First quarter	717 cases	66 deaths	= 9.2 per cent.
Second "	651 "	54 "	= 8.3 "
Third "	305 "	20 "	= 6.6 "
Fourth "	401 "	31 "	= 7.7 "
Year ...	2,074 "	171 "	= 8.2 "

Dr. Hill regards the deaths amongst the notified cases of the year as 165, the per case mortality thus being just 8 per cent. of all classes. But the difference between vaccinated and unvaccinated is very striking, namely:

	Cases.	Deaths.	Mortality per cent.
Vaccinated ...	1,769	77	4.4
Unvaccinated ...	224	75	33.5
Doubtful ...	81	13	16.0

Stated in other words, the above means that if all the cases had been in vaccinated persons the deaths would have been (not 171) but only 91: and had all the sufferers been unvaccinated (not 171) but as many as 694. Thus universal vaccination, supposing that so many persons had been attacked, would have saved in Birmingham last year upwards of 500 lives.

The following table sets out the facts as to mortality at several age-periods in the three classes into which Dr. Hill has divided the attacks.

Ages.	Vaccinated.			Unvaccinated.			Doubtful.		
	Cases.	Deaths.	Mortality %	Cases.	Deaths.	Mortality %	Cases.	Deaths.	Mortality %
Under 1 year ...	0	0	—	41	32	78.0	0	0	—
Between 1 and 5 years ...	5	0	0.0	38	13	64.0	6	0	0.0
" 5 " 15 "	236	1	0.0	73	6	8.0	14	1	7.0
" 15 " 25 "	757	13	2.0	38	8	21.0	19	1	5.0
" 25 " 45 "	689	52	8.0	25	12	48.0	28	8	29.0
" 45 " 65 "	119	9	8.0	7	2	32.0	12	2	17.0
65 and upwards ...	13	2	15.0	2	2	100.0	2	1	50.0
All ages ...	1,769	77	4.4	224	75	33.5	81	13	16.0

The data are terribly significant as to the protective power of infantile vaccination during the first 15 years of life, not one death occurring among 241 cases in vaccinated persons under that age, from small-pox alone, the single death in the table being in a boy who was at the time suffering also from scarlet fever. Among the unvaccinated 78 per cent. of infants attacked under 1 year of age succumbed to the disease, and over one-third of those during the next four years of life, the case mortality getting high again after 15 years, and remaining so during life. It is only in the aged that deaths among the vaccinated reached 15 per cent., and then it is to be remembered that the table is dumb as to revaccination, and primary vaccination cannot be held to retain its full protective power for very many years. As to primary vaccination, the table tells us that in the first 15 years of life this prophylactic measure, no matter how it may have been carried out, gave a chance of recovery from small-pox attack in children and young persons 66 times that of individuals passing through small-pox without it. We could have wished that the facts as to revaccination and quality of vaccination scars had been forthcoming, and also that some detailed account of the influence of the small-pox hospital on the neighbourhood surrounding it had been submitted. As to the latter, however, Dr. Hill very significantly remarks that "in fact the disease was almost confined in its epidemic character to the north-west corner of the city, the neighbourhood in which the small-pox hospital is situated." Whilst the case rate for the city as a whole was 4.2 per 1,000 inhabitants, that for All Saints Ward (containing the hospital) was as high as 14.5 per 1,000 inhabitants, more than 25 per cent. of the total cases arising in this one of the eighteen wards of Birmingham.

The bazaar to be held in aid of the funds of St. Mary's Hospital will be opened at 1 P.M. on June 27th by the Princess of Wales. Mr. George Alexander and Mr. Yorke Stephens have arranged to give a series of dramatic entertainments, and Mr. Wilhelm Ganz an afternoon concert on June 29th.

CHEESE AND BUTTER AS POSSIBLE CARRIERS OF TYPHOID AND CHOLERA INFECTION.

By SIDNEY D. ROWLAND, B.A.,

Late Scholar of Downing College, Cambridge.

THIS investigation was undertaken at the suggestion of Mr. Ernest Hart, and carried out under the surveillance of Dr. Klein, and by his kind permission, in his laboratory.

Objects.—The inquiry arose from the consideration of a recorded observation of Hankin¹ that typhoid bacilli had been found alive and flourishing in Indian *dahi*—a milk product prepared by the *kulvais* from the residue of the day's milk. Hankin is of opinion that its presence in this food product may have important relation to typhoid outbreaks in India, and it was thought that perhaps the similar English products, cheese and butter, might stand on a corresponding footing.

Methods.—Selected samples of cheese and butter were accordingly obtained and impregnated with the microbes of typhoid and cholera, and then kept for a period of nine months, with the object of ascertaining, first, if the bacilli could survive in such a medium; and, secondly, how long they could continue to do so. Specimens of cheese and butter were accordingly procured from a shop in the ordinary manner. They included four samples of cheese (Cheddar, Dutch, American, and double Gloucester), and four of butter (fresh, salt, Dorset, and Brittany). From the centre of these samples small cubical blocks were cut with a sterilised knife, and immediately transferred to deep glass dishes with overlapping covers, somewhat resembling deep Petre's dishes. In this way it was found they could be preserved quite fresh for an indefinite period. Two of the dishes, however, succumbed to attacks of mould (the fresh butter and one of the cheeses); the rest are still (after nine months) apparently in the same condition as when first prepared.

Cultures.—The cholera germs were obtained from a case of cholera at Gravesend last year, and the typhoid from the spleen of a patient who had died from that disease. They were grown on gelatine in the usual way; also in milk, in the hopes that such a nidus might prepare them in some way for their subsequent life in the milk products. Tubes were also prepared and sterilised, and a quantity of cheese or butter introduced into each. They were then steamed in a steamer till quite melted, and allowed to set, so as to afford a sloped surface of the usual description. In this way the exclusion of mould and absolute sterility could be ensured.

Inoculation.—On to the surface of the cheese and butter blocks, a portion of the culture was transferred by a sterilised capillary pipette, and lodged in a small depression made by a platinum loop. The sloped tubes were inoculated in the usual manner. After the first few days, subcultures were made in gelatine from the inoculated samples, and afterwards were made at longer intervals extending over nine months. In no case could any growth be obtained either from the blocks or the tubes. In addition, microscopical examination failed to discover any signs of living bacilli. A few dead ones were found at first, but never did any sign of growth appear, either on the samples or on the gelatine.

It thus appears that the samples examined did not afford a suitable nidus for the growth of the bacilli inoculated, and, what is of more importance, did not allow the microbes even to continue alive. Of course these results must not be extended to any but the particular varieties of cheese and butter examined, but as far as they go they are reassuring, and we have the satisfaction of at least knowing that there is not much danger of typhoid or choleraic infection being conveyed by such extremely common articles of diet.

It may be said by some that this result is in some measure surprising, seeing how readily both these organisms grow in milk; it is, however, none the less to be depreciated on this account, seeing how little we really know of the essential biology of our secret friends and foes.

¹ BRITISH MEDICAL JOURNAL, September 15th, 1894, p. 613; and *Indian Medical Gazette*, No. 8, August, 1894.

PROFESSOR MIKULICZ, of Bonn, has been appointed to the Chair of Surgery in the University of Bonn, vacated by Professor Trendelenburg's translation to Leipzig.