ON THE
EFFECTS OF TWELVE WEEKS' RESIDENCE
IN
B U L G A R I A
(DURING THE MONTHS OF JUNE, JULY, AND AUGUST, 1854)
ON THE SUBSEQUENT HEALTH OF THE
BRITISH TROOPS IN THE CRIMEA.

BY
WILLIAM AITKEN, M.D. EDIN.
CORRESPONDING MEMBER OF THE IMPERIAL NATURAL HISTORY SOCIETY OF
DRESDEN; AND OF THE ROYAL IMPERIAL SOCIETY OF PHYSICIANS
OF VIENNA; FORMERLY DEMONSTRATOR OF ANATOMY IN
THE UNIVERSITY OF GLASGOW; AND LATE
PATHOLOGIST AT SCUTARI.

COMMUNICATED BY

DR. JENNER.

Received April 16th.—Read June 9th, 1857.

It may perhaps be presumed that the inquiries regarding the causes which led to the great losses by disease amongst the troops in the Crimea during the first seven months of the campaign there, have fully attained the object for which they were instituted.

But notwithstanding all that has been written about this

eventful period, some elements of causation in the induction of disease amongst the troops of the allied armies have been entirely overlooked, disregarded, and lost sight of throughout the inquiries into the nature and origin of the sickness and diseases of the soldiers in the Crimea.

One cause, to which I would particularly allude, may be characterised as "*the persistent pernicious influence of the residence in Bulgaria upon the health of the ex-Bulgarian portion of the Crimean army.*"

There are three remarkable periods into which the medical history of the late Russian war may be divided.

1. The period of the residence in Bulgaria from about the end of June, 1854, till September of that year.

2. The period of the first seven months' occupation of the Crimea in the camp before Sebastopol, during which the losses sustained by the allied troops from disease alone, have not been surpassed by any army in the history of the world.

3. The period after April, 1855, characterised by a gradual return of the army to a state of health and efficiency equally unsurpassed. It is entirely due to the laborious exertions of Sir John McNeill and Sir Alexander Tulloch that we are indebted for precise information regarding the causes of the unprecedented losses to the strength of the army which took place during the first seven months of the campaign in the Crimea.

They have shown, in the clearest possible manner, how these losses are attributable to the combined influence of several causes, namely :

- (1.) The influence of circumstances inherent to warfare, and especially the excessive amount of duty performed by men, few in number and inadequate in strength.

- (2.) The influence of departmental deficiency, to which the great privations of the troops were in a great measure due.

- (3.) The pernicious endemic influences of certain localities in the Crimea in which bodies of men were encamped.

It is now my object to show that the inactive residence in Bulgaria during three months exercised a persistent pernicious influence upon the health of the troops in the Crimea; and which continued to make itself felt, more or less, throughout the campaign, but more especially during the first seven months; nay, it may even now be doubted whether many who passed through the campaign in Bulgaria are as well able to resist disease and sickness as their constitutions were wont to do.

It is known, from the evidence of Dr. Mapleton, in 'Parliamentary Paper' No. 247, p. 253, for 1855, that the general health of the troops in Bulgaria may be described as "sickly." They were "using up" while there. An estimated per centage of illness or sickness of the army during their twelve weeks' residence in that district cannot be stated. Many men were weak and ill, and lost flesh rapidly, though they were not under medical care in hospital; and when asked as to their health, they could not definitely say what ailed them. The troops were depressed in spirits from inaction, and were terror-stricken from the suddenness and fatality of the attacks of disease. Long drills, combined with bad and unwholesome tents, great heat during the day, followed by cold and dewy nights, fogs, morning and evening mists from paludal districts, great range of temperature, sour brown bread, and ill-assorted food, contributed to "use up" the strength of the men, and to put the army into that very unsatisfactory state in which it was previous to the embarkation for the Crimea. Physicians will at once recognise that the condition of the men here described corresponds to that state of *anæmia* to which Vogel gives the name of *malaria-chlorosis*. The men were in a very bad state when they marched from the various camps to embark at Varna. They were so weak, that they could not and did not march more than between four and five miles a day, and it was as much as they could do to carry their necessaries, and some required to have their knapsacks and arms carried for them.

The immediate consequences of this may be read in the

losses sustained during the first *twenty-two* days' marching in the Crimea, when the famous "flank movement" was effected. During this short time the strength of the British army was diminished by about 5053 men, of whom 353 were killed at Alma, 1867 were wounded there, 2237 were sent sick to Scutari; and the loss on the "flank march" alone is estimated at about 596 men.

The future persistent pernicious influence of the Bulgarian residence it is now my object more fully to illustrate.

The sources of our information relative to the topics about to be noticed are chiefly contained in—

1. Parliamentary paper (No. 42) of the session 1857, which contains, amongst other information, the dates of the arrival in the East of each regiment, together with its original strength on joining the allied army.

2. Parliamentary paper No. 218 of session 1855, pp. 474—479, shows what drafts were sent out to recruit the different regiments in the Crimea, the amount of the draft, and the period of its arrival in the Crimea.

3. It is known from several sources what were the respective regiments which served in Bulgaria, *e. g.*, Parliamentary papers 218—242, and Russell's 'War.'

4. The general abstract of sickness and mortality appended to the volume published by Colonel Sir Alexander Tulloch, entitled, 'The Crimean Commission and the Chelsea Board.'

It is necessary, in the first place, to classify the Crimean army into two parts, namely:

1. Into the troops which served both in Bulgaria and in the Crimea, and which may be called the *ex-Bulgarian* part of the army.

