr. Bird, entirely disappeared, and the graniform masses, somewhat obscured, presented themselves alone.§ By

\* This resemblance was very striking upon comparing it with the plates of M. Mandl.

† See Mandl, Raspail, and Rayer.

‡ See plates of Rayer and Vigla, *Encyclographie Médicale*, Vol. VI.

§ So completely were they deprived of crystalline matter, that in a similar experiment by Dr. Bird, after illuminating the granular, or—as he defines it—the “opaque mass,” with

using ammonia, the reverse was the case. The crystals, nearly unaltered, remained unusually distinct; while, by the careful addition of water, the granular and other matter, much softened, was readily washed away, leaving the supposed triple phosphates remaining.

When the pellicle has been for a short time exposed under the microscope, the natural salts of the urine are developed by evaporation, presenting numerous shining crystals of varied forms; among the most prominent of which are the triangular and the obscurely marked hexagonal prisms.

The cubic crystals, which M. Eguisier describes, as present in the true pellicle after it becomes old, I have never seen. In a few cases of both kiesteinic and other pellicles, a hollow four-sided pyramid was observed, resembling the chloride of sodium, and in one case a regularly formed cube. This was the nearest approach to the appearances mentioned by Eguisier.

In the pellicle not kiesteinic, the peculiar granular arrangement noticed as so strongly resembling the colostrum, was in no case present. Amorphous darkish masses, accompanied by various crystalline forms, were seen only. Where much discoloration existed from sanguineous or lochial intermixture, a strong resemblance was observed to the globule of the blood.

The shining appearance of the kiesteine is evidently not owing to fatty matter, unless under very peculiar modifications. Neither do I think it entirely owing to the numerous crystals of the triple phosphates, observed by Dr. Bird. I apprehend, that the specimens, in which he found them so abundant, may have been exposed for some minutes to evaporation; as I have remarked, that under such circumstances, the proper salts of the urine develop themselves rapidly in their crystalline forms. I would rather refer the glossy character of the surface to the presence of animal matters generally in the pellicle, without adducing either its fatty elements or the crystals on its surface as the explanation.

It may be proper that I should close this paper by some remarks on the value of the kiesteine as a diagnostic of pregnancy. I do so with diffidence, for my opinions are not sustained by the judgment of the more experienced observers who have preceded me.

I cannot regard the kiesteine as an *unerring* test of pregnancy. I have already shown that it is present under other conditions of the system; and even where pregnancy exists, I am satisfied that this indication is not always observable.

I am convinced too, that the kiesteine is not always distinguishable from other pellicles which appear on the surface of the urine. At least, I am bound to say, that, in the absence of other indications, I should sometimes have found myself unable to distinguish between them. Not that they are

a beam of polarised light and analysing the ray by means of tourmaline, not a trace of colour was perceptible.



generally liable to be confounded; but between the imperfectly developed pellicle of the one character, and the best simulation of it which is sometimes presented by others, the distinction is too slight to be satisfactory or unfailing.

But with the qualifications which these remarks imply, I have no doubt that the pellicle which has been denominated kiesteine *is among the best*, if indeed it be not *the most certain*, of the earlier indications of pregnancy. I resorted to it habitually in my diagnosis in the obstetric wards of our hospital, and with constantly increasing confidence.

In one case, I felt myself at liberty to direct the removal of a patient to the working ward, who claimed the privileges of pregnancy in round terms, and presented all the other symptoms of that state in confirmation of her pretensions. She still retains the suspended catamenia, enlarged abdomen, &c., though five months have elapsed since the birth of the infant was promised me as a proof of my mistake. Other cases of attempted imposture, some of them ludicrous enough, which were detected by the same means, I have collected in my table C.

My associates at the hospital have not unfrequently amused themselves by presenting for my inspection, the urinary excretions of all sorts of patients, and in many varieties of combination. I believe they will bear me witness, that my reliance on the kiesteinic test has not misled me.

Indeed, the cases which I have referred to, and which are arranged in series in the accompanying tables, must satisfy an unprejudiced mind, that there is something well worthy of the obstetrician's study in the pellicles presented by the urine during utero-gestation.

The result of my observations may be summed up in the following general conclusions:

1. That the kiesteine is not peculiar to pregnancy, but may occur whenever the lacteal elements are secreted without a free discharge at the mammæ.

2. That though sometimes obscurely developed and occasionally simulated by other pellicles, it is generally distinguishable from all others.

3. That where pregnancy is possible, the exhibition of a clearly defined kiesteinic pellicle, is one of the least equivocal proofs of that condition; and

4. That when this pellicle is not found in the more advanced stages of supposed pregnancy, the probabilities, if the female be otherwise healthy, are as 20 to 1 (81 to 4) that the prognosis is incorrect.

PHILADELPHIA, *January 28, 1842.*

(A)—Table of Cases during Utero-Gestation.

