ON VACCINATION AND SMALL-POX IN THE
ITALIAN ARMY.

By DR. RIDOLFO LIVI,

Member of the International Statistical Institute, Surgeon-Captain
attached to the Statistical Bureau of the Medical Inspec-
torate, Ministry of War, Rome.

THE medical statistics of the Italian Army give for many years past information of great importance on vaccination and on cases of small-pox among soldiers. They divide the attacked individuals into two classes according to their remote or recent anamnesis. We call "remote anamnesis" that which relates to vaccination undergone before entering the military service; "recent anamnesis" that which relates to vaccination undergone while entering or during the service. Besides, the statistics make it possible for us to calculate with great approximation to accuracy the proportion, on the average strength, of the individuals (1) vaccinated in childhood or before entering the service; (2) variolated in childhood or before entering the service; (3) neither vaccinated nor variolated; and also the proportion of individuals having undergone military vaccination with or without success. Let us add that, in general, military statistics have over all others this great advantage, that they are compiled according to constant methods and rules; that they consider only individuals of the same sex, nearly of the same age and constitution, and all equally exposed to morbid influences. Thus we find ourselves in the best position to obtain a definite answer to the question of the utility of vaccination.

TABLE I.—Vaccinations performed from 1867 till 1897 inclusive.*

Years.	Number of Vaccina- tions Performed during each Year.	Ratio per 1,000 Vaccin- ated.			Proportion of Good Success per 1,000 Vaccinated.			
		Variolated in Infancy.	Vaccinated in Infancy.	Not Variolated nor Vaccinated in Infancy.	In the Vari- olated.	In the Vac- cinated.	In the Non- Variolated and Non-Vac- cinated.	Total.
1867	41,923	68	852	80	200	250	410	260
1868	56,294	65	860	75	280	300	460	300
1869	34,736	72	849	79	300	370	500	380
1870	36,700	83	846	71	360	400	510	400
1871	73,390	58	881	61	350	360	510	370
1872	121,359	49	917	34	230	330	470	330
1873	104,389	63	902	35	250	350	440	350
1874	85,048	48	913	39	260	311	388	312
1875	97,647	46	915	39	294	337	401	337
1876	104,027	44	921	35	329	370	448	371
1877	73,853	36	933	31	343	370	457	371
1878	77,959	33	935	32	343	370	457	371
1879	119,788	32	940	28	378	407	504	409
1880	103,471	32	934	34	397	428	530	430
1881	109,982	28	945	27	434	467	578	469
1882	109,279	24	953	23	463	499	618	501
1883	132,384	22	941	37	541	582	721	585
1884	94,564	20	956	24	531	572	708	574
1885	188,708	22	959	19	568	587	741	591
1886	138,301	19	966	15	544	534	741	539
1887	129,402	21	961	18	559	606	723	611
1888	126,704	23	962	15	554	619	763	621
1889	109,950	22	962	16	452	503	664	505
1890	47,376	17	972	11	491	535	690	537
1891	195,072	23	963	14	537	639	790	639
1892	76,609	12	979	9	433	544	613	555
1893	118,211	17	962	21	593	670	771	672
1894	176,589	14	967	19	527	666	799	669
1895	90,491	12	971	17	544	669	792	670
1896	66,262	10	976	14	485	647	749	648
1897	115,003	10	977	13	584	695	791	698
Total...	3,095,571	—	—	—	—	—	—	—

* Note.—In reply to inquiry, the author explains that in statistics of the results of vaccination in the Italian army there are only two classes, "Positivo" and "Negativo," and that the latter includes all cases of imperfect pustules. "Positivo," therefore, which Dr. Livi translates as "Good Success," seems equivalent to the "Perfect Pustule" class of the British army statistics. He further explains that those in whom the vaccination performed on their arrival at the corps is unsuccessful are immediately revaccinated, and that the statistics of Table I include the successes from this second operation. Those who have a second negative result are again operated on in the following year.—ED. B. M. J.