2. Into the troops which served in the Crimea only, and which may be simply termed the *Crimean* troops.

In thus considering the sanitary condition of the British

army in the the Crimea, as influenced especially by *the residence in Bulgaria*, I offer the following results, merely as *approximative* conclusions to the truth, from data not sufficiently extensive to give such conclusions with absolute accuracy. The topics, however, are of such importance, that in all future pathological inquiries regarding the nature of the diseases from which our troops suffered, not only in the camp before Sebastopol, but also at Scutari, and other local hospitals, the influences of which I now write must occupy a prominent place in the causes of sickness, mortality, and general loss of strength—a place, however, which has not as yet been distinctly assigned to them. The great comparative loss which appears to have been sustained by the drafts especially requires investigation; but unless we are put in possession of the ages of the recruits sent out, their number and periods of service, their admissions to hospital, deaths, and invaliding, as distinct from the other troops, their comparative numerical losses cannot be accurately determined.

The comparative reduction in the strength of each portion of the army could only be inferred (1) by comparing the actual deaths in each, and the ratio of these to the admissions and to the original strength; (2) by comparing the ratio of deaths and invaliding to the admissions, and to the original strength of each of the two divisions of the army; (3) by comparing the per centage of drafts required to recruit the strength of the troops in each of the two divisions of the army.

In attempting approximatively to ascertain the results yielded by such comparisons, there is an evident source of fallacy which cannot, with the existing data, be eliminated; for although the numerical returns of the drafts and the losses of different regiments might be arithmetically dealt with as bodies of men, yet there are no data by which the individual soldiers constituting the drafts, (and consequently holding the same position as the Crimean troops,) could be separated from those in the same regiments who belong to the ex-Bulgarian class. A fallacy, therefore, is involved in the fact, that if A, B, C, and D, represent ex-Bulgarian

soldiers, and if *a*, *b*, *c*, and *d* were the drafts who joined them in the Crimea, the numerical losses of the whole during the period being *four* men, there is no evidence to show whether these *four* men were ex-Bulgarian (A, B, C, D), or Crimean soldiers (*a*, *b*, *c*, *d*.)

The following observations, therefore, merely illustrate the question, considered in a *nosological* point of view, and the evidence is thus far of a circumstantial nature only.

The following are the more important particulars which the tables appended to this paper illustrate, and which demonstrate, to a certain extent, the influence of the residence in Bulgaria as a cause of disease.

A.—TABULAR STATEMENTS TO SHOW THE INFLUENCE OF
THE BULGARIAN RESIDENCE ON THE GENERAL
HEALTH OF THE TROOPS.

Diseases.	EX-BULGARIAN FORCES.			CRIMEAN FORCES.		
	Total admissions from all diseases.	Ratio per cent. to the total admissions from all diseases.	Ratio per cent. to average strength (14959). ¹	Total admissions from all diseases.	Ratio per cent. to the total admissions from all diseases.	Ratio per cent. to average strength (8880). ¹
Fevers	6179	24·2	41·3	2780	16·2	31·2
Cholera	1007	3·9	6·6	872	5·2	9·8
Scorbutic diseases ..	1294	5·0	8·6	540	3·2	6·1
Enteric diseases ...	11098	43·1	74·1	7750	46·8	86·1
Frostbite	1034	4·0	6·9	810	4·9	9·0
Pulmonary diseases	1887	7·4	12·7	1110	6·7	12·5
Other diseases	2960	11·6	19·1	2671	16·1	30·0
Total, exclusive of wounds and injuries. }	25459	...	169·3	16533	...	184·7

When we take the total numbers of admissions and

¹ This average strength is the sum total of the average strengths of each regiment as given by Sir Alexander Tulloch. See tables at the end of this paper.

average strength to estimate the ratio per cent. of admissions to average strength, it is found that the "Crimean" portion of the army suffered a greater loss of strength by *admissions to the hospital* than the ex-Bulgarian troops did by 16 per cent.; the numbers being 170 per cent. of admissions in the ex-Bulgarian troops, and 185 per cent. of admissions among the Crimean troops; and the following is a tabular view of the diseases which prevailed in each of the two portions of the army, arranged in the order of their greatest ratio to the whole admissions.

EX-BULGARIAN.		CRIMEAN.	
	Per centage on total admissions from all diseases.		Per centage to whole admissions.
Enteric diseases . . .	43·1	Enteric diseases . . .	46·8
Fevers . . .	24·2	Fevers . . .	16·2
Pulmonary diseases . .	7·4	Pulmonary diseases . .	6·7
Scorbutic diseases . .	5·0	Cholera . . .	5·2
Frostbite . . .	4·0	Scorbutus . . .	5·2
Cholera . . .	3·9	Frostbite . . .	4·9

But while the admissions to hospital were so much greater amongst the Crimean portion of the army, the deaths per cent. on these admissions were very much greater amongst the ex-Bulgarian part, as shown in the following table :

Deaths per cent. on total admissions from each disease :

EX-BULGARIAN.		CRIMEAN.	
Fevers . . .	23·3	Fevers . . .	17·2
Cholera . . .	63·5	Cholera . . .	53·5
Scorbutus . . .	11·3	Scorbutus . . .	8·0
Enteric diseases . . .	24·2	Enteric diseases . . .	17·7
Frostbite . . .	25·4	Frostbite . . .	16·3
Pulmonary . . .	11·0	Pulmonary . . .	7·4
Wounds and Injuries .	19·1	Wounds and Injuries .	13·7

When we contrast the sanitary state of these two divisions of the army by means of the foregoing tables, the following general statement may be made :

1. That the admissions were greater amongst the *Crimean* portion of the army than amongst the ex-Bulgarian, and the

excesses were chiefly due to enteric diseases, scorbutic diseases, and cholera; while the excess of admissions from the *ex-Bulgarian* portion were chiefly due to fevers and pulmonary diseases compared with the other (Crimean) portion of the army.