| No. | Names.         | Age in years. | Stage of Pregnancy in months and days. | Condition of Mammæ.                               | Appearance when received.                                          | Remarks.                                                                                                                      | Result.                 |
|-----|----------------|---------------|----------------------------------------|---------------------------------------------------|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| 1   | M. Biddee,     | 24            | 6½                                     | Milk exuding upon pressure. Mammæ much distended. | Salmon yellow, turbid, flocculent, and with <i>no deposit</i> .    | Surface gave a filmy pellicle in 16 hours, preceded by crystals. No well marked cloud or deposit.                             | Kiest. on 3d day.       |
| 2   | S. Gilbert,    | 20            | 8.8                                    | Milk in mammæ from the seventh month.             | Deep <i>reddish</i> yellow. Turbid, and with some deposition.      | Crystalline dots. A firm cream-coloured pellicle on 4th day, covered with nutmeg like specks.                                 | K. on 4th day.          |
| 3   | M. Hill,       | 32            | 7.                                     | No milk.                                          | Transparent, with a deep tinge of <i>red</i> . No mucous flocculi. | The shining specks preceding the formation of the pellicle which occurred on the 2nd day. <i>No cloud</i> .                   | K. on 2d day.           |
| 4   | E. Williams,   | 25            | 8.                                     | Milk from this time.                              | Turbid honey yellow, with little or <i>no deposit</i> .            | Surface covered with striæ of a deep yellow, a firm pellicle filling up the interstices. Odour cheesy.                        | K. on 3d day—cheesy.    |
|     | " "            | "             | 9.                                     | " "                                               | Dirty red, with some deposition.                                   | Sides of glass coated by deposition. Distinct pellicle on fourth day.                                                         | K. on 4th day.          |
| 5   | S. Dunken,     | 17            | 9.                                     | Milk exuding by pressure.                         | Pale glaring white flocculi.                                       | Pellicle in circles, greasy in appearance, and not well defined until the 5th day.                                            | K. on 5th day.          |
| 6   | A. Lippincott, | 36            | 8.12                                   | No milk.                                          | Salmon yellow, much deposit.                                       | Little pellicular change until 4th day; it then gave a perfect pellicle about the 7th.                                        | K. on 7th day.          |
| 7   | A. Banks,      | 37            | 8.20                                   | Milk by cupping glass.                            | Salmon colour with deposition.                                     | A good type of the pellicular appearance. Not perfect until the 4th day.                                                      | K. on 3d day.           |
| 8   | H. Walker,     | 24            | 7.                                     | Milk a few days previous.                         | Turbid, flocculent, and with a copious deposit.                    | A well marked opaline cloud, above which the pellicle, much modified, appeared.                                               | K. on 3d modified       |
| 9   | M. Yacely,     | 24            | 8.13                                   | No milk, but very turgid.                         | Turbid salmon colour, but very scanty.                             | Stood for 12 days without any pellicular change.                                                                              | } No K.<br>Exception.   |
|     | " "            | "             | 6.                                     | No milk.                                          | Lighter, and nearly transparent.                                   | Stood until putrefaction took place without any pellicular manifestations.                                                    |                         |
| 10  | M. Gallagher,  | 39            | During labour.                         | No milk.                                          | Reddish yellow, with much flocculent deposition.                   | Pellicle not continuous, and wanting the tenacious character of the kiesteine.                                                | K. on 3d modified       |
| 11  | M. Delano,     | 20            | 8.11                                   | Milk from the 6th month.                          | Straw yellow, bright and transparent.                              | Decided pellicle on the 2nd day.                                                                                              | K. on 2d day.           |
| 12  | E. Buckley,    | 40            | Day of deliv.                          | Milk by pressure                                  | Muddy reddish yellow, and no deposit.                              | An irregular striated pellicle; no crystals, and not such as to warrant me in pronouncing it kiesteine.                       | Exception. No K.        |
| 13  | M. Yorkley,    | 20            | 8.                                     | Milk.                                             | Pale yellow, nearly transparent.                                   | Regularly formed pellicle—thin and pale; odour cheesy.                                                                        | K. on 3d cheesy.        |
| 14  | S. Miller,     | 20            | 7.6                                    | Milk in breast at the 7th month—none at present.  | Reddish yellow, nearly transparent.                                | Spider like lines and circles, yet a well defined pellicle.                                                                   | K. on 2d day.           |
| 15  | C. Ryter,      | 17            | 9th                                    | None.                                             | Bright straw yellow— <i>no deposit</i> .                           | Pellicle characteristic.                                                                                                      | K. on 3d day.           |
| 16  | B. M'Gurth,    | 21            | 9th                                    | Small and flaccid mammæ.                          | Yellow tinged with red, and very turbid.                           | Pellicle not over the entire surface; decomposition rapidly set in.                                                           | K. on 1st day modified. |
| 17  | A. Weaver,     | 21            | 7.                                     | Copious exudation of milk.                        | Turbid red, with a deposit coating sides of glass.                 | An obscured pellicle on 2nd day; <i>not well defined</i> .                                                                    | Doubtful K. on 2d day.  |
|     | " "            | "             | 8.                                     | " "                                               | Not so much deposition.                                            | A characteristic pellicle on the 3d day.                                                                                      | K. on 3d day.           |
| 18  | R. Dawson,     | 22            | Day of deliv.                          | No milk.                                          | Muddy red, with much deposit.                                      | The urine was of a dark brown at the surface: on the 2d day this disappeared, and on the 4th a well marked pellicle appear'd. | K. on 5th day.          |
| 19  | C. Scoby,      | 24            | During labour.                         | Milk at the 7th month.                            | Bright ruby, red tinge with much transparency.                     | Pellicle very thin and filmy, the crystals very numerous.                                                                     | No K.                   |



Table (A) continued.

| No. | Names.                            | Age in years. | Stage of Pregnancy in months and days. | Condition of Mammaræ.                         | Appearance when received.                    | Remarks.                                                                                                                           | Result.            |
|-----|-----------------------------------|---------------|----------------------------------------|-----------------------------------------------|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|--------------------|
|     | C. Scoby,                         | 24            | 4 20                                   | No milk.                                      | Lighter and not so transparent.              | Pellicle, although not very well marked, still kiesteinic                                                                          | K. on 4th modified |
| 20  | H. Benal,                         | 24            | During labour.                         | None.                                         | Pale whitish yellow, translucent.            | Surface covered with a cloudy pellicle from 36 hours after deposite; odour cheesy.                                                 | K. on 1st day      |
|     | " "                               | "             | 7.                                     | " "                                           | Very turbid, and tinged with red.            | Labouring under much febrile disturbance: pellicle, though not well marked, is still present: not cheesy.                          | K. on 4th day.     |
| 21  | E. Hull,                          | 20            | 4½                                     | No milk.                                      | Straw yellow—transparent.                    | Mouldy dots on surface; pellicle forming around them. Very damp weather.                                                           | K. on 4th day      |
|     | " "                               | "             | 7th                                    | " "                                           | Bright straw yellow, with a few flocculi.    | Pellicle advancing regularly from 2nd day.                                                                                         | K. on 4th day      |
| 22  | M. Robinson,                      | 19            | 9.                                     | No milk.                                      | Purulent or mucoid very turbid yellow.       | Gave no acid reaction with the litmus. Pellicle very flat.                                                                         | K. on 3d day.      |
| 23  | M. Robinson, white venereal ward. | "             | 6th                                    | " "                                           | Light straw yellow; transparent.             | Gave a well marked decided pellicle, preceded by crystals, and covered with brown nutmeg dots.                                     | K. on 4th day.     |
| 24  | C. Clarke,                        | 30            | 5th                                    | Milk by pressure from one mamma               | Bright red; nearly transparent.              | Gradual and characteristic.                                                                                                        | K. on 3d day.      |
| 25  | A. M'Hugh,                        | 26            | 7.                                     | Milk in breasts since 5th month.              | Pale light translucent yellow.               | Kiest. well marked, but not in a uniform stratum.                                                                                  | K. on 2d day.      |
| 26  | M. Curlow,                        | 22            | 8.                                     | Milk since 7th month.                         | Turbid red.                                  | The pellicle forming with great regularity; moulding on 3d day, owing to damp.                                                     | K. on 2d day.      |
| 27  | M. Rider,                         | "             | 6.                                     | No milk at present.                           | Turbid red: many flocculi.                   | Decomposition after standing 8 days. Extreme anæmia. Alkaline reaction. Same result.                                               | } No K.            |
| 28  | " "                               | "             | 8.                                     | " "                                           | Not so turbid.                               | Stood for 3 days without any change: it then exhibited the crystals and a gradual characteristic pellicle, well formed by 8th day. |                    |
| 29  | A. Clarke,                        | "             | 8.                                     | Milk by pressure                              | Deep salmon colour—some deposition.          | Stood for 3 days without any change: it then exhibited the crystals and a gradual characteristic pellicle, well formed by 8th day. | K. on 8th day.     |
| 29  | M. Ackland,                       | "             | 7.                                     | Milk at present                               | Straw yellow ting'd with red.                | Stood for some time without change. A pellicle on 4th day.                                                                         | K. on 4th day.     |
| 30  | E. Johnson,                       | "             | 6.                                     | No milk.                                      | Yellow honied, translucent.                  | A modified irregular pellicle.                                                                                                     | K. on 3d modified  |
| 31  | J. Garrigan,                      | "             | 5.                                     | No milk.                                      | Salmon colour, turbid, and with depositions. | A singular tenacious scum two lines in thickness and of a deep blue colour.                                                        | K. on 3d modified  |
| 32  | S. Dashur, women's outwards.      | 30            | During labour.                         | Milk from last pregnancy, 18 months previous. | Deep red, translucent.                       | A well developed pellicle.                                                                                                         | K. on 4th day.     |
| 33  | L. Hauwick,                       | 26            | 6.25                                   | Milk one week after quickening.               | Straw yellow—transparent.                    | Decomposed rapidly—a very copious deposite and tolerably marked pellicle were observed.                                            | K. on 2d day.      |
| 34  | M. Stratton,                      | 30            | 9.                                     | No enlargement and no milk.                   | Straw yellow, with flaky masses.             | No very evident crystals.                                                                                                          | K. on 5th day.     |
| 35  | M. A. Bowers,                     | 28            | 7.14                                   | Milk at and during last month.                | Red, with lateritious deposite.              | No pellicle whatsoever until 3d day.                                                                                               | K. on 3d day.      |
| 36  | M. B. Mark.                       | 18            | 7.19                                   | Milk from her 8th month.                      | Reddish yellow—no deposition.                | The cloud-like appearance preceded the characteristic pellicle.                                                                    | K. on 4th day.     |
| 37  | E. Wilkinson, or Atkinson,        | 41            | 9.                                     | No milk.                                      | Purulent yellow, with copious deposite.      | Litmus gave no acid reaction: ferrocyanuret of potassium and heat gave coagulation.                                                | Exception. No K.   |
| 38  | M. Stevens,                       | 34            | 8.20                                   | Milk by pressure                              | White glaring and pale.                      | A very thin but highly characteristic pellicle, with cheesy odour.                                                                 | K. on 1st day      |
| 39  | M. Salters,                       | 29            | 9.                                     | Milk by pressure                              | Reddish yellow.                              | A thick pellicle, not preceded by crystals.                                                                                        | K. on 4th day.     |

