taught any of the duties which pertain to motherhood. Among the better classes there is less mortality among the infants, for all the conditions of life are better. Nevertheless, there are many weakly, athreptic, and artificially-fed children even among the richer classes, for the congenital debilities of which I have spoken obtain also among these classes; after birth, however, the children, being much better cared for, gradually overcome this debility, and finally grow up notwithstanding.

The advantages of suckling do not rest entirely with the infant. Besides the popular tradition that a woman does not generally conceive while suckling—a tradition I hold to be well founded—it is clearly advantageous to the mammary glands that their function should be allowed to go on in a normal manner; lactation should come to an end after parturition as gradually as it develops into activity during pregnancy. Rapid child-bearing is very debilitating; this is especially the case among poor, overworked, underfed women, and, in my opinion, is one of the most potent of the debilitating influences with which we have to deal in this connection. In a certain proportion of the cases, I find that mothers have adopted artificial feeding because they are not strong enough to nurse. I should like to raise this question, and learn the opinion of Fellows of the Society upon it. I have met with a few undoubted cases, where such a cause, in some shape or other, appeared to be operative; but the cases are certainly uncommon, and it may, I think, be justly asserted that the causes are preventable.

In my analysis I stated that in 35 per cent. of the cases the mothers were acting under medical advice in not suckling their children. Even if the cases be excluded in which there was some physical reason to necessitate such a course, still the proportion of cases is large in which mothers desist from suckling with the consent of their medical advisers; and I am inclined to think that the habit of not suckling is largely on the increase—that slighter causes suffice to justify it now than formerly. Among reasons given and accepted as sufficient are the following—tuberculosis or syphilis in the mother. For myself, I may say that I have never met with a case in which a mother has given any constitutional disease to her own offspring through suckling it. As regards tuberculosis—a very transmissible disease in some families—it would be difficult to prove that it was conveyed by suckling the infant. Surely tendencies to a disease are much more likely to be derived from the far more intimate relation between the mother and foetus *in utero* than from suckling. As regards syphilis, Colles's law is not known to have any exception.

Not so many years ago, before these artificial foods had been invented, wet nurses were in great request. Such an arrangement was admirable when the supply of milk was sufficient both for the child and the nursing, and when both were allowed to partake of it; but it was disastrous when the child had to give place to the nursing, as was too often the case. But other evils and misfortunes than this tended largely to bring wet-nursing into disuse, namely, the danger of conveying disease either from the foster-mother to the child, or *vice versa*. I am inclined to think that it was this occasional conveyance of disease to or from a suckling infant which is responsible for the wide-spread belief that certain dyscrasias or constitutional conditions may be conveyed by a mother to her child through the breast-milk. My own experience, however, does not furnish me with a single example in point. The mother who bears a child will impress on it any constitutional peculiarity she herself possesses; it appears to me quite impossible that her milk can subsequently convey any further infection. Thus I think that to desist from suckling because the mother may be tubercular is a mistake as far as the child is concerned. The normal discharge of the maternal duties during a normal period, for reasons already alluded to, is clearly as advantageous to the mother as to the child.

I now approach the end of my thesis. The Fellows of the Society will see, from what has preceded, how I have been gradually led to change my views, and have come to regard infantile athrepsia not as the result of artificial feeding, least of all as the result of starch-containing foods, but as a congenital condition—a condition due to the untoward surroundings and mode of life of their parents.

As to the remedies for such conditions, I can do no more than just hint at them. They must be curative and preventive. I will not enter on the very large subject of foods and of diet for such children. Clearly there can be no hard-and-fast line, for there is a strong personal element in each individual case. Briefly, I should say, urge a mother to suckle, entirely if she can, or in part, especially when the child is weakly, and while the child is young; in other than breast-milk must be used, be careful to have it fresh and good and adequately diluted. If a child thrive on milk, so much the better—let well alone; but if artificial food must be added, insist on some simple

food, in moderate quantity, carefully prepared and administered, rather than upon some highly elaborated and largely advertised nostrum of the exact nature of which you are ignorant. Let it be remembered that fresh foods are far better than prepared foods, and that the processes of pancreatising and malting tend rather to destroy this freshness.

As regards preventive measures, seeing that I attribute far more influence to the congenital debility and home surroundings of these children than to starch-foods, it will be obvious in what way I should seek to lessen not only the amount of this infantile marasmus, but also the causes which lead to it. So long as adverse conditions of life persist, so long will be born marasmic and wasted infants. For such cases the conversion of the few grains of unaltered starch into dextrose, which each individual child daily consumes, will continue to prove a mere delusion, and be utterly inadequate to affect the question one way or another. Our sanitary inspectors would pronounce absolutely against the wholesomeness of milk produced by cows fed in such places as are occupied in every large town by crowds of child-bearing women, and would condemn the places as unfit for the rearing of cattle intended for human food.