2. That while the admissions were greater from the *Crimean* portion, the mortality compared with the amount of admissions was much greater amongst the *ex-Bulgarian* portion of the army than amongst the *Crimean*. The greater ratio of mortality chiefly arose from (1) cholera, (2) frostbite, (3) enteric diseases, and (4) fevers amongst the *ex-Bulgarian* part.

Some interesting features in these antithetical conditions may be noticed in the history of fever and cholera amongst the troops.

In the case of fevers, the difference in the whole admissions was 8 per cent., being so much more in the *ex-Bulgarian* troops than in the *Crimean*.

When it is considered that about 3·3 per cent. is the usual average of fever patients admitted into hospitals in large cities, such as London (*e. g.* Guy's), it is at once made obvious how prevalent were fevers in the Crimea, and especially among the *ex-Bulgarian* part of the army. The admissions for fever in the Crimea being 24·2 per cent. amongst the *ex-Bulgarian* troops, and 16·2 per cent. amongst the others, compared with the total admissions for all other diseases.

The pernicious influence of the residence in Bulgaria on the constitution of the soldier cannot be more clearly demonstrated than by those facts which show how readily that portion of the army succumbed. They were "used up" when they left Bulgaria; they were less able to cope with disease, and more of them died.

To demonstrate these statements, and illustrate more fully the antithetical conditions already adverted to, it is necessary to consider the classes of diseases one by one.

1. *Of the Fevers.*¹

	Ex-Bulgarian troops. Average strength 14,959.	Crimean troops. Average strength 8880.
Total admissions to hospital in Crimea.....	6179	2780
„ deaths in the Crimea.....	919	294
„ deaths at Scutari or elsewhere.....	531	186
„ Invalided to England	242	159
Admissions per cent. on average strength.....	41·3	31·2
Deaths per cent. on average strength :		
Crimea, 6·1; Scutari, 3·6 (ex-Bulgarian force) }	9·7	5·3
„ 3·3; „ 2·0 (Crimean force) }		
Deaths per cent. on total admissions :		
Crimea, 14·7; Scutari, 8·6 (ex-Bulgarian) ... }	23·3	17·2
„ 10·5; „ 6·7 (Crimean)		
Invalided per cent. on average strength	1·6	1·5
„ „ „ total admissions	3·9	5·0

The summary here given shows, that in fevers the admissions were greater in the *ex-Bulgarian* regiments by 10 per cent., calculated on the total strength of the troops; while the deaths per cent. were nearly doubled compared with the *Crimean* portion of the army, and calculated on the strength of each.

With regard to the rate of mortality amongst the total cases of fever admitted, the deaths per cent. were more amongst the *ex-Bulgarian* force by 6·1 per cent.; the ratio of mortality being 23·3 per cent. amongst them, while it was only 17·2 amongst the *Crimean* troops. For the sake of comparison, it may be noticed that in civil hospitals of large towns, such as in London, for example, Guy's, the average ratio of mortality from fever, over the admissions for that species of disease, is about 10·3 per cent. On looking to the numbers invalided, comparatively fewer appear to have been left among the *ex-Bulgarian* troops to be able to avail themselves of this source of escape from sufferings; for the numbers invalided from *fever* amongst

¹ See Appendix, Tables I and II.

the *Crimean* portion of the army was greater than in the *ex-Bulgarian* force by 3 per cent.

2. Cholera.¹

	Ex-Bulgarian strength 14,959.	Crimean strength 8880.
Total admissions to hospitals in Crimea	1007	872
„ deaths in the Crimea	623	467
„ deaths at Scutari or elsewhere.....	28	5
Admissions per cent. on average strength.....	6·6	9·8
Deaths per cent. on average strength	4·1	5·2
Deaths per cent. on admissions: Crimea, 61·8; Scutari, 1·7 (ex-Bulgarian) ... }	63·5	53·5

It is interesting to notice, with regard to cholera, the similarity of pathological phenomena presented by the history of this disease in Bulgaria and in the Crimea, compared with its known phenomena as an epidemic. Up to and including the period now under consideration, two separate epidemics may be said to have affected the army. The *ex-Bulgarian* campaigners were exposed to both of them. During the first epidemic, while in Bulgaria, they suffered severely, and indeed so long as they remained in the vicinity of Varna the disease never left their camps. They carried it with them to the Crimea, and it continued to seize upon and to kill many victims on the march from Old Fort to Balaclava, and more especially after the Battle of the Alma, and on the famous Flank March, when the fate of the more feeble soldiers was at once sealed by death.²

During the Crimean epidemic of cholera the statistics present a remarkable antithesis to those of the other classes of diseases, more especially in the following details:

1. The per centage of admissions on the average strength of the *troops serving in the Crimea* only was much greater

¹ See Appendix, Tables I and II.

² See 'Glasgow Medical Journal' for April, 1857, for an account of the loss on the "Flank March."

than the ratio of admissions amongst the *ex-Bulgarian* troops; and the per centage of deaths from cholera, calculated on the strength of the troops, was also *greater* amongst the former than amongst the latter.

2. But the per centage of deaths, calculated on and compared with the admissions, was *greater* amongst the *ex-Bulgarian* forces by 8·3 per cent. than amongst the Crimean troops.

With regard to the first of these statements, it may be observed that, according to what we know regarding the nature of this remarkable disease, an explanation may exist in the circumstance, that already, during the Bulgarian campaign, the more susceptible of the troops had been seized by the disease, and many had already died. The disease, to use a common expression, "had worked itself out upon them." Fewer, therefore, were in a condition to take the disease, subsequently, amongst the *ex-Bulgarian* troops in the Crimea, and, therefore, fewer of this part of the army died in the Crimea from cholera.

On the other hand, again, with regard to the second of these antithetical statements, it may be observed, that, on account of the "used up" condition of the *ex-Bulgarian* troops, a much larger per centage died amongst them, of those who were attacked, than amongst those who were attacked amongst the *Crimean* troops.