Table (A) continued.

| No. | Names.        | Age in years.   | Stage of Pregnancy in months and days. | Condition of Mammaræ.                     | Appearance when received.                       | Remarks.                                                                                                                                         | Result.                   |
|-----|---------------|-----------------|----------------------------------------|-------------------------------------------|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| 40  | M. Hero,      | 15              | 6.16                                   | Distended and exuding milk.               | Reddish yellow, translucent with flocculi.      | Presented for the two first days the acicular crystalline specks; on the third day the pellicle, and on the fifth well marked nutmeg like spots. | K. on 3d day.             |
|     | " "           | 15              | 9.                                     | " "                                       | More turbid; colour very nearly the same.       | Crystals, creamy pellicle, &c. at their greatest development on 5th day.                                                                         | K. on 2d day.             |
| 41  | A. M'Cully,   | 22              | 7.14                                   | Large and exuding the milk.               | Pale straw colour, rather dim, yet transparent. | Surface marbled on 2nd day; crystals also evident; pellicle on 3d: by 6th day well marked.                                                       | K. on 6th day.            |
| 42  | S. Palmer,    | 19              | 6.                                     | No milk.                                  | Dim, transparent, honied yellow.                | A horn like or waxen pellicle, crystalline points interspersed.                                                                                  | K. on 4th day modified.   |
|     | " "           | "               | During labour.                         | Abundant supply of milk.                  | Red, highly coloured, with lateritious deposit. | Urine highly coloured—presented a horny pellicle with white striæ intersecting it.                                                               | No K.                     |
| 43  | B. Devine,    | 20              | 5.27                                   | Milk.                                     | Salmon colour.                                  | Minute crystals on the 1st day; surface studded on 2d; cloudy appearance on 3d; pellicle on 4th.                                                 | K. on 4th day.            |
| 44  | M. M'Guire,   | 23              | 8.                                     | No milk.                                  | Bright straw yellow, clear.                     | Uniform scum; crystals not very evident.                                                                                                         | K. on 3d day.             |
|     | " "           | 2 days previous |                                        | Very tense, but no exudation of milk.     | Garnet colour, with a few flocculi.             | A thick consistent pellicle formed on 2nd day, slightly tinged with red, one line in thickness                                                   | K. on 2d day.             |
| 45  | E. Hastley,   | 36              | 4 mos.                                 | Distended.                                | Translucent, red, with some deposition.         | A characteristic 'creamy' pellicle.                                                                                                              | K. on 4th day.            |
| 46  | A. Hutchins,  | 19              | 4 mos.                                 | Mammary abscess, with fistulous orifices  | Clear cider yellow; some deposit.               | A cloud on the 2nd day, preceded by crystals, and followed by a pellicle with brown dots.                                                        | K. on 3d day.             |
| 47  | A. Graves,    | 25              | 6 mos.                                 | Distended.                                | Brownish ochre yellow, with much deposit.       | Does not redden litmus paper: decomposition commenced on 2nd day: gives no pellicle.                                                             | Exception. No K.          |
| 48  | H. Thompson,  | 20              | 6 mos.                                 | Tumid, but no milk.                       | Slight muddy yellow; quantity 20 oz.            | Presented no pellicle whatever: found on inquiry that it was voided in the afternoon.                                                            | } K. on 3d day            |
|     | " "           | "               | 9.                                     | " "                                       | Straw yellow, muddy.                            | Presented a well marked pellicle on the 3d day.                                                                                                  |                           |
| 49  | J. M'Cartney, | 39              | 8.10                                   | Turgid, but exuding milk.                 | Greenish or citrine yellow.                     | Little change until 4th day: pellicle perfect on 5th.                                                                                            | K. on 5th day.            |
|     | " "           | "               |                                        | " "                                       | Clear cider yellow.                             | Pellicle apparent on 2nd day: at its maximum on 7th: odour cheesy.                                                                               | K. on 2d day              |
| 50  | S. Fisher.    | 24              | 7.20                                   | Milk.                                     | Clear cider yellow, trans.                      | Milky, opaline or white pellicle on 3d day.                                                                                                      | day cheesy. K. on 3d day. |
| 51  | A. Lenam,     | 40              | 8.20                                   | No milk, but tense.                       | Light reddish, cider yellow, flocculent.        | Pellicle on 3d day; odour cheesy, but very slightly so.                                                                                          | K. on 3d day.             |
| 52  | M. Gilbert,   | 24              | 6.25                                   | No milk.                                  | Reddish yellow and no deposit.                  | Pellicle on 3d day, soon obscured by decomposition.                                                                                              | K. on 3d day.             |
|     | " "           | "               |                                        | " "                                       | Deep red, with flocculi.                        | Well marked on 2nd day with crystals, specks and fat like appearance.                                                                            | K. on 2d day.             |
| 53  | M. M'Mename   | 20              | 7.21                                   | Left mamma exudes milk: abscess in right. | Light cider yellow.                             | Peculiar pellicle arranged in striæ and in circles—not the kiesteine.                                                                            | } No K. Except            |
|     | " "           | "               |                                        | " "                                       | Rather dusky.                                   | Same result.                                                                                                                                     |                           |
| 54  | C. Smith,     | 23              | 7.                                     | Milk.                                     | Bright straw yellow.                            | Pellicle regularly formed on 2nd day; cheesy on 5th.                                                                                             | K. on 2d day              |
| 55  | M. Moody,     | 23              | 8.16                                   | Milk since her 3d month.                  | Reddish yellow, somewhat brown.                 | A well marked pellicle studded with crystals.                                                                                                    | K. on 3d day              |
|     | " "           | "               |                                        | " "                                       | Same with flocculi.                             | Voided a few hours before delivery: decomposed rapidly but the pellicle well marked.                                                             | K. on 2d day.             |