Has not the time come for a reconsideration of the starch dogma, and for a protest, by the whole profession, against the continuation of a system of local government which permits human beings to be bred, born to live and die in holes long since declared unfit for the animals on which they feed? It seems doubtful what will be done with the funds now being collected all over the country, and known as the Women's Jubilee Offering. Can a more worthy object be imagined than the inauguration of conditions of life and living, more suitable than at present obtain, for thousands of the mothers, wives, and children of the poorer classes in most of the large cities and towns of wealthy England?

ON THE REFRACTIVE INDICES OF SOME PATHOLOGICAL FLUIDS.

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IN the hope that an examination of the refractive indices of various pathological liquids would help as a means of distinguishing them from each other, I have made a series of observations on this subject.

I may say, however, that I have not arrived at any very definite result from a utilitarian point of view; still, it is possible that, by-and-bye, the calculation of the refractive index, taken in connection with other facts, may be found useful in the diagnosis of pathological liquids. It is for that reason that I venture to publish these preliminary results, and I regret that I have not been able to tabulate a more extensive series of measurements. For the specimens examined I have to thank my friends Dr. Saundby, of Birmingham, and Dr. Batterham, late House-Surgeon at the Wolverhampton Hospital, now of St. Leonard's. I may refresh the memory of any one who may care to look at these figures, and who may happen to have forgotten his "Physics," by briefly showing how to get the refractive index of a liquid. The index of refraction of a prism is the ratio of the sines of the angles of incidence and refraction¹; or, if μ = refractive index, A = angle of prism, i = difference between direct reading and deviation reading, then we have

$$(1) \quad \mu = \frac{\sin \frac{1}{2}(A + i)}{\sin \frac{1}{2}A}.$$

In the case of liquids, these are enclosed in a hollow glass prism, so constructed that, when filled with the liquid, the refracting angle of the latter shall be a certain angle, generally 60°. My hollow prism was made by Browning, of 63, Strand. A spectroscope, capable of being used as a spectrometer, is necessary; and I may say at once that the ordinary chemical spectroscopes, which are advertised as being fitted for the calculation of refractive indices, are generally useless for the purpose, owing to their prism tables being fixed; for the prism has to be set at the minimum angle of deviation in the case of each liquid examined. In Hilger's spectroscopes, the prism table is always made movable for this purpose. I need not here describe how to get the direct reading of the slit, and how to get the deviation reading when the prism is set at the minimum angle of deviation, as full directions for the adjustment of a spectrometer will be found in Glazebrook and Shaw's *Practical Physics*, and in the *Physical Optics* of the former

¹ "If a ray of homogeneous light fall on a refracting medium at an angle of incidence ϕ , the angle of refraction being ϕ' , then the ratio $\frac{\sin \phi}{\sin \phi'}$ is constant for all values of ϕ , and is the refractive index for light of the given refrangibility going from the first to the second medium." (Glazebrook and Shaw.)

author, also in Kohlrausch's *Physical Measurements*. A book of mathematical tables, such as Chambers's, is also necessary.

An example will now make the method of calculation clear. Setting the collimator tube and the telescope tube so that their axes are in a straight line, and illuminating the slit with the sodium flame, having the prism removed from the table, and taking all the precautions mentioned in the above books, we find, for instance, that the reading of the vernier is $27^{\circ} 13'$. The hollow prism is now filled with the liquid—in this example, hydrocele fluid—and the prism set at the minimum angle of deviation for the sodium line; the intersection of the cross-wires of the telescope tube is now made to coincide with the yellow sodium line, the tube clamped, and the reading taken, when it is found to be $51^{\circ} 49'$; hence the angle $i = 24^{\circ} 36'$. The angle A of prism being 60° , we substitute these data in the above formula (1), which now reads:

$$(2.) \quad \mu = \frac{\sin \frac{1}{2} (60^{\circ} + 24^{\circ} 36')}{\sin \frac{1}{2} (60^{\circ})} = \frac{\sin 42^{\circ} 18'}{\sin 30^{\circ}}$$

Looking up the natural sine of $42^{\circ} 18'$ in the *Mathematical Tables*, we find it to be 6730125, and similarly that of $30^{\circ} = 5000000$, therefore

$$\mu = \frac{6730125}{5000000} = 1.3460$$

to four places of decimals, all that is required. But this only gives the refractive index, which is dependent upon the density of the liquid, and therefore on its temperature. The lower the temperature the greater the density, and therefore the greater the index of refraction. In order to compare the refractive energies of different liquids, "a function of the refractive index is required which does not vary with the temperature, and is therefore constant."

Table of Refractive Indices.