3. *Scorbutic diseases.*¹

	Ex-Bulgarian strength 14959.	Crimean strength 8880.
Total admissions to hospital in Crimea	1294	540
„ deaths in the Crimea	106	28
„ „ at Scutari or elsewhere	42	16
„ „ invalided to England	32	18
Admissions per cent. on average strength.....	8·6	6·1
Deaths per cent. on total admissions:		
Crimea, 8·2; Scutari, 3·1 (<i>ex-Bulgarian</i>)	11·3	8·0
„ 5·1; „ 2·9 (<i>Crimean</i>)		
Invalided per cent. on admissions	2·5	3·3

¹ See Appendix, Tables I and II.

With regard to the scorbutic diseases it can very readily be understood, from the nature of this species of disease, how the "used up" condition of the *ex-Bulgarian* troops predisposed to the scorbutic state in the Crimea; and accordingly, it is seen, from the above summary, that amongst them the admissions per cent. in the Crimea, on the average strength, were greater by 2·5 per cent., and the deaths greater by 5·3 per cent. than amongst the Crimean troops.

4. *Enteric diseases.*¹

	Ex-Bulgarian strength 14,959.	Crimean strength 8880.
Total admissions to hospital in Crimea	11098	7750
" deaths in the Crimea	1057	686
" deaths at Scutari or elsewhere.....	1648	690
" invalided to England	384	211
Admissions per cent. on average strength.....	74·1	86·1
Deaths per cent. on average strength:		
Crimea, 7·0; Scutari, 11·0 (ex-Bulgarian) ...	18·0	15·4
" 7·7; " 7·7 (Crimean)		
Deaths per cent. on total admissions:		
Crimea, 9·5; Scutari, 14·7 (ex-Bulgarian) ...	24·2	17·7
" 8·8; " 8·9 (Crimean)		
Invalided per cent. on average strength	2·5	2·3
" " on admissions	3·4	2·5

Very nearly the same antithetical statements may be made regarding the enteric affections, amongst the two divisions of the army, as have been made regarding cholera, the *ex-Bulgarian* troops being in a predicament similar as to both. The susceptibility to these diseases had been already well-nigh exhausted in Bulgaria, and accordingly it is observed that more were admitted amongst the new comers to the Crimea for diseases of the *stomach* and *bowels* than amongst the old campaigners of Bulgaria. The ratio of mortality also, both on admissions and on strength, was greater amongst the *ex-Bulgarian* troops.

¹ See Appendix, Tables I and II.

One remarkable feature in the history of this class of diseases is the great mortality which attended them at Scutari, the ratio being 23·6 per cent. at Scutari against 18·3 per cent. in the Crimea. Such facts tend to confirm the belief entertained by not a few, that not only were the diseases prolonged and tedious at Scutari, but that Scutari, not only from such results but also from its physical climate, as I have elsewhere attempted to show,¹ was a very unfavorable place for convalescence, and never ought to have been selected as the head-quarters of our large hospitals.

5. *Frostbite.*

	Ex-Bulgarian strength 14,969.	Crimean/ strength 8880.
Total admissions to hospital in Crimea	1034	810
" deaths in the Crimea	82	34
" deaths at Scutari or elsewhere	184	99
" invalided to England	73	51
Admissions per cent. on average strength	6·9	9·0
Deaths per cent. on average strength	1·2	1·1
Deaths per cent. on admissions :		
Crimea, 7·8 ; Scutari, 17·6 (ex-Bulgarian) ... }	25·4	16·3
" 4·1 ; " 12·2 (Crimean)		
Invalided per cent. on admissions	7·8	6·6

Of the sufferings of the troops from frostbite, it is to be observed, that more were admitted to hospital amongst the soldiers *who served in the Crimea* only than from amongst the *ex-Bulgarian* campaigners ; but that the per centage of deaths amongst this *latter* class of troops was very much greater than amongst the *former*, namely, 25·4 against 16·3, being a greater ratio of mortality by 9·1 per cent.

With regard to Scutari, the history of the cases of frostbite furnish additional facts in illustration of what I have already alluded to in the preceding paragraph, namely, that

¹ 'Glasgow Medical Journal,' April, 1857.

² See Appendix, Tables I and II.

the ultimate sufferings of the troops, from this class of diseases, treated at Scutari, were of the most prolonged and tedious kind. When, therefore, such facts are connected with an observation made by Sir Alex. Tulloch, to the effect that—"it was only by degrees that the small proportion who returned, of those who had left the Crimea sick, awakened a suspicion of the fatal character of the disease, and the extent to which the constitution of the troops had suffered by the hardships and privations they had undergone."¹ No other conclusion can possibly be arrived at than that Scutari was unfavorable for convalescence, and an unfit place for the treatment of such large numbers of our sick. I do not wish it to be understood for a moment that the physical climate of Scutari induced of itself diseases there; but that the nature of the climate, the local positions of the hospitals, their sanitary condition, especially as to drainage and overcrowding or even occupation of the corridors, all combined to develop diseases there (such as typhus fevers) and to maintain their existence when imported.

6. *Pulmonary Diseases.*²

	Ex-Bulgarian strength 14,959.	Crimean strength 8880.
Total admissions to hospitals in Crimea	1887	1110
„ deaths in the Crimea	126	55
„ „ at Scutari or elsewhere.....	94	38
„ invalided to England	172	72
Admissions per cent. on average strength.....	12·7	12·5
Deaths per cent. on admissions :		
Crimea, 6·1 ; Scutari, 4·9 (ex-Bulgarian)	11·0	7·4
„ 4·0 ; „ 3·4 (Crimean).....		
Invalided per cent. to England	9·0	6·4

The ratio of admissions for this class of affections was nearly the same in both divisions into which I have divided

¹ Tulloch, l. c., p. 150.