Table (A) continued.

| No. | Names.         | Age in years | Stage of pregnancy in months and days. | Condition of Mammæ.                           | Appearance when received.       | Remark.                                                                             | Result.                |
|-----|----------------|--------------|----------------------------------------|-----------------------------------------------|---------------------------------|-------------------------------------------------------------------------------------|------------------------|
| 56  | M. Schuyler,   | 29           | Day of delivery                        | Week before delivery had milk in mammæ.       | Honey yellow, rather turbid.    | Decomposition about the 3d day: pellicle <i>ramiform</i> and not regularly disposed | Modified K.            |
|     | " "            |              |                                        | " "                                           | Same, rather more transparent.  | No pellicle until 4th day, and then very feebly developed.                          | K. on 4th day.         |
| 57  | H. Charles,    | 30           | 9.                                     | Milk since 7th month.                         | Reddish yellow, some deposit.   | Pellicle formed regularly from 2nd day.                                             | K. on 2d day.          |
| 58  | M. Parker,     | 20           | 8 days previous to deliv.              | No milk, but much distended                   | Transparent, garnet colour.     | Pellicle in circles incrusting sides of glass.                                      | K. on 3d day modified. |
| 59  | M. Milnor,     | 30           | 7.28                                   | Milk upon pressure.                           | Clear straw yellow; no deposit. | Milky, dotted and characteristic pellicle—cheesy.                                   | K. on 4th day.         |
| 60  | M. Collins,    | 20           | 6.                                     | " "                                           | Abundant lateritious deposit.   | Striated, glazed, unsatisfactory pellicle.                                          | K. on 5th modified     |
| 61  | E. Connor,     | 20           | 7.10                                   | Milk in mammæ from 3d month.                  | Palish water yellow; muddy.     | Minute dotted pellicle, kiesteinic but very thin.                                   | K. on 3d day.          |
| 62  | A. Petsal,     | 30           | 6                                      | No milk.                                      | Deep red, with flocculi.        | Characteristic.                                                                     | K. on 5th day.         |
| 63  | A. Mason,      |              | 7.                                     | No milk.                                      | Light reddish.                  | The brownish nutmeg specks.                                                         | K. on 3d day.          |
| 64  | H. Conway,     |              | 6½                                     | No milk.                                      | Transparent bright ruby red.    | Regularly formed; stood 14 days without disintegrating.                             | K. on 2d day.          |
| 65  | E. Hutten,     |              | 5.                                     | Milk exuded in 3d month.                      | Transparent red, as above.      | In circles, having a corrugated aspect.                                             | K. on 3d day.          |
| 66  | H. Anderson,   | 18           | 7.                                     | No milk.                                      | Flocculent red.                 | Not uniformly disposed.                                                             | K. on 3d modified      |
|     | " "            | "            | 7½                                     | Milk.                                         | " "                             | A well marked pellicle on 3d day.                                                   | K. on 3d day.          |
| 67  | E. Jeansire,   | 20           | 6½                                     | Milk a week previously.                       | Bright straw yellow.            | Opalescent regularly formed pellicle.                                               | K. on 3d day.          |
| 68  | M. Miller,*    | 32           | 3 trials of 2 weeks, 7 weeks, & 3 mos. | Trifling alterations.                         | Flocculent red.                 | A well defined cloudy deposit, but no kiesteinic pellicle.                          | No K.                  |
| 69  | Mrs. C. G—m,   | 35           | Full 2½                                | Full and turgid.                              | Cider yellow; very flocculent   | Gave a well marked K.                                                               | K.                     |
| 70  | Miss Baker,    | 21           | 10th week.                             | No changes in conformation.                   | Straw yellow.                   | Accompanied by the brownish specks.                                                 | K. on 3d day.          |
| 71  | E. Black,      | 16½          | 6 weeks                                | Enlarged slightly; no marked characteristics. | Bright honey yellow.            | A well formed kiesteinic pellicle on 2nd day.                                       | K. on 2d day.          |
| 72  | M. Alexander,  | 36           | 8 mos.                                 | Milk by syringe.                              | Flocculent.                     | A well marked pellicle preceded by the crystals and sediment.                       | K. on 3d day.          |
| 73  | M. A. Cornell, | 22           | 7 mos.                                 | Milk.                                         | "                               | Kiesteine with great tenacity on 4th day.                                           | K. on 4th day.         |
| 74  | M. M'Canny,    | 19           | 6 mos.                                 | Turgid and with milk.                         | Turbid straw colour             | Well marked kiesteine—alkaline with litmus                                          | K. on 2d day.          |
| 75  | S. Sharp,      | 25           | 5.                                     | No milk.                                      | Very viscid.                    | But a well marked pellicle.                                                         | K. on 2d day.          |
| 76  | M. Richardson, | 21           | 8.                                     | No milk.                                      | Obscured dark red.              | Bronchitis, urine alkaline and no pellicle                                          | No K.                  |
|     | " "            | "            | "                                      | Milk.                                         | Lighter colour and transparent. | Gave a modified pellicle.                                                           | Mod. K.                |
| 77  | A. Thompson,   | 30           | 9.                                     | Milk.                                         | Ruby red                        | Well marked pellicle.                                                               | K. on 3d.              |
| 78  | S. Spangler,   | 26           | 8.                                     | Turgid and exuding milk.                      | Flocculent.                     | Firm consistent pellicle.                                                           | K. on 3d day.          |
| 79  | S. Carey,      | 23           | 5.                                     | Milk.                                         | Honey yellow.                   | Well marked kiesteine.                                                              | K. on 4th              |
| 80  | M. A. Andrews, | 22           | 7.                                     | Milk.                                         | Turbid.                         | K. on 3d: no deposition evident to the eye.                                         | K. on 3d day.          |
| 81  | S. Ford,       | 28           | 9.                                     | No milk.                                      | Highly coloured—ruby tinge.     | K. on 5th.                                                                          | K. on 5th day.         |
| 82  | M. A. O'Neill, | 25           | 7.                                     | Turgid with m'k.                              | Flocculent.                     | Well marked pellicle with cheesy odour.                                             | K. on 4th cheesy.      |
| 83  | J. Scantlen,   | 22           | 7.                                     | Milk.                                         | Muddystraw colour               | Somewhat striated, yet a characteristic scum.                                       | K. on 1st day.         |
| 84  | E. Dougherty,  | 27           | 8.                                     | Milk.                                         | Reddish do.                     | Consistent pellicle.                                                                | K. on 2d.              |
| 85  | M. Thompson,   | 32           | 3.                                     | Milk.                                         | Clear straw colour.             | Modified by striae.                                                                 | Mod. K.                |

\* Found after these results were in type *not to be pregnant*.