We put aside all comparison between small-pox morbidity and mortality among the military and civil individuals. We will consider only:

1. Whether in all the military population the individuals who have been vaccinated are more or less exposed than the unvaccinated, to attack by small-pox, and in what measure.
2. Whether among the individuals attacked by small-pox, those who have been vaccinated are more or less exposed, and in what measure, to death.

These are, after all, the capital points of the question.

I.—VACCINATIONS IN THE ITALIAN ARMY.

From 1867 (the first year in which the medical statistics were compiled) till 1897 inclusive, 3,095,571 vaccinations and revaccinations have been performed on military men. The table (No. I) gives for each year the ratio of individuals who at the epoch of their vaccination showed (1) marks of small-pox (variolated); (2) marks of vaccination (vaccinated); (3) neither marks of vaccination nor of small-pox (neither variolated nor vaccinated). One sees very clearly a gradual diminution in the figures of the variolated, which is always parallel to a diminution of the figures of the unvaccinated. Thus we may come to the conclusion that small-pox was more prevalent when vaccination was not so general as it is now. We see also in this table (columns 6, 7, and 8) that the never-vaccinated individuals have the greatest rate of successful vaccination, while the least rate always belongs to the variolated.

The table shows also in the last column a regular augmentation in the general proportion of successes, which rises from 260 per 1,000 in 1867 to 698 per 1,000 in 1897; a fact owing, in our opinion, partly to the improvement in vaccination technique, as well as to the greater facility of securing a first-rate lymph; but partly also to the gradual replacement of arm-to-arm vaccination by animal vaccination, which has always given a greater ratio of successes.

II.—SMALLPOX IN THE ITALIAN ARMY.

We give in Table II (p. 1018) the sickness and mortality by small-pox since 1867. This table is not very complete. First, for a long while, in our statistical returns, variola, varioloid, and varicella have been mingled under the same denomination. Still more, during many years, the statistics take no account of those attacked by small-pox treated in the civil hospitals; so that in order to have an idea of the course of small-pox throughout the entire period of thirty-one years, we should only consider the figures relating to military hospitals. However, a constant diminution is evident. From a serious mortality, we descend to almost *nil* in the last years. Sickness presents a parallel diminution. We are of opinion that the very notable progress gradually made in military hygiene—in the barracks as well as in the military hospitals—the stricter isolation of patients, and more rational disinfection, have contributed to this diminution. But if this great diminution were only due to the above causes, one could not know how to explain why, for instance, measles and typhoid fever have not diminished too, and at the same rate, while against these infections, in the barracks as well as in the military hospitals, all the hygienic prescriptions are practised with the same zeal and intelligence as against small-pox.

III.—FATALITY RATES OF THOSE ATTACKED BY SMALL-POX, ACCORDING TO THEIR VACCINATION.

Since 1877 the annual medical reports give a little table in which the cases of small-pox observed during each year are divided according to the remote and recent anamnesis of the attacked individuals. This series of twenty-one years' observations is however not homogeneous, for from 1877 till 1881 inclusive the cases of variola and varioloid are mingled with those of varicella, a disease whose affinity with small-pox is yet discussed, although denied by many pathologists. However we have divided 1877-97 into two periods, 1877-81 and 1882-97, in only the last of which varicella is separated from small-pox. Table III (p. 1019) shows that either examining separately the cases of small-pox (and varioloid) in the period 1882-97, or taking in small-pox, varioloid, and varicella (in the period 1877-81 as well as in all the twenty-one years), the results are always identical. Those who have never been vaccinated when attacked by small-pox have the greatest probability of death, those instead who have been recently and suc-

TABLE III.—Small-pox Cases According to Remote and Recent Anamnesis.