² See Appendix, Tables I and II.

the army of the East; but the deaths amongst the *ex-Bulgarian* troops were greater, by nearly 4 per cent., than amongst the *Crimean* forces; and the numbers invalided to England were also greater amongst the former than amongst the latter by 4·6 per cent.

The nature of these pulmonary affections I have not been able to ascertain; and it would, no doubt, be of interest to know how far any of them were purely idiopathic, and how far a tendency to tuberculosis had been engendered, or had sustained a stimulus to development, by the *Crimean* or *Bulgarian* campaigns.

7. "Other Diseases."¹

	Ex-Bulgarian strength 14,969.	Crimean strength 8880.
Total admissions to hospital in Crimea	2960	2671
" deaths in the Crimea	111	74
" " at Scutari or elsewhere.....	132	62
" invalided to England	365	164
Admissions per cent. on average strength.....	19·1	30·0
Deaths per cent. on admissions:		
Crimea, 3·7; Scutari, 4·4 (ex-Bulgarian)	8·1	5·0
" 2·7; " 2·3 (Crimean).....		
Invalided per cent. on strength	12·3	6·1

This last class, under which a very great variety of diseases are brought together, on account of the antiquated nosological classification employed by the Army Medical Department, seems to show, in the same way as most of the others have done, the "used up" condition of the *ex-Bulgarian* troops, but the details are not sufficient to found any other definite observations upon.

It is obvious that this inquiry regarding the diseases of the *ex-Bulgarian* forces, especially, might be pushed much further in many directions, did time permit, and if material could be got for doing so; and, perhaps, not a more interesting

¹ See Appendix, Tables I and II.

investigation could be prosecuted than that which would attempt to determine the extent of the period of latency of some of the diseases. On the return of our troops from Walcheren, it is known that fresh cases of fever continued to occur as late as five, six, eight, nine, and even ten months afterwards, so that the persistent pernicious influence of the Bulgarian campaign is not without a parallel. M. Boudin also quotes some remarkable instances in which the influence of a previous residence is felt after removal from a paludal district. Towards the end of April, 1843, the 69th regiment of French infantry arrived at Versailles from the citadel of Strasburg, the focus of a marshy district, where it had been quartered for two years. For more than a year afterwards this regiment continued to fill the hospital with intermittents, the disease attacking even those who remained free from it all the time they were at Strasburg.¹ It is known, also, that the late Director-general, Sir James Macgreggor, never counted upon men who had been long exposed to such influences in estimating the strength of the army during the Peninsular war.

B.—INFLUENCE OF THE RESIDENCE IN BULGARIA ON THE SURGERY OF THE WAR.²

Results of Wounds and Injuries.	Ex-Bulgarian regiments.	Crimean regiments.
Deaths per cent. on the total admissions : Crimea, 9·1 ; Scutari, 10·0 (ex-Bulgarian) ... } " 8·6 ; " 5·1 (Crimean) }	19·1	13·7
Invalided per cent. on the admissions	45·1	20·4

The numerical statement here given shows still further the persistent pernicious influence of the residence in

¹ 'Etudes de Géologie Médicale sur la Phthisie Pulmonaire et la Fièvre Typhoïde, dans leur Rapports avec les Localités Marécageuses,' &c., par S. Ch. Boudin, Paris, 1845.

² See Appendix, Tables I and II.

Bulgaria upon the troops, by the comparative results of the surgery of the war.

It will be observed that the ratios of the deaths, per cent., in the Crimea and at Scutari, on the total admissions for wounds and injuries, were 19·1 per cent. amongst the *ex-Bulgarian* troops, and 13·7 per cent. amongst those who had served in the *Crimea* only. It may be here also noticed, for the sake of comparison, that amongst surgical patients in large city hospitals, such as Guy's, in London, the ratio of the deaths to the total surgical admissions is 11 per cent.; a statement which puts in a very favorable light the surgical results, on the whole, of the surgery in the Crimea.

With regard to Scutari, it is to be noticed, in this instance, that the per centage of deaths was also much greater here than in the Crimea.

The ratio of the numbers who were invalided amongst the *ex-Bulgarian* troops for wounds and injuries was nearly double those in the *Crimean* portion of the army, a statement which is of general application to all classes of the diseases already noticed.

General circumstantial evidence.—It may, perhaps, be contended, that the necessary operations of warfare bore with an undue influence on some portions of the army of the East rather than on others, so as to render less clear the effects of the Bulgarian residence upon the troops. It will be seen, however, from Colonel Tulloch's summary, that the brunt of the more severe duties of the front were chiefly sustained by that portion of the army which had been in the Crimea only, namely, the 14th, 18th, 39th, 71st, 17th, 34th, 89th and 90th regiments, in which, as also in the Highland Brigade, the mortality was as high as 45 per cent. for the whole period. So far, therefore, such a statement renders the pernicious influence of the Bulgarian campaign *à fortiori* more obvious.

We may also fairly set any partial advantage from short periods of service peculiar to some of the Crimean troops against any severe losses incident to service in the front.

Comparatively short periods of service were incident to the 14th, 18th, 39th, and 71st, who did not arrive till January, thereby escaping one severe outbreak of cholera and much of the suffering from scurvy and frost-bite. So also the 17th, 34th, 89th, and 90th regiments did not arrive till December, two of them well clothed, and thus far enjoying comparatively greater sanitary advantages.