(B)—Cases during *Lactation*.

| Nos. | Names.         | Age. | Time after Delivery. | Condition of Mammæ                          | Remarks.                                                                                     | Result.              |
|------|----------------|------|----------------------|---------------------------------------------|----------------------------------------------------------------------------------------------|----------------------|
| 1    | S. Miller,     | 20   | 2 months.            | Freely withdrawn.                           | No pellicle.                                                                                 | No K.                |
| 2    | C. Ryter,      | 17   | 2 weeks.             | " "                                         | " "                                                                                          | No K.                |
| 3    | B. M'Gurth,    | 21   | 6 weeks.             | " "                                         | " "                                                                                          | No K.                |
| 4    | A. Weaver,     | 21   | 8 hours.             | Rather turgid, but exuding milk.            | Before establishment of the lacteal secretion on the application of the child to the breast. | No K.                |
| 5    | R. Dawson,     | 22   | 2 weeks.             | Freely suckling.                            | No pellicle whatsoever.                                                                      | No K.                |
|      | " "            | "    | 3 months.            | " "                                         | No change.                                                                                   | No K.                |
| 6    | C. Scoby,      | 24   | 1 week.              | " "                                         | No change.                                                                                   | No K.                |
| 7    | H. Benel,      | 24   | 72 hours.            | Milk not yet withdrawn.                     | Immediately after birth gave a red horn like pellicle.                                       | No K.                |
| 8    | E. Hull,       | 20   | 4 days.              | Freely suckling.                            | No change.                                                                                   | No K.                |
| 9    | M. Robinson,   | 19   | 1 day.               | Large, tumid, and but little milk.          | One day after birth of a still-born child rather sanguineous.                                | K. on 4th day.       |
| 10   | C. Clarke,     | 30   | 2 months.            | Withdrawn freely.                           | No change by pellicle.                                                                       | No K.                |
| 11   | A. M'Hugh,     | 26   | 1 month.             | " "                                         | " " "                                                                                        | No K.                |
| 12   | M. Curlow,     | 22   | 3 weeks.             | " "                                         | " " "                                                                                        | No K.                |
| 13   | M. Ryder,      | "    | 1 month.             | " "                                         | " " "                                                                                        | No K.                |
| 14   | A. Clarke,     | "    | 1 or 2 months        | Mammæ large and secretion scanty.           | Secretion much disturbed from a gastro-enteritic attack.                                     | No K.                |
| 15   | M. Aiklyn,     | "    | 4 months.            | Freely withdrawn.                           | No pellicle resembling K.                                                                    | No K.                |
| 16   | E. Johnson,    | "    | 6 months             | " "                                         | " "                                                                                          | No K.                |
| 17   | J. Garrigan,   | "    | 3 weeks.             | Much inflamed and swollen.                  | Inflammation of the papillæ—gave a well defined pellicle on 4th.                             | K. on 3d day.        |
| 18   | S. Dashur,     | "    | 18 months.           | No exit to milk.                            | While weaning on 3d day.                                                                     | No K.                |
| 19   | L. Hawick,     | "    | 3 months.            | Freely emptied.                             | Milk plentiful and regularly withdrawn.                                                      | No K.                |
| 20   | M. A. Straton, | "    | 2 months.            | Painful, and no milk visible.               | Severe bronchitis; secretion much impeded.                                                   | K. on 3d day cheesy. |
| 21   | M. Bowers,     | "    | 4 weeks.             | Milk freely withdr'n.                       | No change.                                                                                   | No K.                |
| 22   | M. Mark,       | "    | 2 months.            | " " "                                       | Pellicle on 4th day.                                                                         | K.                   |
| 23   | E. Wilson,     | "    | " "                  | " " "                                       | No pellicular change.                                                                        | No K.                |
| 24   | M. Stevens,    | "    | 3 months.            | No milk.                                    | Gastritis; no pellicle.                                                                      | No K.                |
| 25   | M. Salters,    | "    | 4 months.            | " " "                                       | No pellicle.                                                                                 | No K.                |
| 26   | M. Hero,       | 15   | 3 days.              | Large and distended; no exudation.          | 4 days after birth gave a red horny pellicle.                                                | No K.                |
|      | " "            | "    | " "                  | Milk scanty and badly withdrawn.            | A febrile attack (gastric) gave a modified pellicle.                                         | K. modified.         |
|      | " "            | "    | " "                  | Freely emptied.                             | Free discharge, &c.                                                                          | No K.                |
| 27   | A. M'Cully,    | 22   | 3 hours.             | Large, and no exudation.                    | Carefully withdrawn before secretion was well estab'd.                                       | K. on 4th day.       |
|      | " "            | "    | 3 months.            | " "                                         | " " but no K.                                                                                | No K.                |
| 28   | S. Palmer,     | 19   | 4 days.              | Large, and badly emptied.                   | During lochia a horny scum.                                                                  | No K.                |
|      | " "            | "    | 3 months.            | Freely emptied.                             | Freely nursing.                                                                              | Cheesy K.            |
| 29   | B. Devine,     | 20   | 3 weeks.             | Turgid, full, and no exudation.             | Had not had her breasts well emptied for 48 hours                                            | K. on 4th day.       |
| 30   | P. Bunting,    | "    | 4 weeks.             | Red, indurated, and no egress to secretion. | Much distension, and commencing mammary abscess.                                             | K. on 3d day.        |
| 31   | M. Biddee,     | 24   | 6 hours.             | Natural, and exuding milk.                  | 6 hours after delivery yielded a true pellicle.                                              | K.                   |
| 32   | S. Gilbert,    | 20   | 4 weeks.             | Freely emptied.                             | No pellicle.                                                                                 | No K.                |
| 33   | M. Hull,       | 32   | 3 weeks.             | " "                                         | " "                                                                                          | No K.                |
| 34   | E. Williams,   | 25   | Not known.           | " "                                         | " "                                                                                          | No K.                |
| 35   | M. Shrook,     | 22   | 13 m. weaning.       | Large, full and painful.                    | Weaning her child 3d day.                                                                    | K. on 3d day.        |
| 36   | Mrs. C. C. C.  | "    | Weaning.             | " "                                         | " " 2d day.                                                                                  | K. on 4th day.       |
| 37   | C. Saxon,      | 28   | 8 hours.             | Breast turgid.                              | Immediately after birth gave a red horn like pellicle.                                       | No K.                |
|      | " "            | "    | Weaning.             | Natural, not very full.                     | While weaning 3d day.                                                                        | Modified K.          |
| 38   | H. Black,      | 22   | 3 months             | Milk tolerably well withdrawn.              | Tumefaction and inflammation of mammæ. A partial scum was presented.                         | No K.                |
| 39   | S. Compes,     | 19   | 8 hours.             | Turgid.                                     | Interval between commencement of free secretion and delivery.                                | No K.                |
|      | " "            | "    | 3 weeks.             | Scanty milk.                                | Acute colitis with its accompanying fever.                                                   | No K.                |
|      | " "            | "    | 4 months.            | Freely withdrawn.                           | Breasts freely discharged.                                                                   | No K.                |
| 40   | M. O'Neil,     | 25   | 3 months.            | " "                                         | " " "                                                                                        | No K.                |
| 41   | M. Spillrine,  | 20   | 2 months.            | " "                                         | " " "                                                                                        | No K.                |
| 42   | M. M'Closky,   | 23   | 6 months.            | " "                                         | " " "                                                                                        | No K.                |



Table (B) continued.