Recent Anamnesis.		Remote Anamnesis.															Total.									
		Never Vaccinated nor Variolated in Childhood or before entering the Service.					Vaccinated or Variolated in Childhood, or before entering the Service.					Remote Anamnesis not Stated.														
		Attacked by Variola and Varioloid.	Attacked by Variocella.	Attacked by Variola, Varioloid, and Variocella.	Deaths.	Deaths for 100 Treated.	Attacked by Variola and Varioloid.	Attacked by Variocella.	Attacked by Variola, Varioloid, and Variocella.	Deaths.	Deaths for 100 Treated.	Attacked by Variola and Varioloid.	Attacked by Variocella.	Attacked by Variola, Varioloid, and Variocella.	Deaths.	Deaths for 100 Treated.										
Period 1877-81.	Attacked by small-pox or varicella before being vaccinated at the corps	—	—	15	5	—	33.3	—	—	103	10	—	9.7	—	2	—	—	—	120	15	—	12.5				
	Attacked by small-pox or varicella after being vaccinated at the corps without success	—	—	58	6	—	10.3	—	—	629	34	—	5.4	—	17	2	—	11.8	—	—	—	6.0				
	Attacked by small-pox or varicella after being vaccinated at the corps with success	—	—	14	1	—	7.1	—	—	173	5	—	2.9	—	8	—	—	—	—	—	—	3.1				
	Attacked by small-pox or varicella with recent anamnesis not stated	—	—	14	1	—	7.1	—	—	22	—	—	—	—	84	12	—	14.3	—	—	120	13	—	10.8		
Period 1882-97.	Attacked by small-pox or varicella before being vaccinated at the corps	—	—	101	13	—	12.9	—	—	927	49	—	5.3	—	111	14	—	12.6	—	—	1,139	76	—	6.7		
	Attacked by small-pox or varicella after being vaccinated at the corps without success	26	4	30	5	19.2	16.7	188	29	217	16	8.5	7.4	11	1	12	2	18.2	16.7	225	34	259	23	10.2	8.9	
	Attacked by small-pox or varicella after being vaccinated at the corps with success	20	14	34	1	5.0	2.9	590	196	746	13	2.4	1.7	11	3	14	—	—	—	581	213	794	14	2.4	1.8	
	Attacked by small-pox or varicella with recent anamnesis not stated	44	10	54	2	4.5	3.7	619	258	877	14	2.3	1.6	29	8	37	1	3.4	2.7	692	276	968	17	2.5	1.8	
Period 1877-97.	Attacked by small-pox or varicella before being vaccinated at the corps	—	—	45	10	—	22.2	—	—	320	26	—	8.1	—	14	2	—	14.3	—	—	—	—	379	38	—	10.0
	Attacked by small-pox or varicella after being vaccinated at the corps without success	—	—	92	7	—	7.6	—	—	1,375	47	—	3.4	—	31	2	—	6.5	—	—	—	—	1,498	56	—	3.7
	Attacked by small-pox or varicella after being vaccinated at the corps with success	—	—	68	3	—	4.4	—	—	1,050	19	—	1.8	—	45	1	—	2.2	—	—	—	—	1,163	23	—	2.0
	Attacked by small-pox or varicella with recent anamnesis not stated	—	—	22	1	—	4.5	—	—	68	—	—	—	—	167	21	—	12.6	—	—	—	—	257	22	—	8.6
		227	21	—	—	—	9.3	—	—	2,813	92	—	3.3	—	257	26	—	10.1	—	—	—	—	3,257	139	—	4.2

TABLE IV.

Periods.	Remote Anamnesis in childhood or before entering the service.				Total average strength.	Ratio per 1,000 of strength.		
	Variolated.	Vaccinated.	Variolated and Vaccinated.	Never vaccinated or variolated.		Variolated.	Vaccinated.	Neither variolated nor vaccinated.
Period 1877-81 ...	7,689	178,909	186,598	7,237	193,835	40	923	37
„ 1882-97 ...	4,350	198,653	203,003	4,143	207,146	21	959	20
„ 1877-97 ...	5,031	194,118	199,149	4,828	203,977	25	951	24

longer or shorter time without being vaccinated. The regulations prescribe that recruits must be vaccinated immediately after their arrival at the regiments; but, before arriving at his regiment the recruit has already passed from 9 to 10 days at

the chief town of the district of recruitment (*distretto di reclutamento*) without being vaccinated.