It cannot, therefore, be said that the mortality amongst the *ex-Bulgarian* troops was in any way increased by the more severe and necessary operations of war during the siege, compared with the others. On the contrary, it is observed by Sir Alex. Tulloch, that "great as was the loss amongst the corps in front, it was much below what some of the corps suffered, especially the following, in which the mortality greatly exceeded the average."¹ These unfortunate regiments were the 46th, 95th, 63d, 33d, 23d, 44th, 28th, and 50th. The loss in these eight corps averaged 73 per cent. during the seven months.¹

Now it is worthy of notice that *six* out of these *eight* regiments are *ex-Bulgarian* troops, and with the exception of the 46th, whose great loss appears to have been from cholera immediately after their arrival, the cause of the great mortality amongst the other regiments is not attempted to be accounted for. On looking carefully into the general *nosological* summary which Sir Alexander Tulloch gives, in a tabular form, it will be seen that *fevers*, *enteric diseases*, and *scorbutic diseases*, are those which swell the numbers on the lists of these regiments. The malarious influences imbibed in Bulgaria no doubt developed themselves by a zymotic-like action under the melancholy state of things which Sir Alexander Tulloch and Sir John M'Niell so energetically and boldly brought to light.

The subsequent history of the *ex-Bulgarian* troops in the Crimea very fully illustrates and substantiates a general remark made by Sir Alexander Tulloch, that "a distinction

¹ Tulloch, l. c., p. 158.

was manifested in favour of particular parts of the force, with reference to immunity from disease," and which he justly describes as due, principally, to the diminished intensity of the diseases, or to the greater strength of the constitution to resist their effects." The diminished intensity or less susceptibility to disease is manifest in the greater exemption from cholera amongst the *ex-Bulgarian* troops in consequence of their having already passed through a severe epidemic of it; while the greater strength of constitution to resist the effects of disease is exemplified by those troops who were in the Crimea only, as well in regard to cholera as to other diseases. "The diseases made their appearance in all in a greater or less degree, but were less fatal wherever the strength of the patients had not been materially impaired previous to the attack, or a moderate degree of rest, comfort, and improved diet could be obtained."¹

These additional and important elements in the causation of sickness, disease, and mortality amongst the troops in the Crimea, to which I have attempted to direct attention and to illustrate, do not invalidate the general conclusion at which Sir Alexander Tulloch arrives, when he says that most of the causes "appeared capable at least of mitigation;" nay, more, I think that of all the causes which were suffered to operate to the injury of our brave soldiers, the residence in Bulgaria ought to have been avoided; and that under a proper sanitary police to control in some measure the encampments of the army, such a potent cause of sickness, disease, and mortality never ought to have existed.

From these details I think it is very clearly apparent that the long inactive residence in Bulgaria constituted a very prominent element of causation in the induction of disease in the Crimea; and that its influence long continued to be felt as an influence of a most persistent and pernicious kind, although it is well known that while in

¹ Tulloch's 'Summary,' p. 160.

Bulgaria many could not say they suffered from any well-defined disease to which a name could be given. They became, however, the subjects of impaired health, which showed itself by imperfect digestion, flatulence, diarrhœa, loss of muscular strength, sallow looks, morbid susceptibility to external impressions of cold or heat, with night sweats, loaded turbid urine, and an unhealthy state of the cutaneous and mucous circulation, but without any manifest local disease—a form of anæmia to which Vogel has given the name of *malaria-chlorosis*. Such a condition frequently came under my own observation while at Scutari, and although in such cases an apparent restoration to health is effected, yet the constitution is so impaired, that the application of any external cause, such as wet, cold, privation, or fatigue, at once brings about the development of some zymotic disease, such as fevers, dysentery, diarrhœa, cholera, scorbutus. Abundant examples of such-like results are constantly to be observed in the Lower Alps, in the Roman territory and Maremma of Italy, the Carolinas and Virginia of North America, the great district of the Sunderbund near Calcutta, as well as many other similar localities, some of which have been particularly noticed. “A glance at the inhabitants of malarious countries or districts,” writes Dr. James Johnson, “shows that the range of disorders produced by the poison of malaria is very extensive. The jaundiced complexion, the stunted growth, the stupid countenance, the shortened life, attest that habitual exposure to malaria saps the energy of every mental and bodily function, and drags its victim to an early grave. Fever and ague, though two of the most prominent features of malarious influences, are as a drop of water in the ocean when compared with the other less obtrusive, but more dangerous maladies, that silently but effectually disorganize the vital structures of the human fabric under the operation of the deleterious and invisible poison.

“What are the consequences? Malarious fevers; or, if these are escaped, the foundation of chronic malarious disorders is laid in ample provision for future misery and suf-

fering. Compare the range of human existence, as founded on the decrement of human life in Italy and in England. In Rome a *twenty-fifth* part of the population pays the debt of nature annually. In Naples a *twenty-eighth* part dies. In London only *one* in *forty*, and in England generally only one in *sixty* falls before the scythe of time, or the ravages of disease."

Besides the prolonged residence in Bulgaria, it is now well known that other circumstances contributed in a very material degree to bring about the sickness and mortality amongst the British troops in the East during the Russian war. These have been already noticed. They were brought to light and demonstrated with the greatest possible clearness by Sir Alexander Tulloch, more especially in the recent publication to which I have frequently referred, and in which he gives a summary of information collected by Sir John M'Niell and himself relative to the sickness, mortality, and prevailing diseases among the troops serving in the Crimea. The information contained in this summary might very justly stamp Sir Alexander Tulloch as the pathologist of the war; and if his valuable researches into the state of the individual regiments had not been made, I could not have traced the influence of the residence in Bulgaria with anything like the precision necessary for such important inquiries; although I was well convinced, from many observations I made at Scutari, that the residence in Bulgaria was making itself felt, even at that remote period; but I had not the means to substantiate that impression, till the combined researches of Sir Alexander Tulloch, with the statements emanating from the War Office, and other documents of a public and official kind, all of which I have distinctly referred to, put us in possession of the necessary data upon which to found those conclusions which I have had the honour, through the kindness of Dr. Jenner, to communicate to the Society.