| Nos. | Names.              | Age. | Time after Delivery. | Condition of Mammaræ                        | Remarks.                                                           | Result.               |
|------|---------------------|------|----------------------|---------------------------------------------|--------------------------------------------------------------------|-----------------------|
| 43   | E. Wilkinson,       | 41   | Weaning.             | Tense and full.                             | 2d day of weaning period.                                          | K. on 3d day.         |
| 44   | E. Pugh,            |      | 2 months.            | One mamma tumid, and no exit to milk.       | Injured by teeth of child.                                         | K. on 2d day.         |
| 45   | M. Martha,          | 22   | 4 days.              | Natural.                                    | Free exit and well secreted; presented no pellicle.                | No K.                 |
| 46   | M. Reilly,          | 20   | 48 hours.            | Mammæ distended.                            | Withdrawn by catheter 48 hours after delivery.                     | K. on 2d day.         |
| 47   | M. M'Carty,         | 39   | 3 weeks.             | Freely withdrawn.                           | No change.                                                         | No K.                 |
| 48   | S. Duncan,          | 17   | 3 months.            | " "                                         | " "                                                                | No K.                 |
| 49   | A. Lippincott,      | 36   | 3 weeks.             | Breast rather turgid.                       | Bronchitis with angina; much lacteal secretion, but exit impeded.  | K. on 3d day.         |
| 50   | A. Banks,           | 37   | 1 month.             | " " "                                       | No pellicular change.                                              | No K.                 |
| 51   | H. Walker,          | 24   | 8 hours.             | Large, protruding and no milk.              | Secretion not re-established; voided with care yet no K.           | No K.                 |
| 52   | M. Yaseley,         | 24   | 48 hours.            | " " "                                       | 48 hours after—milk not yet withdrawn.                             | K. on 3d day.         |
| 53   | M. Gallagher,       | 39   | 3 days.              | Milk freely secreted and withd'n by child.  | No Kiesteine.                                                      | No K.                 |
| 54   | M. Delano,          | 20   | 5 days.              | " " "                                       | " "                                                                | No K.                 |
| 55   | E. Buckley,         | 40   | 7 days.              | " " "                                       | " "                                                                | No K.                 |
| 56   | M. Yorkley,         | 20   | 10 days.             | " " "                                       | " "                                                                | No K.                 |
| 57   | M. M'Guire,         | 23   | 48 hours.            | Large, tumid and painful.                   | Tested 36 hours after death of child—gave a well marked pellicle.  | K. on 4th day cheesy. |
|      | " "                 | "    | 1 week.              | Same; less distended.                       | 1 week after delivery breast much distended; child still-born.     | No K.                 |
| 58   | E. Hastley,         | 36   | 3 weeks.             | Entire suspension of the lacteal secretion. | Inflammation of mammary glands and entire suspension of secretion. | K. on 3d day.         |
| 59   | Mrs. Ann Hutchings, | 19   | 4 days.              | 7 fistulous sinus.                          | Peritonitis and mammary abscess.                                   | K. on 2d day.         |
|      | " "                 | "    | 1 month.             | Induration and one or two closed.           | Large abscesses with 7 sinuous orifices; secretion much impeded.   | K. on 2d day.         |
|      | " "                 | "    | 3 months.            | Partially restored.                         | Same condition; secretion restored.                                | No K.                 |
| 60   | A. Graves,          | 25   | 24 hours.            | Commencing ulceration and no exit of milk.  | Immediately after delivery mammary inflammation & induration.      | No K.                 |
|      | " "                 | "    | Weaning.             | " "                                         | While weaning.                                                     | No K.                 |
| 61   | H. Thompson,        | 26   | 2 weeks.             | Freely secreting and well withdrawn.        | Gave a well defined kiesteinic pellicle, rather reddish.           | K. on 4th day.        |
| 62   | J. M'Cartney,       | 39   | 4 weeks.             | Flaccid and not secreting.                  | General anæmia; secretion much retarded.                           | No K.                 |
| 63   | S. Fisher,          | 24   | 1 month.             | Freely emptied.                             | No pellicle.                                                       | No K.                 |
| 64   | A. Lenam,           | 40   | Not known.           | Distended.                                  | After death of child.                                              | K.                    |
| 65   | M. Gilbert,         | 24   | 10 hours.            | "                                           | Between establishment of the secretion and birth.                  | No K.                 |
|      | " "                 | "    | 3 months.            | Natural.                                    | Free exit, &c.                                                     | No K.                 |
| 66   | M. M'Mename,        | 20   | 4 hours.             | Not exuding.                                | Immediately after birth carefully withdrawn.                       | K. on 2d day.         |
| 67   | C. Smith,           | 23   | 2 months.            | Natural                                     | Gave no pellicle.                                                  |                       |
| 68   | M. Moody,           |      | 2d month.            | Tumid, large, and suspended secretion.      | Commencing mammary abscess; gave a well defined K.                 | K.                    |
|      | " "                 |      | 3d month.            | Natural.                                    | Free exit.                                                         | No K.                 |
| 69   | M. Schuyler,        | 29   | 36 hours.            | Natural.                                    | Dropped her child while on the urinal—36 hours after.              | No K.                 |
|      | " "                 |      |                      |                                             | Natural, &c. No pellicle.                                          |                       |
| 70   | H. Charles,         | 30   | 10 days.             | Freely exuding and withdrawn.               | No change until 3d day, when a well marked pellicle appeared.      | K. on 4th day.        |
| 71   | M. Parker,          | 20   | 5 months.            | Freely withdrawn.                           | No change.                                                         | No K.                 |
| 72   | M. Milnor,          | 30   | 2 months.            | " " "                                       | " " " indicative of kiesteine.                                     | No K.                 |
| 73   | M. Collins,         | 20   | 1 month.             | " "                                         | No kiesteinic change.                                              | No K.                 |
| 74   | E. Connor,          | 20   | 10 days.             | " "                                         | Lochia continue; a reddish pellicle was presented.                 | No K.                 |
|      | " "                 | "    | 2 months.            | " "                                         | Presented no change.                                               | No K.                 |
| 75   | A. Petsan,          | 30   | 20 days.             | Large, tumid, and not secreting.            | Inflammation and tumefaction of mammaræ.                           | No K.                 |
| 76   | A. Mason,           | 22   | 1 month.             | Suspended secretion.                        | Peritoneal inflammation.                                           | No K.                 |
| 77   | H. Conway,          | 19   | 15 days.             | Some exudation of milk.                     | Mammary abscess: gave a well defined kiesteinic pellicle.          | K. on 3d day.         |
| 78   | E. Hutton,          | 20   | 1 week.              | Breasts freely empt'd.                      | No kiesteinic change.                                              | No K.                 |

Table (B) continued.