It is to be considered, too, that a very small number of conscripts escape vaccination, perhaps through arriving late from their country, or through falling ill of some disease which occasions them to be sent to the hospital. These individuals are vaccinated later on the occasion of other general vaccinations or revaccinations. Anyhow this number is very small indeed, almost infinitesimal. Therefore, in calculating the lapse of time during which each individual in the army remains without being vaccinated to be a fortnight, we believe we go further than is necessary. Now, supposing one-third part of the army to be renewed each year, we will see (taking, for the purpose of this calculation, the average strength of the whole period 1877-97) that one-third of the strength (203,977 ÷ 3 = 67,992) remains every year 15 days without being vaccinated, or in other words, that the total days of the not yet vaccinated men in the force amount to 1,019,880 a year. This number, divided by 365 (the number of days in the year), gives an average strength of 2,794 not yet vaccinated in the corps.

Calculating similarly we have:

For the period 1877-81 ... Not vaccinated in the corps ... 2,658
For the period 1882-97 ... Not vaccinated in the corps ... 2,838

TABLE VI.

Recent and Remote Anamnesis.		Average Strength.	Attacked by Small-pox and Varioloid.		Deaths.		Per 10,000 Average Strength.	
			In 16 years.	In average each year.	In 16 years.	In average each year.	Sickness.	Mortality.
Never vaccinated nor variolated in childhood.	Not yet vaccinated in the corps ...	56	26	1.6250	5	0.3125	290.0	55.80
	Vaccinated in the corps without success ...	1,103	20	1.2500	1	0.0625	11.3	0.57
	" " with success ...	2,984	44	2.7500	2	0.1250	9.2	0.42
	Recent anamnesis not stated ...	—	5	0.3125	—	—	—	—
Total... ..		4,143	95	5.9375	8	0.5000	14.3	1.21
Vaccinated or variolated in childhood.	Not yet vaccinated in the corps ...	2,782	188	11.7500	16	1.0000	42.2	3.59
	Vaccinated in the corps without success ...	80,802	550	34.3750	13	0.8125	4.3	0.10
	" " with success ...	119,419	619	38.6875	14	0.8750	3.2	0.07
	Recent anamnesis not stated ...	—	33	2.0625	—	—	—	—
Total... ..		203,003	1,390	86.8750	43	2.6875	4.3	0.13
Remote anamnesis not stated		—	103	6.4375	12	0.7500	—	—
General Total		207,146	1,588	99.2500	63	3.9375	4.8	0.19
Partial Totals according to the recent anamnesis :								
Not yet vaccinated in the corps		2,838	225	14.0625	23	1.4375	49.6	5.07
Vaccinated in the corps without success		81,905	581	36.3125	14	0.8750	4.4	0.11
" " with success		122,403	692	43.2500	17	1.0625	3.5	0.09

TABLE VII.