APPENDIX.—TABLE I.

Sickness and Mortality amongst the Ex-Bulgarian Force in the Crimea.

Number of Ex-Bulgarian Foot Regiments of the Line.	Average strength during the period.	FEVERS.				CHOLERA.			SCORBUTIC DISEASES.				ENTERIC DISEASES.				FROST-BITE.				PULMONARY DISEASES.				ALL OTHER DISEASES.				WOUNDS AND INJURIES.			
		Admitted into Hospital in the Crimea.	Died in the Crimea.	Died at Scutari.	Invalided to England.	Admitted into Hospital in the Crimea.	Died in the Crimea.	Died at Scutari.	Admitted into Hospital in the Crimea.	Died in the Crimea.	Died at Scutari.	Invalided to England.	Admitted into Hospital in the Crimea.	Died in the Crimea.	Died at Scutari.	Invalided to England.	Admitted into Hospital in the Crimea.	Died in the Crimea.	Died at Scutari.	Invalided to England.	Admitted into Hospital in the Crimea.	Died in the Crimea.	Died at Scutari.	Invalided to England.	Admitted into Hospital in the Crimea.	Died in the Crimea.	Died at Scutari.	Invalided to England.	Admitted into Hospital in the Crimea.	Died in the Crimea.	Died at Scutari.	Invalided to England.
30th	522	135	31	20	11	19	9	2	98	7	1	—	387	21	43	12	10	1	2	3	45	—	5	10	82	1	3	7	158	38	17	56
55th	695	236	17	23	12	32	15	—	34	4	2	2	710	15	50	15	23	—	4	1	147	3	5	4	156	1	5	11	124	6	7	55
95th	417	337	67	32	10	17	15	1	33	4	2	—	538	80	83	9	32	8	9	2	52	5	2	5	101	7	7	6	140	13	19	82
41st	684	313	53	23	6	7	6	—	54	—	4	1	354	24	43	8	48	4	4	2	206	6	7	7	161	2	3	6	180	9	10	51
49th	655	236	21	18	8	19	9	1	34	3	1	1	324	14	49	6	29	4	—	—	159	8	2	3	97	6	7	6	173	1	12	62
4th	508	366	24	25	7	34	23	1	33	2	1	—	397	30	57	13	47	3	4	1	70	7	—	8	56	2	5	14	41	5	2	3
50th	520	375	89	20	13	68	45	—	54	3	2	—	209	67	53	25	98	—	9	7	34	6	1	7	122	9	4	14	73	12	7	18
28th	522	389	67	17	16	38	28	1	47	8	2	1	459	51	58	18	20	2	13	2	75	4	3	9	145	8	4	21	39	7	3	10
38th	689	342	102	25	7	38	20	1	141	—	4	10	764	9	70	15	81	—	5	3	109	6	8	7	181	2	3	20	72	10	2	11
44th	598	532	97	25	8	58	41	—	32	2	1	1	267	44	58	9	19	3	10	2	56	11	6	6	129	2	8	30	47	7	4	9
Rifle Brigade	601	110	7	54	22	10	10	2	99	8	2	3	674	70	158	37	33	—	19	5	51	5	9	15	165	3	16	27	169	18	21	67
42d	704	120	8	9	6	55	37	—	23	—	—	—	359	18	31	6	9	—	2	—	77	4	2	3	107	4	3	7	25	1	4	8
79th	714	436	72	12	5	83	37	3	73	10	3	—	191	10	39	11	3	—	1	—	45	9	3	7	63	—	2	12	15	—	2	5
93d	727	277	42	9	9	22	12	—	73	20	—	—	224	14	32	14	—	—	1	—	115	9	2	6	89	8	5	11	20	—	4	21
Rifle Brigade	641	202	6	—	—	40	21	—	29	3	—	—	623	8	—	—	97	—	—	—	87	—	—	—	207	6	—	—	100	7	—	—
7th	562	99	9	19	8	50	34	—	25	1	1	1	262	39	70	11	58	—	6	12	77	7	4	7	114	9	4	15	98	16	21	75
23d	579	136	20	22	10	78	41	4	43	3	—	2	447	124	71	14	46	14	24	2	28	5	2	8	93	9	4	15	78	9	12	65
33d	424	392	70	25	9	27	20	3	59	21	—	2	326	38	74	20	89	16	7	1	89	10	4	5	110	3	1	18	102	11	21	89
1st	771	173	23	12	11	110	74	—	22	—	1	1	492	113	80	21	53	8	9	1	44	1	7	8	96	6	8	14	58	4	1	7
19th	548	102	9	16	8	63	46	2	42	1	1	1	332	56	70	16	53	6	9	3	60	4	—	5	113	1	5	15	72	9	9	70
77th	736	169	31	18	5	32	16	4	110	3	4	—	510	54	48	18	37	3	5	2	76	4	3	6	96	4	7	22	117	9	7	31
88th	624	312	17	19	8	11	8	—	7	—	2	1	896	39	62	22	—	—	2	7	56	2	4	7	164	3	4	21	157	12	8	39
Grenadier Guards ...	487	85	9	45	11	7	6	—	—	—	5	4	334	28	138	26	88	4	18	6	45	3	8	14	157	13	10	22	—	—	14	106
Coldstream Guards...	478	163	11	19	20	47	21	2	53	3	2	—	609	56	103	16	43	6	13	4	40	6	4	5	115	1	5	11	164	11	18	42
Scots Fusiliers.....	553	145	17	24	12	43	29	1	76	—	1	1	400	35	108	22	15	—	8	7	6	1	3	10	60	6	10	18	101	7	14	77
Totals	14959	6179	919	531	242	1007	623	28	1294	106	42	32	11098	1057	1648	384	1034	82	184	78	1887	126	94	172	2960	111	132	365	2323	212	239	1059
Per cent. on aver. strength		41.3	6.1	3.6	1.6	6.0	4.1	—	8.6	0.7	—	—	74.1	7.0	11.0	2.5	6.9	—	1.2	—	12.7	—	—	—	19.1	—	—	2.4	—	—	—	—
Per cent. on admission for each disease.....		—	14.7	8.6	3.9	—	61.8	1.7	—	8.2	3.1	2.5	—	9.5	14.7	3.4	—	7.8	17.6	7.8	—	6.1	4.9	9.0	—	3.7	4.4	12.3	—	9.1	10.0	45.1

APPENDIX.—TABLE II.