| Nos. | Names.          | Age.       | Time after Delivery.        | Condition of Mammæ.             | Remarks.                                                        | Result.                |
|------|-----------------|------------|-----------------------------|---------------------------------|-----------------------------------------------------------------|------------------------|
| 79   | H. Anderson,    | 19         | 5 days                      | Breasts tumid, large and tense. | Child lived 2 days: a well defined pellicle 5 days after birth. | K. on 5th day.         |
| 80   | E. Jeansire,    | 20         | 10 hours.                   | Not exuding.                    | During interval of birth and free exit.                         | No K.                  |
| 81   | " "             | 1 month.   | 4 hours.                    | Well withdrawn.                 | Fully and freely discharged                                     | No K.                  |
| 81   | J. Mills,       | 24         | 36 hours.                   | Large, yet exud. m'k.           | During interval no milk.                                        | No K.                  |
| 82   | H. Minor,       | 20         | Weaning.                    | " "                             | While weaning.                                                  | No K.                  |
| 83   | C. Baker,       | 20         | 10 hours.                   | Tense and no milk.              | By catheter, during interval                                    | K.                     |
| 84   | H. Willomeine,  | 22         | Weaning.                    | Tense, yet exuding.             | During interval between application of child and birth.         | No K.                  |
| 85   | C. Van Arsdale, | 22         | 2 years.                    | Varying.                        | While weaning gave a modified pellicle.                         | K. on 3d day modified. |
| 86   | C. Cunningham,  | 27         | 18 months.                  | "                               | Restored by glass: no kiesteine while weaning.                  | No K. and K.           |
| 87   | Wilhermeine,    | 22         | After death of child.       | "                               | While weaning restored by cupping glass.                        | K. on 1st day.         |
| 88   | " "             | 18 months. | 18 months.                  | Full and turgid.                | Secretion restored: gave no kiestine.                           | No K.                  |
| 89   | S. Ford,        | 28         | 3 days.                     | Full and turgid.                | Gave a well marked K.                                           | K. on 3d day.          |
| 90   | J. Scantlin,    | 22         | 36 hours.                   | Flaccid.                        | Puerperal peritonitis.                                          | No K.                  |
| 91   | E. Andrews,     | 18         | 4 days after d'th of child. | Large and distended.            | " "                                                             | No K.                  |
| 92   | S. Sharpe,      | 25         | 4 days after delivery.      | Large.                          | Pellicle well marked.                                           | K. on 2d day.          |
| 93   | E. Dougherty,   | 27         | 10 days.                    | Flaccid.                        | No marked pellicle.                                             | No K.                  |
| 94   | J. Wilson,      | 25         | 2 months.                   | Freely suckling.                | No pellicle.                                                    | No K.                  |
| 94   | Mrs. Dickenson, | 20         | 3 months.                   | Freely withdrawn.               | No scum nor deposite.                                           | No K.                  |

## Summary of Results in TABLE B.

| CONDITION OF PATIENT.                                                                | NUMBER EXAMINED. | RESULT.       |
|--------------------------------------------------------------------------------------|------------------|---------------|
| Obstructions, mechanical and otherwise, to the free exit of the secretion, - - - - - | 11               | 7 gave the K. |
| Suspension and obstructions from constitutional disturbances, - - - - -              | 8                | 3 gave the K. |
| Interval between birth and the free exit of the milk, - - - - -                      | 13               | 6 gave the K. |
| During weaning, in various conditions of the lacteal function, - - - - -             | 10               | 8 gave the K. |
| Lactation suddenly interrupted by death of child, - - - - -                          | 4                | 3 gave the K. |
| During unimpeded and natural lactation, - - - - -                                    | 48               | 5 gave the K. |
| Total number during lactation in various conditions, - - - - -                       | 94               | 32            |

## (C)—Examples of Cases tested by the Kiesteinic Indication.

1. *Helen Anderson*, ætat. 18, woman's venereal ward, was under treatment for commencing secondary symptoms, attended with a recent gonorrhœa. Her habits were extremely irregular, and her intercourse had been for the last eighteen months promiscuous. The menses had during this period been much interrupted, and for the last twelve months were entirely suspended.

Her abdomen attracting attention from its increased size, the urine was submitted to examination, and presented a well-marked pellicle; a second trial gave the same result: some time after, she was removed to the obstetrical ward, and here delivered of a premature infant.

2. *Mrs. Mary Welsh*, ætat. 37, May 25th, 1841, white obstetrical wards, had been for two years an inmate of the women's out-wards. On the 23d of July she married for the second time, having had by her former husband five healthy children. Some months after her marriage, her menstrual function was somewhat deranged; but for two months immediately preceding, and for three after, its regularity was uninterrupted. Since the 27th of October her catamenia have entirely



ceased, the cessation being unaccompanied by the ordinary indications of a "change of life." Her sensations resembled those of previous pregnancies; and on the following March, five months after, she distinctly felt the motion of the child.

Wishing, in the course of my observations, to procure some urine from pregnant females well advanced, I sent for *ten* specimens of which there could be no doubt, and included this woman on my list. I was surprised to find that her urine presented no *kiesteine*, and submitted it in consequence to another trial; and this giving the same result, I noted the case as an exception, and so mentioned it to Dr. Dunglison and to others.

While in her eighth month, however, I made a third examination, which presenting also no pellicle, led to a close investigation of her case, and finally to her dismissal from the ward on my own responsibility.

That there were many evidences of pregnancy, and that the absence of the peculiar pellicle had much influence on her discharge, will be seen from the subjoined examination made in the eighth month.

*Mammæ*.—Large and protruding; much developed; nipple prominent; the disc somewhat tumefied, and the general condition rather firm than flaccid. By pressure, a yellowish, milky fluid exuded from the *breast*, and the papillæ were quite mammelated from the enlargement of the follicles. *Abdomen*.—Tumid, and much protruding, the rugæ of previous pregnancies having disappeared by the tension; the navel, although not prominent, was not depressed. On percussion, generally flat, but tympanitic around the umbilical region. Uterus examined *per vaginam*, rigid, rather patulous about the mouth; vagina very rugose and contracted, dry and badly lubricated. By auscultation and the stethoscope, I made out no fœtal pulsation, although opinions were divided as to its existence; a *souffle* was distinctly heard, but I did not feel myself competent to decide as to its character. By ballottement, no result.

After carefully considering the above case, I discharged her, much against her own wishes and those of her fellow patients, to the female working wards, where she remains at the date of this paper without a change of symptoms.

3. *Isabella Smith*, ætat. 25, entered the white obstetrical wards on the 20th of April, 1841, professing to be in the eighth month, and presenting so many indications of well advanced pregnancy that no deception was suspected. A series of epileptic paroxysms, which prevented the usual more rigid examination, caused her temporary removal to the women's lunatic asylum, where, on the morning after her admission, I procured a specimen of her urine. The absence of a pellicle on two trials, made at the instance of Dr. Dunglison, satisfied me that she was an impostor; and on the 28th, during a well simulated paroxysm of epilepsy, her dress gave way, and disclosed an abundant mass of hair padding ingeniously arranged over the abdomen.

4. ————— Black obstetrical wards. This woman came into the ward in the sixth month, as she supposed, with arrestation of the menses, tumid abdomen, enlarged mammæ, &c.

At the time of procuring the first specimen of her urine, I was assured by the nurse and herself that they felt the motion of the child. No indications of the *kiesteine* were present, however, and a second trial giving the same result, she was dismissed from the ward.

5. *Mary Patterson*, ætat. 30, in the women's venereal ward, supposed herself pregnant, and had so many of the signs as to render her case an undecided one. Her urine gave no pellicle, and in the result this test was found correct.