Recent and Remote Anamnesis.		Average Strength.	Attacked by Small-pox, Varioloid, and Varicella.		Deaths.		Per 10,000 of Average Strength.	
			In 21 years.	In average each year.	In 21 years.	In average each year.	Sickness.	Mortality.
Never vaccinated nor variolated in childhood.	Not yet vaccinated at the corps ...	67	45	2.1429	10	0.4762	319.8	71.07
	Vaccinated at the corps without success ...	1,533	92	4.3810	7	0.3333	28.6	2.17
	" " with success ...	3,228	68	3.2381	3	0.1429	10.0	0.44
	Recent anamnesis not stated ...	—	22	1.0476	1	0.0476	—	—
Total... ..		4,828	227	10.8095	21	1.0000	22.4	2.07
Vaccinated or variolated in childhood.	Not yet vaccinated at the corps ...	2,727	320	15.2381	26	1.2381	55.9	4.54
	Vaccinated at the corps without success ...	88,108	1,375	65.4762	47	2.2381	7.4	0.25
	" " with success ...	108,314	1,050	50.0000	19	0.9048	4.6	0.08
	Recent anamnesis not stated ...	—	68	3.2381	—	—	—	—
Total... ..		199,149	2,813	133.9524	92	4.3810	6.7	0.22
Remote anamnesis not stated		—	257	12.2381	26	1.2381	—	—
General Total		203,977	3,297	157.0000	139	6.6190	7.7	0.32
Partial Totals according to the recent anamnesis :								
Not yet vaccinated at the corps		2,794	379	18.0476	38	1.8095	64.6	6.48
Vaccinated at the corps without success		89,641	1,498	71.3333	56	2.6667	8.0	0.30
" " with success		111,542	1,163	55.3810	23	1.0952	5.0	0.10

Now it remains to know how many, among these unvaccinated in the corps had been vaccinated or variolated in childhood, and how many had been neither vaccinated nor variolated. There is no reason to believe that the rates of these classes among the unvaccinated in the corps will be different from the rates found among all the military men in general, which we have established in the Table No. IV.

Then we have :

	Unvaccinated in the Corps.			
	Never Vaccinated nor Variolated in Childhood or before entering the Service.	Vaccinated.	Variolated.	Total.
Period 1877-81 ...	98	2,454	106	2,658
" 1882-97 ...	56	2,722	60	2,838
" 1877-97 ...	67	2,657	70	2,794

Subtracting these numbers from the total strength of each period, we have :

	Vaccinated in the Corps.			
	Never Vaccinated nor Variolated in Childhood or before entering the Service.	Vaccinated.	Variolated.	Total.
Period 1877-81 ...	7,139	176,455	7,583	191,177
„ 1882-97 ...	4,087	195,931	4,290	204,308
„ 1877-97 ...	4,761	191,461	4,961	201,183

Now, it remains only to be known how many, among all these vaccinated in the corps, have been successfully or unsuccessfully vaccinated. In order to ascertain this we have

only to calculate according to Table No. I the average of the successes obtained in vaccination during the two periods and in each category of remote anamnesis. Thus we have:

Period	Good Successes per 1,000 Vaccinations.		
	Among the Variolated.	Among the Vaccinated.	Among the Never Variolated nor Vaccinated.
Period 1877-81...	379	408	505
1882-97...	525	598	730
1877-97..	491	553	678

If we now apply these proportions to the already established number of variolated, vaccinated, and never vaccinated, we shall have the definitive repartition of the average strength into categories of recent and remote anamnesis, and with their respective combinations, as it results from the following table:

TABLE V.

Categories of Recent Anamnesis.		Remote Anamnesis in Childhood or before entering the Service.				Total average Strength.
		Variolated.	Vaccinated.	Total Variolated and Vaccinated.	Never Variolated nor Vaccinated.	
Period 1877-81.	Not yet vaccinated in the corps	106	2,454	2,560	98	2,658
	Vaccinated in the corps	7,583	176,455	184,038	7,139	191,177
	Without success	4,709	104,461	109,170	3,534	112,704
	With success	2,874	71,994	74,868	3,605	78,473
	Total	7,689	178,909	186,598	7,237	193,835
Period 1882-97.	Not yet vaccinated in the corps	60	2,722	2,782	56	2,838
	Vaccinated in the corps	4,290	195,931	200,221	4,087	204,308
	Without success	2,038	78,764	80,802	1,103	81,905
	With success	2,252	117,167	119,419	2,984	122,403
	Total	4,350	198,653	203,003	4,143	207,146
Period 1877-97.	Not yet vaccinated in the corps	70	2,657	2,727	67	2,794
	Vaccinated in the corps	4,961	191,461	196,422	4,761	201,183
	Without success	2,525	85,583	88,108	1,533	89,641
	With success	2,436	105,878	108,314	3,228	111,542
	Total	5,031	194,118	199,149	4,828	203,977

So that, to know the different receptivity of small-pox according to the different categories of anamnesis, we have only to seek the relation between the figures of the respective average strength, and those of the cases of small-pox given by Table No. III. Let us consider first only the period 1882-97, in which the cases of small-pox and varioloid have been kept separated from those of varicella. (See Table VI, p. 1020.)