Sickness and Mortality amongst the Troops who served only in the Crimea.

Number of the Regiment.	Average strength during the period.	FEVERS.				CHOLERA.			SCORBUTIC DISEASES.				ENTERIC DISEASES.				FROST-BITE.				PULMONARY DISEASES.				ALL OTHER DISEASES.				WOUNDS AND INJURIES.			
		Admitted into Hospital in the Crimea.	Died in the Crimea.	Died at Scutari.	Invalided.	Admitted into Hospital in the Crimea.	Died in the Crimea.	Died at Scutari.	Admitted into Hospital in the Crimea.	Died in the Crimea.	Died at Scutari.	Invalided.	Admitted into Hospital in the Crimea.	Died in the Crimea.	Died at Scutari.	Invalided.	Admitted into Hospital in the Crimea.	Died in the Crimea.	Died at Scutari.	Invalided.	Admitted into Hospital in the Crimea.	Died in the Crimea.	Died at Scutari.	Invalided.	Admitted into Hospital in the Crimea.	Died in the Crimea.	Died at Scutari.	Invalided.	Admitted into Hospital in the Crimea.	Died in the Crimea.	Died at Scutari.	Invalided.
47th	637	294	32	13	4	22	16	2	185	10	1	—	399	26	43	18	37	—	2	6	93	2	2	16	98	1	2	16	95	4	6	42
20th	532	275	31	18	7	12	5	1	77	15	5	2	528	34	68	23	109	15	7	3	90	13	2	8	152	4	2	19	195	15	19	54
21st	582	345	37	14	17	26	17	1	54	2	—	—	618	62	74	20	36	—	9	1	27	4	4	8	149	9	4	10	133	14	7	30
57th	715	90	7	6	8	41	17	—	73	—	—	—	385	29	31	8	73	1	9	2	68	3	1	3	111	1	3	9	133	8	3	35
68th	503	75	5	12	6	10	6	—	63	—	—	1	1372	39	54	10	12	—	2	4	22	2	4	2	418	1	5	13	70	20	2	17
68th (detach.)	154	67	2	—	—	1	—	—	3	—	—	—	172	—	—	—	1	—	—	—	56	1	—	—	59	—	—	—	12	—	—	—
63d	448	84	48	32	11	—	—	1	—	—	—	4	245	95	91	18	—	—	11	4	28	12	6	10	146	21	17	19	99	7	8	32
62d	430	200	24	5	3	34	23	—	19	1	—	—	415	35	29	12	41	6	1	1	101	5	4	1	123	2	3	7	16	—	—	—
9th	309	37	1	3	3	108	77	—	7	—	—	10	369	33	41	19	40	—	7	5	37	2	1	4	128	—	4	8	28	4	—	3
46th	378	184	36	19	12	304	113	—	29	—	2	1	547	79	106	21	92	—	7	7	82	3	5	9	292	23	5	25	43	5	2	9
97th	646	129	18	10	9	132	63	—	17	—	1	1	299	81	59	19	35	1	10	1	10	3	2	2	104	1	2	7	39	4	4	2
89th	433	42	3	9	3	40	40	—	4	—	—	1	568	62	39	14	100	—	4	6	71	—	2	2	134	2	3	9	34	4	2	3
17th	561	116	5	9	2	21	16	—	—	—	—	—	430	30	6	1	83	3	3	2	53	1	1	—	110	1	4	3	33	3	—	1
34th	504	84	6	3	6	46	34	—	—	—	—	—	257	9	15	5	31	—	5	2	82	2	3	1	104	1	2	4	48	2	2	3
90th	419	79	7	15	2	55	26	—	9	—	2	—	285	49	19	7	91	7	20	4	7	2	—	1	80	1	2	10	36	3	3	1
71st	330	163	10	5	—	3	2	—	—	—	—	—	78	—	—	2	1	—	—	—	13	—	—	—	84	—	—	1	6	—	—	—
14th	423	129	2	1	—	6	2	—	—	—	—	—	318	—	—	2	3	—	—	—	166	—	—	3	209	3	1	1	47	1	—	—
39th	401	161	5	6	42	10	10	—	—	—	1	—	278	3	6	5	1	—	1	—	45	—	—	—	106	2	2	1	22	3	—	—
18th	475	226	15	6	4	—	—	—	—	—	—	—	186	10	9	7	27	1	1	3	39	—	1	2	115	1	1	2	43	2	—	—
Totals	8880	2780	294	186	139	872	467	5	540	28	16	18	7750	686	690	211	810	34	99	51	1110	55	38	72	2671	74	62	164	1132	99	58	232
Per cent. on aver. strength		31.2	3.3	2.0	1.5	9.8	5.2	—	6.1	—	—	—	86.1	7.7	7.7	2.3	9.0	—	1.1	—	12.3	—	—	—	30.0	—	—	1.8	—	—	—	—
Per cent. on admission for each disease		—	10.5	6.7	5.0	—	53.5	—	—	5.1	2.9	3.3	—	8.8	8.9	2.5	—	4.1	12.2	6.6	—	4.0	3.4	6.4	—	2.7	2.3	6.1	—	8.6	5.8	20.4