6. I have at this moment before me a letter from Dr. T. Lindsey Walker, of Va., one of my colleagues at the Philadelphia Hospital, to whose intelligent interest I am much indebted, in which he states, that of seven specimens of urine, presented under fictitious names, and at a distance of two miles from the place where they were voided, I successfully indicated the only four, which were those of pregnant females.

7. *S. C*—, ætat. 22. Her urine was presented to me by a medical friend, requesting an opinion. The evidences of pregnancy were well marked, and to many conclusive. Repeated trials of her urine in no instance gave the kiesteine, and subsequent examination confirmed the accuracy of its evidence: she was not pregnant.

8. *Maria Hero*, ætat. 15. This young woman, at the very commencement of my experiments, refused to give me her urine; and when at last I succeeded in procuring a specimen, it yielded no pellicle. I made a second trial, and this gave the same result. Embarrassed by this apparent contradiction of the other indications in her case, I determined to make a third trial, and obtained a perfectly marked kiesteinic pellicle. I learned on subsequent inquiry, that she had, on the two first occasions, borrowed urine from her neighbour.

This was only one of *very* many cases of attempted imposture detected in the course of my examinations.

9. *Miss* — —, ætat. 23. Applied to Dr. N. Benedict, of this city, for a course of treatment for suppressed menstruation. Her previous character had been undoubted. He had felt an interest in the inquiries which I was conducting, and sent me a specimen of her urine for examination.

It presented on the third day the kiesteinic pellicle so well marked as to leave no doubt in my mind as to the proper diagnosis of her case. Having reported to him accordingly, he declined administering emmenagogues, and in the result she reluctantly confessed herself in the second month of pregnancy. She is now awaiting delivery.

With another case, of the many which I have had the pleasure of determining for the same gentleman, I will now conclude.

10. *Mrs. M*— *M*—, ætat. 32. Since her marriage, which occurred five years ago, has been the mother of three children, the interval between them being of nearly uniform duration. At the expected period, experiencing well understood symptoms, she supposed herself again pregnant. Her urine, tested in the third, fifth, and seventh weeks, presented no pellicle. Her symptoms were now augmented by a host of sensible signs; and finally a fourth trial, made *after averred quickening, giving no kiesteine*, led me to consider her case as an exception, and to note it as such in my tables.

Since that date, however, I am enabled to add her name to my confirmatory list; a subsequent examination making it perfectly evident that her condition is owing to other causes.

P. S.—April 20, 1842. Since this dissertation was submitted to the Medical Faculty of the University of Pennsylvania, two papers on this sub-



ject have appeared; one by Mr. Letheby, in the *London Medical Gazette* of Dec. 24, 1841, and an elaborate paper by Dr. Stark, in the *Edinburgh Medical and Surgical Journal*, for January of the present year.

The facts observed by Mr. Letheby accord *generally* with my own. He found "unquestionable evidence of kiesteine in forty-eight out of fifty cases between" the second and ninth month of utero-gestation," and was unable, like myself, to "account for its absence in the two exceptions." In seventeen non-pregnant women he found no indication of its presence; but detected it in the urine of ten suckling women, immediately after delivery, and onwards to periods between the second and sixth months, when it disappeared. The few microscopic results which he gives coincide also with my own.

Dr. Stark's paper is devoted to the signs of pregnancy, and among the rest to the state of the urine. He refers succinctly to his own observations relative to the kiesteinic pellicle, which he supposes to be derived from the suspended sediment; and he asserts that there exists a relative proportion between these and the earthy salts which enter into the composition of the urine. His paper derives its principal interest from his researches into the character of the sediment.

In the *natural sediment* of the urine of pregnancy, he was unable to detect the presence either of albumen or caseum by acids, alkalis, or alcohol, with the aid of heat; but when he added a certain quantity of milk to the urine, both these principles were discovered readily by the aid of acids, the other tests producing no effect: when milk was added in smaller quantities, however, it was *undiscoverable by any reagent*. Being unable to refer the sediment to any of the known deposits of the urine, though his investigations had immediate reference to its distinctive characters, he employed ether to effect a separation of the *animalized matter* which he thought it might contain, and he supposes that he succeeded by this means in detecting a substance entirely different from any heretofore known.

Failing to determine its constitution by chemical agents, he resorted to the microscope. He here found that this sedimentitious matter, whether examined while yet held in solution by the recent urine, or when it had assumed the form of a deposit, or when it had been disengaged by ether, was composed of distinct transparent or "pellucid" globules, which when in their sedimentary condition bore a striking resemblance to the caseum globule of recent milk, but which when pellucid bore an equally strong resemblance to the serous or albuminous globule.

Dr. Stark now reduced the question to very narrow bounds, by inquiring as to the identity of this sedimentary matter with albumen, caseum, fibrine, and gelatine. He thinks that its minute structure and chemical properties sufficiently distinguish it from the two first;—from albumen, because it dissolves instead of coagulating upon the application of heat; from caseum, because it is soluble in nitric and sulphuric acids, which exert on this principle a very contrary action. From fibrine, it has necessarily a still greater dif-

ference. There remains *gelatine*; and compared with this, the distinction was less striking. The globules of both under the microscope, were similarly formed: both were soluble in the acids and alkalies, and by the aid of heat. The only distinctive particular seems to have been the action of tannin, which as is well known precipitates *gelatine* from its solution in water. Some of the natural sediments, dissolved in boiling water, and cooled to a blood heat, were treated with a decoction of galls: a flocculent precipitate was at once produced; but instead of *gelatinizing* upon cooling—it *was deposited*; and instead of becoming more solid and more easily separable, upon reboiling, it again underwent solution.

Upon these grounds he attains the conclusion, which I give without comment, “that this substance is a matter *sui generis*, an elementary substance or principle, forming in some measure a connecting link between the albuminous and gelatinous elementary principles.” This substance he proposes to designate by the name of “*Gravidine*.”

It is unnecessary to say, that this discovery of a new organic principle, if confirmed by future investigation, will be a matter of great interest. I must confess, however, that the distinctive characteristics of the new substance do not seem to me very decidedly marked in the results announced by Dr. Stark; and such is the complex, and often deceptive nature of the investigations of physiological chemistry, that we have a right to wait for renewed experiments before admitting too implicitly the certainty of those he has described.

Dr. Stark considers that his experiments entirely subvert an opinion which has met with some favour regarding the theory of these appearances. Ever since the publication of Nauche’s paper, the supposed presence of caseum in the urine of pregnancy has countenanced the idea entertained by Bird and others, already referred to, that the elements of the milk (not as Dr. Stark infers, the milk itself,) might probably exist in the urine:—as, however, the matter is neither milk nor caseum, a theory based upon their presence must necessarily fall. The conclusion may be a correct one so far as the chemical analysis is concerned; and yet the connection between the kiesteine pellicle and the mammary secretion may be adequately proved by other evidence. If even the *Gravidine* be regarded as a new organic principle, its properties are not so peculiar, nor its analogies with caseum so remote, as necessarily to imply the operation of different causes in the formation of the two.

I have already mentioned my conviction, founded on personal observations, that the unmodified caseum is not found in the urine; but the presence of the colostral appearances under the microscope, and the numerous phenomena which I have described as attending the presence of the Kiesteine leave me no room to doubt its *intimate connection with the condition of lactation*.