These numbers are so significant that any commentary will be superfluous. We will only observe that, if the army were to be exclusively composed—in conformity with the wishes of the antivaccinists—of never vaccinated individuals, we should have, for an average strength of 207,000 men, no fewer than 6,007 small-pox cases per year, and an annual loss of 1,561 by death from small-pox.

But perhaps it may be objected that some of our proportional figures are based upon a too small number of observations. Let us then enlarge the field of our observations, extending it to the whole period 1877-97, though as we have already said, for the first five years varicella was mingled in the statistics with variola and varioloid.

In Table VII, p. 1020, we have mingled together variola and varicella, in order to extend our examination to the whole period 1877-97.

Diagram showing the Different Mortality and Sickness per 10,000 of the Average Strength according to the Remote and Recent Anamnesis.

- A. Never variolated nor vaccinated in childhood, and not yet vaccinated in the corps.
 B. Variolated or vaccinated in childhood, but not yet vaccinated in the corps.
 C. Never variolated nor vaccinated in childhood, and vaccinated in the corps without success.
 D. Never variolated nor vaccinated in childhood, and vaccinated in the corps with success.
 E. Variolated or vaccinated in childhood, and vaccinated in the corps without success.
 F. Variolated or vaccinated in childhood, and vaccinated in the corps with success.

In conclusion, having demonstrated by the very great amount of evidence contained in the military statistics: (1) That small-pox attacks in a very much larger proportion the individuals who have never been vaccinated, and (2) that when it exceptionally attacks the vaccinated individuals it shows a very much smaller severity, we cannot conceive upon what proofs, upon what arguments, a serious scientific opposition to vaccination can be grounded.

REFERENCE.

¹ *Giornale Medico del R. Esercito*, January-February, 1899. ² The duration of service in India is generally three years, for the cavalry only it is four years, for the gendarmerie (*Carabinieri*) five years.

PEMPHIGUS CONTAGIOSUS.

By N. GORDON MUNRO, M.B., C.M. EDIN.,
Yokohama.

In Japan and China, along the whole southern coast line, it may be, of the Asiatic continent, there exists a skin affection of a comparatively trivial nature, but interesting in its close resemblance to pemphigus. This disease has not escaped the notice of Dr. P. Manson, who has given an excellent account of it in *Hygiene and Diseases of Warm Climates*, under the name of "Pemphigus Contagiosus." The Japanese name of this affection is "Tobi-hi" (sparking or leaping fire), a quite appropriate title, as the lesions resemble so closely those of superficial burns.

Pemphigus contagiosus is characterised by the occurrence of one or more bullæ, appearing simultaneously or in succession, and spreading by contagion from one part of the skin to another, or from person to person. Each bulla is preceded by a spot of hyperæmia which marks the site of the coming vesicle, and spreads with the development of the latter as a thin areola, or surrounding circle, sometimes not very evident. This spot of hyperæmia is usually the seat of a slight, rarely severe, itching, burning, or stinging sensation, which decreases with the advent of the vesicle, although it may return at a later stage, when the collapse of the vesicle brings the superficial and deep layers of the epidermis into contact. Each vesicle or bulla contains a clear fluid with a few cells from the stratum granulosum, leucocytes, and a micrococcus.

It can scarcely be doubted that this micrococcus, which was noticed by Manson, is the specific cause of the disease, and