FLUID.	μ Refrac. Index.	Direct Reading.	Deviation Reading.	Difference i .	Sp. Grav. or D.	Specific Refract. Energy.	REMARKS.
Urine of case of urticaria.	1.3426	15° 52'	40° 12'	24° 20'	1.030	.3326	
Fluid from ascites.	1.3365	27 13	51 5	23 52	1.010	.3331	
Albuminous urine.	1.3378	27 13	51 12	23 59	1.013	.3334	Recovering from acute Bright's.
Urine	1.3374	27 13	51 10	23 57	1.012	.3334	Chronic Bright's
Urine; chronic bronchitis.	1.3413	27 13	51 27	24 14	1.023	.3336	
Urine	1.3378	27 14	51 12	23 58	1.012	.3338	
Fluid from ascites.	1.3365	27 13	51 5	23 52	1.008	.3338	Hepatic cirrhosis; second tapping. Bright's (recent)
Albuminous urine.	1.3378	15 52	39 51	23 59	1.011	.3341	
Pericardial fluid	1.3417	15 50	40 6	24 16	1.017	.3359	General tuberculosis; no pericarditis. Acute pleurisy.
Fluid from pleura.	1.3430	15 52	40 15	24 23	1.020	.3362	
Hydrocele fluid	1.3404	27 13	51 23	24 10	1.012	.3363	Patient aged 64.
Hydrocele fluid	1.3447	27 13	51 43	24 30	1.021	.3376	Two months' duration; aged 56.
Fluid from pleura.	1.3451	27 13	51 45	24 32	1.020	.3383	First tapping; boy, aged 10.
Ovarian fluid ..	1.3460	27 13	51 49	24 36	1.022	.3385	
Hydrocele fluid	1.3460	27 13	51 49	24 36	1.022	.3385	Second tapping; first 6 yrs. ago.
Urine	1.3438	15 46	40 13	24 27	?	?	Normal.
Urine	1.3421	17 16	41 35	24 19	?	?	Normal.
Pleuritic fluid ..	1.3387	27 11	51 14	24 3	?	?	"Heart-disease"
Pleuritic fluid ..	1.3451	27 13	51 45	24 32	?	?	Several weeks' standing. Congenital. "General dropsy."
Hydrocele fluid	1.3417	15 54	40 10	24 16	?	?	
Urine	1.3382	27 13	51 14	24 1	?	?	
Aqueous of eye of ox.	1.3360	15 31	39 21	23 50	?	?	
Vitreous of eye of ox.	1.3339	15 45	39 26	23 41	?	?	
Vitreous of eye of ox.	1.3347	15 46	39 31	23 45	?	?	
Pericardial fluid	1.3421	15 48	40 6	24 18	?	?	Acute pericarditis.
Cerebro-spinal fluid.	1.3365	15 49	39 41	23 52	?	?	Tubercular meningitis.

Gladstone and Dale have found that if μ be the refractive index, and d the specific gravity, $\frac{\mu-1}{d}$ is independent of the temperature. This formula represents the specific refractive energy of each

substance. In the above case, the specific gravity was found to be 1.022, hence we substitute for the formula

$$\frac{\mu-1}{d} \text{ this, namely: } \frac{1.3460-1}{1.022}$$

or .3385, which is therefore the specific refractive energy of hydrocele fluid.

In this way the calculations in the following table were worked out, of which the first fifteen are arranged in the order of the gradual increase of the specific refractive energy.

It will be noticed that the specific refractive energy of urine is low, as is also that of ascitic fluid, and the refractive index of cerebro-spinal fluid is also very low. The specific refractive energy of pleuritic fluid is higher than pericardial fluid, and that of ovarian fluid higher than either, except in one instance. It will also be noticed that urine of specific gravity 1030 has a lower specific refractive energy than the albuminous urine of specific gravity 1011.

A CASE OF MOLLITIES OSSIIUM IN THE MALE.

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MOLLITIES OSSIIUM is such a rare condition, especially in men, that no apology is necessary for recording the following case.

A. M., aged 31, married, an engraver, consulted me on account of pains in his bones. He is an only child, and has no sign of syphilis, either inherited or acquired. When thirteen months old, his mother says, he could walk; he was neither bow-legged nor knock-kneed; as a boy he was a very fleet runner. When three, he had whooping-cough; but his mother never noticed any change in his chest till the last year or two. When six and a half, he had scarlatina; and, whilst convalescing from it, he was knocked over by a dog, and received an injury to his right knee, for which he was taken to the General Hospital; he remained there for ten months, when his leg was amputated, and he left one month afterwards. He became a highly skilled workman, and married when twenty. Seven years ago, he slipped and broke his left thigh, and was again admitted into the General Hospital. He left that institution twelve months afterwards with the

fracture still ununited. A year after this he broke his left humerus; it united in a month, leaving no deformity. Three years ago, he noticed a dull aching in both arms, the least jerk causing severe pains in the muscles and bones. Eighteen months ago, his bones commenced to give way and bend until he assumed his present condition, described below. He has five children, aged 10, 7, 5, 3, and 1. The